DYNAMICS OF UNDERGROUND ECONOMY IN SIERRA LEONE AND MACROECONOMIC POLICY IMPLICATIONS

Michael Nyong
University of Calabar,
Department of Economics,
Nigeria
nyongmike@gmail.com

Abstract

An important challenge to development policy making in Sierra Leone is the conspicuous absence of credible statistic and systematic evidence on the underground economy. Despite of the fact that activities of the underground economy are wide ranging knowledge of the size, trends, causes, and dynamics of the underground activity are scanty and remain inadequate. In this study an attempt is made to estimate the size of the underground economy of Sierra Leone for the period 1960-2015, and investigate the implications for macroeconomic policy. The results revealed that the relative size of the underground rose from 58.8% in 1960 to 62.05% in 1968, fell slightly to 58.2 in 1980, rose sharply to 75% in 2000 and fell moderately to 73.9% in 2015. The mean size of the underground economy was estimated at 64.97%. The relative size was fairly stable at 60% between 1960-1989, rose rapidly to 71.9% on average during the civil war years 1990 -2001 and fell marginally to 69.2% during the period 2002-2015. The mean tax evasion was estimated at 4.34% of GDP. The estimated value for extent of tax evasion is large and should not be ignored given that the actual mean tax revenue during the period was about 11.36% of GDP. The results revealed cointegration between formal GDP and underground economy GDP. Causality test between the formal economy and the underground economy indicates bi-directionality with causality running from both ways (from RGDP and URGDP). The policy implications of the study were also articulated. Overall, the estimates for the underground economy in Sierra Leone are considerably larger than those obtained for other African countries (Zimbabwe 30.35% 1980-2009, Tanzania 36.93% 1968-1990, South Africa 9.5% 1966-2002, Ghana 40% 1983-2003). This is not surprising given the

collapse of infrastructure and other formal support services arsing from more than a decade long civil war.

Key Words

Underground economy; macroeconomic policy; Sierra Leone.

INTRODUCTION

The term underground economy is synonymous with informal, black, shadow, or second economy. Although there is as yet no precise definition of the term, a common definition used is" unmeasured and untaxed economic activity" that takes place in a country. It refers to economic activities, visible or invisible, irregular, parallel, and hidden that operate outside the purview of government regulation. Smith (1994) defines underground economy as "… all economic activities according to national income conventions but are presently not captured by official national accounts statistics and may be broadly conceived as consisting of three categories: informal sector, parallel and black market activities".

   Given that economic policies are motivated by realistic estimates from "the national account", the under reporting of economic activities in the underground economy may lead to misleading policy strategy (Bagachwa, Naho, 1995). Unreported economic activities in the underground economy means that macroeconomic variables namely consumption, investment, imports, exports, fiscal pressure, and debt burden estimates will be understated and may lead to fallacious conclusion. As seen in Ahumada et al. (2006) an underestimation of gross domestic product (GDP) will suggest an overvaluation of fiscal pressure, debt burden, public deficit/GDP ratios while per capita GDP would be undervalued. As a result government may not see the need and urgency to fashion or design "appropriate macroeconomic policies for optimal" macroeconomic management (Thomas, 1999). Furthermore, it is meaningless to analyze income distribution in a country without taking into consideration the underground economy incomes.

   Inspite of the critical importance of the underground economy in Sierra Leone, inadequate work has been done to estimate its size and determine its implication for tax yield and other macroeconomic policy concerns. This has become necessary because of the widening budget deficit, high level of smuggling, and dwindling revenue from diamond, the country dominant mineral export commodity. Annual production estimates of diamond varies "between $70-$250 million; however, only a fraction of that passed through formal export channels (1999: $1.2 million; 2000: $16 million: 2001: projection $25 million)" as indicated in UNDP (2016). The balance is smuggled out and is said to have "been used to finance rebel activities in the region, money laundering, arms purchases, and financing of other illicit activities". Although Soltani-Koroma (2016) and Korsu & Amoah (2015)

have attempted to estimate the size of Sierra Leone underground economy, the coverage was limited. For instance, Soltani-Koroma provided estimates of composition and size of the underground economy for two years period 2013-2014 using results "from the 2004 Population and Housing Census and the 2011 Sierra Leone Integrated Household Survey". Korsu and Amoah (2015) provided estimates of the size of the underground economy in Sierra Leone for the period 2003-2012 and its tax revenue impact. The study was part of a larger study that incorporated all the 15 West African countries in "Economic Community of West African States" (ECOWAS). In both studies there was no explicit attempt to link the underground economy to the formal economy to determine the direction of causality. Moreover, studies on the underground economy in Sierra Leone is still scanty. There is limited knowledge of the size, trends and dynamics of the underground economy in Sierra Leone. The underground economy in Sierra Leone, like in many other developing countries, "still remains an enigma as it has neither been comprehensively studied nor understood" (Ogbuagbor, Malaolu 2013).

The objectives of this paper are to (i) determine the size of the underground economy of Sierra Leone and its trends from 1960 to 2015, as well as its major determinants, (ii) examine the extent of tax revenue lost due to the underground economy, (iii) investigate the cointegration and causal relations between the underground economy and formal economy, On the basis of results obtained in (i), (ii) and (iii) this paper will attempt to derive key macroeconomic policies for sustainable economic growth and development in Sierra Leone.

The rest of the paper is organized in four sections. First section has been the introduction. In second section we present a brief literature review and the theoretical underpinning. Third section articulates the analytical methodology. In fourth section the empirical results and analysis are presented. The last section concludes together with some macroeconomic policy implications.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

One of the major challenges of studies on the underground economy pertains to measurement without theory (Koopmann 1947; Thomas 1999). According to Koopmann (1947) the challenge of theoretical void has led to "measurement without theory" approach. Thomas (1999) was more specific. According to him empirical studies on the underground economy were carried out without any theoretical anchor. The results have been "that measuring the size of the underground economy has been an end" in itself, rather than a means to investigating the fundamental issues of how it relates to the formal economy.

Fortunately for us four dominant theoretical perspectives on the underground economy do exist. These are the dualist school of thought, the structuralist, legalist, and the voluntarist school. The dualist school of thought insists that the underground economy emerges "as a result of the failure of the formal" economy to "absorb the entire labour force". The underground

economy consists of marginalist activities and not related to the formal economy. It operates to provide income "to the poor and safety-net in times of crisis" (ILO, 1972; Hart, 1973; Sethuraman, 1976; Tokman, 1978). Thus, the underground economy is a separate economy not related to the formal economy, its role being to provide a "survivalist" safety- net for the poor (ILO 1972). The dualist school of thought may be seen as a reaction to the apparent failure of the Lewis (1954) prediction "that economic development in developing countries would, in the long-run, generate enough modern jobs to absorb surplus labour from the agrarian/traditional economy" (Chen, 2007; Chen, 2012). Consequently, it is recommended that government should promote a relation between them. Fighting unemployment in the formal economy may be one way of addressing the problem. Promoting productivity in the informal economy may be another.

The structuralist school of thought brings a new dimension to the causes of the emergence of the underground economy. The struturalists (Moser, 1978; Taylor, 1979, 1983, 1989; Castells, Portes, 1989; De Soto, 1989, MacAfee 1989; La Portes et al., 1989; Kelley, 1994) maintain that the underground economy consists of surbordinated micro-enterprises and workers and that it serves to reduce input and labour costs, thereby increasing competitiveness of large corporations. It subscribes to the dependence between the formal and underground economy because history, institutions and politics make some structures more likely than others. It insists that lack of employment in the formal economy stimulates demand for underground economic activity. It added that the formal and underground economies may be competitive. Harding and Jenkin (1989) insist that not only does the underground economy promote competition it also "reduces pressure on wages, stimulating economic growth while keeping inflation low". However, the existence of the underground economy may weaken any stimulating influence of the Keynesian demand management policies (Kelley, 1994). Therefore, the underground economy should not be relied on to promote growth and reduce poverty.

Legalist school of thought focuses on over-regulation. It maintains that over-regulation in the official economy is a major determinant of the existence of the underground economy. According to the legalists, operators in the underground economy find it difficult to comply with formal economy taxation and bureaucratic red tapes. They avoid these over-regulations by operating in the underground economy, thereby reducing costs and increasing wealth. It is suggested that government should do nothing but adopt a laissez-faire attitude to the underground economy which will die a natural death in the long run as the formal economy grows.

The voluntarist school of thought see underground economy as small and medium scale "entrepreneurs who deliberately seek to avoid" government regulation and taxation. Contrary to legalist school, it does not attribute growth of the underground economy to cumbersome bureaucratic red-tapism. The school maintains that underground economy "enterprises create unfair competition for" official "enterprises because they avoid formal regulations, taxes, and other costs of production" (Chen, 2012). In terms of macroeconomic policy it recommends the integration of the underground

economy with the formal economy under government. This will widen the tax base, increase tax productivity, reduce the unfair competition to formal businesses, and generate enough revenue for growth and development of the entire economy.

   Thus, on the strength of these competing schools of thought it is not clear which one best explains the underground economy in Sierra Leone. Whereas the dualist maintains that there is no relationship between them, the structuralists favour surbordination and dependence while the legalists insists on over-regulation. It is not at all clear which of these four competing schools of thought best explain the behaviour of the underground economy in Sierra Leone. Furthermore, given heterogeneity of the underground economy, there is merit to each of the perspectives. However, the Sierra Leone experience may be more heterogeneous and complex than any one perspectives would suggest. Besides the critical question is not just about integrating the two economies (i.e. formalizing the underground economy) since the underground economy has come to stay but rather that of decreasing the cost of working in the underground economy and increasing the benefits of working in the official economy (Chen, 2007).

UNDERGROUND ECONOMY IN SIERRA LEONE: NATURE AND COMPOSITION

The underground economy in Sierra Leone is large and heterogeneous. It consists of small scale economic activities both in the urban and rural areas. Some of these include street vendors in Freetown, Kenema, Bo, Makeni, Pujehun, Koidu and Kallahun. Others include garbage collectors, roadside barbers, hair dressers, motor cycles and motor repairers (mechanics), tailoring, shoe repairers (cobblers), illegal artisinal mining (in gold and diamond), prostitution, drug trafficking (cocaine and marihuana). Other specific economic agents operating in the underground economy include, caterers, petty traders and blacksmiths. Other categories of operators include casual workers, restaurants and hotels, security guards, temporary office helpers, and small-scale agriculture ventures. Some others include illegal foreign exchange dealers (black market for foreign exchange), money lenders, smugglers of contraband goods, gold and diamonds across the porous Sierra Leone borders with Guinea and Liberia.

  According to Partnership Africa Canada (2006) about "50% of Sierra Leone 's diamond were smuggled annually". Consequently, the government is losing revenue from smuggling in Gold. According to Bank of Sierra Leone (2009) there was a drop in gold production level in 2009 from 6150 Troy Ounces in 2008 to 5060 Troy Ounces in 2009 due partly "to drop in mining activity and partly to increased smuggling as the Government of Sierra Leone raised the duty higher than" its neighbours. According to Federico (2007) Sierra Leone has the potential of being one of the richest (from gold and diamond) countries in the world. Unfortunately "it remains one of the world's poorest countries". The revenue accruing from mining is not being redistributed to benefit the larger population in Sierra Leone.

The illegal foreign exchange market attracts a number of young men popularly called "dollar boys". The dollar boys are part of a poorly paid army that trades foreign exchange in Sierra Leone where hard currency is scarce and labour is cheap. The underground trade in foreign exchange is one of the pillars of the state economy providing traders and companies with access to foreign exchange that the Bank of Sierra Leone cannot satisfy. One of the reasons the Sierra Leone economy has not collapsed is that the underground economy fills the gap, particularly the dollar boys who provide critical service to everyone from small-time traders to larger scale-importers. Indeed the underground economy has become a "reserve army of the unemployed".

Table 1 shows the sectoral distribution of economic activity in Sierra Leone underground economy. The figures are adapted from Soltani-Koroma (2016) report of the informal economy in Sierra Leone. The report was based on "2004 Sierra Leone Population and Housing Census and the 2011 Sierra Leone Integrated Household Survey (SLIHS)". The survey of the informal economy included unregistered establishment, households unincorporated enterprises and unregistered employ-ment without social security. The economy was divided into four major sectors namely agriculture, industry, services and Financial Intermediation Services Indirectly Measured (FISIM). These are in turn sub-divided into 20 sub sectors (Agriculture 4, Industry 5, Services 11). Table 1 revealed that underground agricultural output was about 83 percent of formal economy GDP in 2013. This increased marginally to 83.3 percent in 2014. While the output of the services was 31.9 percent of formal economy services in 2014, the output of small scale industries was about 66.6 percent of formal economy industry GDP in 2014. Overall, the size of the underground economy was estimated at 60 percent of GDP in 2013 and 59.6% in 2014.

Table 1: Underground and formal economy GDP at current market prices (million leones)

Economic sectors	2013			2014		
	FGDP	UGDP	UGDP/FGDP	FGDP	UGDP	UGDP/FGDP
1.Agriculture	**5,588,797**	**4,639,988**	**0.830**	**6,133,399**	**5,110,058**	0.833
Crops	3,657,545	2,648,567	**0.724**	3,917,107	2,836,526	0.724
Others	1,931,252	1,991,421	**1.031**	2,216,292	2,273,532	1.026
2.Industry	**2,836,112**	**1,897,581**	**0.669**	**3,070,694**	**2,043,718**	0.666
Mining & Quarrying	2,478,408	1,652,272	**0.667**	2,697,101	1,798,067	0.667
Others	357,704	245,309	**0.686**	373,594	245,651	0.658
3.Services	**4,406,873**	**1,438,736**	**0.326**	**4,785,225**	**1,525,859**	0.319
Wholesale & Retail Trade	1,009,194	567,671	**0.563**	1,086,281	605,408	0.557
NPISH	140,609	52,080	**0.370**	147,686	54,634	0.370
Others	3,257,070	818,984	**0.251**	3,551,258	865,817	0.244
4.FISIM	**229,325**	**22,681**	**0.099**	**251,031**	**24,827**	0.099

5.Total value added	12,602,457	7,953,624	0.631	13,738,287	8,660,808	0.630
GDP	13,309,395	7,990,832	0.600	14,602,453	8,706,290	0.596

Notes: FISIM = Financial Intermediation Services Indirectly Measured; NPISH=Non-profit Institution Serving Household.
Source: Adapted from Soltani-Koroma (2016).

Table 2: Gender distribution of employment in underground economy 2011

Age	Male	Female	Total (A)	Formal (B)	% Formal (A/B)
15-19	78,823	94,777	173,600	131,459	132.0564
20-24	78,252	107,855	186,107	169,655	109.6973
25-29	100,795	195,697	296,492	288,517	102.7641
30-34	93,038	158,506	251,544	288,497	87.1912
35-39	133,618	178,455	312,073	303,302	102.8918
40-44	94,887	111,475	206,362	207,292	99.55136
45-49	99,790	78,980	178,770	179,933	99.35365
50-54	71,785	73,064	144,849	149,003	97.21214
55-59	50,958	38,313	89,271	84,729	105.3606
60-64	36,353	27,263	63,616	62,439	101.885
65+	73,307	42,167	115,474	104,610	110.3852
Total	911,606	1,106,552	2,018,158	1,969,436	102.4739

Source: Adapted from Soltani-Koroma (2016).

Table 2 shows the gender and age distribution of employment in the underground economy in 2011. Results from the Table indicate that more than 50 percent employment in the underground economy are youth in the age grade brackets 15-39. Although workers in the underground economy include both men and women, majority of the workers are women who constitute more than 55 percent of total workforce (SLIHS 2011). Women are the major actors in the underground economy in most of the age categories particularly age group 15-19, 20-24, 25-29 35-39, 55-59, 60-64 and 65+. With an estimated population of 5.6 million in 2008 and about 935,800 households, the underground economy accounts for about two-thirds of the total labour force, and 70 percent of urban labour force (GSO, 2005). About 65 percent of the labour force are rural and 80 percent of rural sector are engaged in subsistence agriculture. Because of the absence of employment in the formal economy the youths have "struggled to find viable sources of income" in the underground economy where there is only limited infrastructure (GSO 2005).

Ulandsskretariat (2014) observed that the underground economy of Sierra Leone only absorbs "9% of the labour force". In 2014 it was estimated that the underground economy "employs 2 million people (92%) of the economically active population, about half of whom are women". Consistent with findings in other developing countries, "Sierra Leone's underground economy cuts across both the rural and urban informal 'sectors'". As seen in Table 1 the single largest sector employer of labour is agriculture. About

70% of the rural population are employed in the agricultural sector, followed by wholesale, retail, petty trading and artisans activities. From the above analysis it is obvious that the underground economy in Sierra Leone is large and increasing.

EMPIRICAL LITERATURE

There some fairly recent studies that have attempted to identify the major drivers of the underground economy. It is observed that the underground economy is bound to grow in countries where rural communities suffer from high levels of inequality in income and political participation (De Ferranti et al., 2003; Perry et al., 2006). Perry et al. (2007) maintain that these countries are often plagued by elite capture "exercised by both elites and organised segments" of the middle class. Perry et al. (2007) points out that state capture leads to the generalised perception that the state is run for the benefit of the few, thus it reinforces a social norm of non-compliance with taxes and regulations, what might be dubbed a 'culture of informality'."

This view is affirmed by Putzel et al. (2014) who maintain that elite capture of resources has severe repercussions for creating equitable and effective resource governance systems. The implication of Putzel et al. (2014) findings suggests the need for improve on the quality of government institutions in service delivery.

Cambwera et al. (2011) focus on regulation. According to them government laws and regulations may exclude certain economic agents from the formal economy due to high cost of registration, burdensome bureaucracy and corruption. Small scale entrepreneurs do not earn enough profit "to justify these costs". Consequently, informality becomes a logical response for them(Perry et al., 2007). Del Pozo-Vergnes (2013) in Benson et al. (2014) introduced a new dimension to drivers of underground economy: ethnic political exclusion. He posits that exclusion takes place along class and ethnic lines, as "the ruling elites capture resource access regimes and systematically marginalise other groups".

Perhaps, one of the most important driver of informality is poverty (and the ensuing desire to diversify income). Another is unemployment. Underground activities are regarded as possible escape route out of poverty (Barrett et al. 2001). According to Becker (2004), Palmer (2007) Jobseekers, particularly the rural youths, turn to the informal sector if they cannot find work in the formal labour market. The economy also provides a cushion for "employment during global downturns" (Chambwera et al., 2011). Availability of cheaper good is regarded as another important factor. Low-income consumers' demand for affordable and cheap goods motivate informal production and trading of some products. Chambwera et al. (2011) reveal that rural operators and local communities frequently "capture higher economic benefits from informal activities as opposed to formal ones".

There are some few studies on the underground economy in Africa. In Ghana, Ocran (2009) investigated the evolution of Ghanaian underground economy in the period 1960-2007. Using the currency demand analytical

framework the results revealed that the size of the underground economy increased from 14% in 1960 to 18% by 1977 and to about 30% during the period 2003-2004. The Ghanaian results are substantially higher than those obtained for South Africa by Saunders and Loots (2005). The South African results revealed that the size of the underground economy averaged about 9.5% during the period 1967-1993, fell to 7.2 percent during the period 1967-1993 and 8.4 of recorded GDP during the period 1994-2002. A related study by Saunders (2005) indicated an average relative size of the informal economy at 9.5 % of GDP.

In Tanzania Bagachwa and Naho (1995) estimated the size of the second economy to determine the extent to which the official GDP misrepresent or under-report total production of goods and services in the country. Their empirical estimates based on Tanzi currency demand approach indicate that the second economy is large and increasing and should not be ignored. The average relative size of the second economy to official economy was estimated at 36.93 % during the period 1968-1990.

Similarly, in Malawi Chipeta (2002) used "Tanzi currency demand approach" to estimate the size of Malawian underground economy in the period 1965-1990. The findings revealed a low size for the second economy at 7.2% in 1972 and rising to 39.1% by 1990. The overall average relative size was estimated at 15.87% during the period 1965-1995. Chipeta study further shows that tax evasion as percentage of actual total tax revenue rose from 9.54 percent in 1972 to 15.3 percent in 1981. By 1986 it has risen to 39.4 percent, more than twice its value in 1981. In 1990 the proportion of tax evasion to actual total tax revenue had risen to about 59.6%. A similar empirical study by Makochekanwa (2010) on Zimbabwe's second economy using the currency model produced much higher results than Malawi case. The results indicate an average relative size of the second economy of Zimbabwe at about 30.35 % of measured GDP during the period 1980-2009.

In Nigeria Ogbuagbor and Malaolu (2013) investigates the size and development in the informal economy of Nigeria using error correction multiple indicators multiple causes (MIMIC) or (EMIMIC) for the period 1970-2010. Their results revealed that the size of the informal economy averaged about 64.6 of GDP and that "unemployment, tax burden, government regulation and inflation were critical drivers of informality".

In Sierra Leone one can explicitly identify two main studies on the underground economy namely Korsu and Amaoh (2015) and Soltani-Koroma (2016). While Soltani-Koroma attempted to measure the size of the underground economy without any theory (i.e measurement without theory) and estimated the relative size of the underground economy at about 60 % in 2013, and 59.6 % in 2014, Korsu and Amaoh estimated the underground economy for 15 West African countries including Sierra Leone for the period 2000-2012 using annual data. The method used was the Arrelano and Bond (1991) dynamic panel generalised method of moments (GMM). The results indicate that the size of the underground economy of Sierra Leone during the period 2003-2012 varies between 23.2 percent to 41.0 percent of official GDP with a coefficient of variation of about 0.206 (standard deviation 5.395,

mean 26.20). In both cases the studies suffer from inadequate coverage. Only very few years are covered. Given the economic and political crisis that Sierra Leone suffered, the estimates are too low and unrealistic and need to be revisited. Furthermore, none of the two studies (Korsu, Amaoh, 2015; Soltani-Koroma, 2016) considered some critical macroeconomic policy questions: To what extent is the flight underground detrimental to the growth of the formal economy of Sierra Leone? What is the relationship between underground economy and official economy business cycles? What is the role of the quality of formal institutions on underground economy? Beyond the tax evasion arguments, the issues of direction of causality and cointegration are important for policy purposes.

ANALYTICAL METHODOLOGY

Studies on underground economy have relied on one of four approaches. These include direct method, the indirect method, the indirect currency approach and the model or multiple indicators multiple causes (MIMIC) method. However, the problem with direct approach (survey and tax audit methods) is it provides only point estimates (Schneider, Enste, 2003). The indirect approach which is based on the discrepancy between the estimates of GDP using income approach and using expenditure approach assumes that the two approaches are independent. Unfortunately, in Sierra Leone the expenditure approach and the income approach are dependent. The monetary method of Guttmann (1977), Fiege (1979) and Tanzi (1980, 1982, 1983) assumes that cash is used predominantly in conducting business in the underground economy, and that "high taxes" and harsh "business regulatory framework are important causes of informality". Unfortunately It rests on the questionable assumption "that the velocity of circulation of money in the underground economy" and formal economy are the same.

The model approach (Giles,1999a,1999b; Frey, Schneider, 2000; Schneider, Enste; 2003) or MIMIC method maintains that the underground economy is "unobservable variable" which is affected by a host of factors including tax burden, regulation, unemployment and high transaction costs etc. This approach has been criticised on several grounds particularly with regards to its unsuitability for economic problems as it was designed for "psychometric application and to measuring intelligence seems far removed from measuring underground economy" (Breusch, 2005b). It is an "unconvincing framework for measuring the underground economy." Furthermore, MIMIC approach, despite its sophistication, suffers from conceptual flaws, and apparent manipulations of results. According to Breusch the MIMIC approach should not be applied in estimating the size of the underground economy. Its use is therefore misguided. In this study we adopt a modified currency demand model of Tanzi and Guttmann as indicated in Giles (1999a, 1999b). It does not depend on the questionable assumption that the underground economy and the formal economy have the same velocity of circulation of money. Instead we assume

that the total demand for currency (CU) is the sum of the demand in the official economy (CUO) and demand in the underground economy (CUU).

$$CU_t = CUO_t + CUU_t$$

From the Keynesians and monetarist theories of the demand for money we have:

$$CUO_t = \Theta_0(Y_{ot})^{\Theta 1}(R)^{\Theta 3}(INF)^{\Theta 4}$$

But since the demand for money in the underground economy is for transaction purposes only we must have:

$$CUU_t = (Y_{ut})^{\Theta 2}$$

Combining above equations we obtained the total demand for currency:

$$CU_t = \Theta_0(Y_{ot})^{\Theta 1}(Y_{ut})^{\Theta 2}(R)^{\Theta 3}(INF)^{\Theta 4}$$

where Y_{ot} = measured official real output, Y_{ut} = underground real income, R = short term interest rate, INF = inflation rate. These are the usual variables in the conventional money demand function.

From the theories on the underground economy articulated in the previous section, we specify the ratio of output of underground economy to measured official output to be a function of tax rate (TAXY or ratio of tax revenue to GDP) reflecting tax burden, real income, ratio of government expenditure to GDP (GOY) or government size, real per capita income (PCI), openness to international trade (TOP), exchange rate depreciation (EXR) and quality of institutions (QI). The fiscal variable TAXY has been used by many studies as a critical factor inducing people to involve themselves in the underground economic activities(Saunders, 2005; Buehn, Schneider, 2008; Macias, 2008; Ogbuagbor, Malaolu 2013, Asiedu, Stengos, 2014; Korsu, Amaoh, 2015). Some others have used the marginal tax rate but non availability of data for this variable precludes its use in this study. We use government size (GOY) as an indicator of efficiency and bureaucracy. Excessive government regulation is said to encourage underground activities, "delaying procedures and services". It constitutes one of the basis for government corruption. Trade openness (TOP) encourages importation of contraband goods which are usually smuggled into the economy. This leads to an increase in the activities of the criminal elements of the underground economy. Quality of government institution and good governance (QI) is measured by contract intensive money ((M2-CU)/M2). It captures enforceability of contracts and security of property rights. QI indicates confidence and trust in dealing with other parties. If this trust exists then investment would be higher as a greater proportion of money would be held in financial institutions. Higher values of QI is indicative of greater respect for property rights and strong contract enforcement. The QI variable is expected to have a negative effect on the underground economy. Exchange rate (EXR) variable is another factor. In

expectation of exchange rate depreciation savers will tend to hold more stable foreign currency. Exchange rate depreciation weakens the domestic currency, stimulates underground market for foreign currencies and other illegal activities such as smuggling, under-invoicing of exports and over-invoicing of imports. The determinants of underground economy are specified as:

$$\frac{Y_{ut}}{Y_{ot}} = \psi_1 + \psi_2 TAXY_t + \psi_3 LY_{ot} + \psi_4 LPCI + \psi_5 GOY + \psi_6 TOP_t + \psi_7 LEXR +$$

$$+ \psi_8 DWAR + \psi_9 QI_t ,$$

where $\psi_1, \psi_2, \psi_3, \psi_4, \psi_5, \psi_6, \psi_7, \psi_8, > 0, \psi_9 < 0$ and L before a variable means natural logarithm. A civil war dummy (DWAR) is added in view of the fact that during war time underground economic activities is expected to increase. All the variables are expected to have a positive sign except QI which is expected to carry a negative sign. Solving for Y_{ut}, putting the value into above equation and taking logarithm of the results we obtain:

$$LCU = L\Theta_0 + (\Theta_1 + \Theta_2) LY_{ot} + \Theta_2 L\{\psi_1 + \psi_2 TAXY + \psi_3 LY_{ot} + \psi_4 LPCI + \psi_5 GOY +$$

$$\psi_6 TOP_t + \psi_7 LEXR + \psi_8 DWAR + \psi_9 QI\} + \Theta_3 LnR_t + \Theta_4 LnINF_t + \Theta_5 DWAR + e_t,$$

where $\Theta_1, \Theta_2, \Theta_4, \Theta_5 > 0$, $\Theta_3 < 0$ and INF = inflation rate, GOY = government size measured by ratio of government expenditure to GDP, and DWAR = dummy variable to capture the civil war years 1991-2001. As earlier indicated we expect the war years to lead to greater underground activity. It should carry a positive sign. It takes the values of unity for each year during the civil war years and zero in any other years. The exchange rate variable (EXR) is the amount of Leone per $1.00. The stochastic error term e is assumed to be white noise and unautocorrelated. The last equation is the nonlinear estimation equation. Estimated values for the parameters ψi, $i = 1, 2, \ldots, 8$ are used to obtain estimates of the relative size of the underground economy indicated in the equation before for the period 1961-2015. The estimated value for ψ_1 represents the equilibrium long- run average relative size of the underground economy. The absolute size of the underground economy is obtained by multiplying the relative size by the formal economy real GDP.

Tax Revenue Loss

The size of tax revenue loss due to the underground economy is calculated as:

$$TRUN_t = TAXY * Y_{ut}$$

This is the potential tax revenue loss because the operators in the underground economy do not pay tax.

Cointegration and Causality Tests

To determined if there is any long –run relationship between the underground economy and the formal economy we use Johansen and Juselius (1990), Johansen (1995) cointegration approach on Y_{ot} and Y_{ut} variables. This is done after determining the order of integration of the variables using augmented Dickey Fuller (ADF) test (Dickey-Fuller, 1979) and Phillip-Perron (PP) test (Phillip, Perron, 1988).

Cointegration test on long-run relationship between the formal and underground economy is carried out using Johansen and Juselius (1990) and Johansen (1995) approach.The direction of causality between Y_{ot} and Y_{ut} is determined using Toda and Yamamoto (1995) method which is superior to Granger (1969) causality approach. Whereas Granger causality is based on differencing leading one to run the risk of identifying wrong order of integration, Toda and Yamamoto is applicable, "irrespective of the order of integration and cointegration properties of the system".

According to Toda and Yamamoto (1995) this approach is valid provided k ≥ d, where k=lag length, d=maximum order of integration. The estimates were performed using EVIEWS 9.0

Data were obtained from World Bank World Development Indicators (WDI), Bank of Sierra Leone Annual Report and Statement of Accounts (2009, 2012, 2015), World Economic Outlook (WEO), and International Financial Statistics yearbook (1980, 1999). The results of the empirical estimates are presented in the next section.

EMPIRICAL RESULTS AND ANALYSIS

The empirical results are presented in Table 3 and 4. Table 3 presents the results from the nonlinear estimation of the currency demand equation using Gauss-Newton optimisation method with maximum iteration set at 500. The results are long-run estimates only. Attempt to include lagged dependent variable to estimate the short –run equation has not been successful. In any case the use of error correction models to estimate the short-run currency demand model is controversial (Thomas,1998; Asiedu, Stengos, 2014). The results show that 92 percent of total variations in the currency demand in Sierra Leone during the period 1960-2015 was explained by the independent variables in the equation. This shows high goodness of fit. Most of the explanatory variables have the expected signs, are statistically significant at better than 10 percent level. Thus, the demand for currency in Sierra is sensitive to changes in income, tax rate, government size, exchange rate, quality of government institutions, and to dummy variable measuring civil war years.

The results also supports Keynesian and monetarist theory of the demand for money where the principal factors namely income (transaction and

precautionary motives), interest rate (opportunity cost of holding financial assets) and inflation (opportunity cost of holding real goods) have the expected signs. Income is highly elastic with an income elasticity of holding currency at 46.64 percent. The statistical significance of the estimated elasticity $(c(3)=\Theta_2)$ confirms the existence of a significant underground economy in Sierra Leone. The results also show that the Sierra Leone civil war years led to significant hoarding of cash and hence to increase underground economic activity. The savings deposit rate variable is not significant probably because of the inclusion of underground economy in the currency demand model of Sierra Leone.

Overall, the model is well specified and the estimated parameters are reliable. There is no evidence of autocorrelation, heteroskedasticity, or non normality of the residual errors. The values for Durbin Watson (DW) Statistic, White heteroskedasticity F – Ratio and the Jarque Bera statistic are suggestive. The regression results are not spurious because the value for DW at 2.0249 is far higher than the adjusted R^2(0.915). The DW is within the vicinity of no autocorrelation as is the Breusch-Godfrey serial correlation Lagrange multiplier (LM) statistic at 2.103. All the F-statistic for test of heteroskedasticity Breusch-Pagan-Godfrey(1.016), Harvey(1.7555), Glejser(1.455) and ARCH(0.185) show no evidence of heteroskedasticity.

Table 3: Parameter estimates of the demand for currency

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	281.9202	533.442	0.5060	0.6154
C(2)	-3.5501	7.165238	2.4782	0.0171
C(3)	46.6428	20.0208	2.3297	0.0219
C(4)	0.6497	0.2138	3.0388	0.0013
C(5)	0.5887	0.3436	1.7131	0.0937
C(6)	2.1832	1.8045	1.2126	0.2317
C(7)	1.1124	0.4732	2.3465	0.0235
C(8)	-0.4368	0.2496	-1.7504	0.0871
C(9)	1.1633	.49207	2.3645	0.0225
C(10)	8.4823	2.2323	4.0210	0.0005
C(11)	-0.4735	0.2233	2.1205	0.0326
C(12)	-0.0617	0.0594	-1.0388	0.3045
C(13)	-0.0648	0.0269	-2.4083	0.0203
C(14)	0.1495	0.0719	2.0793	0.0441
Adjusted R^2	0.915042	S.D. dependent var		4.21816
S.E. of regression	0.130579	Akaike info criterion		-1.04626
F-statistic	5213.549	Durbin-Watson stat		2.02487
Prob(F-statistic)	0.000000	Schwarz criter		-0.61226

Jarque - Bera Statistic : 0.346
Breusch –Godfrey Serial Correlation LM test: F-ratio 2.103 Prob. F(2,42) 0.135
Breusch-Pagan-Godfrey heteroskedasticity test: F-ratio 1.016 Prob. F(9,46) 0.442
Harvey Heteroskedasticity test: F- ratio 1.7555 Prob., F(9, 46) 0.103
Glejser Heteroskedasticity test: F-ratio 1.4559 Prob. F(9, 46) 0.193

ARCH Heteroskedasticity test: F-ratio   0.1885   Prob. F(1,53)   0.668
Source: Own calculations.

   From the results presented in Table 3 three important facts of general interest emerged. First, the underground economy in Sierra Leone is driven by regulation and taxation (taxy and goy). This is consistent with the views expressed by the legalist and voluntarist schools of thought. Second, the quality of institutions and good governance (QI) is important in reducing the size of the underground economy. Thus, policies to promote good governance, quality of government institutions and trimming the size of government are critical in reducing the size of the underground economy. Third, during the war time much underground economic activity took place in Sierra Leone. Finally, the long – run average size of the underground economy relative to the formal economy is estimated at 64.97 percent (ψ_1 = c(4)) during the period 1960 – 2015.
   From the foregoing results the relative size of the underground economy to formal economy is estimated and presented in Table 4. The results show that the relative size of the underground economy rose from 58.8% in 1960 to 62.86% in 1968, fell to 58.18% in 1980, rose to 64.40% in 1990. By 2001 when the civil war ended the relative size of the underground economy has risen rapidly to 73.7% . It rose marginally to 73.91% in 2015. The relative size varies between 56.25% on the low side in 1983 to 74.11% on the high side in 2013. The mean value of the relative size of underground economy is estimated at 64.97% with a coefficient of variation of about 0.094. Similarly, the mean value of the extent of tax evasion at 4.44% is large and cannot be ignored given that the mean value of actual tax rate is about 11.36%.
 Table 5 highlights the dynamics of the underground economy. There are three troughs during which the relative size of the underground economy fell significantly, 1975 (57.78%), 1983 (56.25%) and 2002 (65.23%). The first two periods occur during the period of relative peace and stability in Sierra Leone under president Siaka Stephen, and the third trough occurred when the country was emerging from the civil war Whereas the average size of the underground economy was only 59.8% during the period 1960-1970, it rose significantly to 71.89% during the period 1991-2001 when civil war occurred. This reveals that underground economic activities in Sierra Leone was at its highest during the civil war years, was marginal during the period 1960-1970 and on the rise again during the period 2002-2015.

Table 4: Relative size of the underground economy and extent of tax evasion

Year	Relative Size of Underground (%)	Extent of Tax Evasion (% GDP)	Actual Tax Revenue (% GDP or TAXY)
1960	58.770	4.855	13.116
1961	58.787	5.051	13.642
1962	58.639	5.020	13.581
1963	59.245	5.543	14.899
1964	58.636	4.919	13.309

1965	58.926	4.421	11.923
1966	60.069	5.150	13.724
1967	60.120	5.782	15.400
1968	62.052	6.743	17.609
1969	61.860	5.498	14.386
1970	60.696	4.742	12.555
1971	60.971	5.868	15.492
1972	60.602	6.037	16.000
1973	60.302	4.940	13.131
1974	60.516	6.022	15.973
1975	57.784	5.527	15.093
1976	58.691	5.153	13.934
1977	59.713	5.451	14.579
1978	59.287	5.754	15.459
1979	58.582	5.526	14.958
1980	58.185	5.923	16.102
1981	60.159	6.889	18.339
1982	59.108	4.308	11.596
1983	56.251	2.782	7.728
1984	60.297	3.377	8.977
1985	59.254	1.722	4.628
1986	60.793	2.385	6.308
1987	63.191	6.266	16.183
1988	62.684	2.764	7.172
1989	61.120	1.178	3.105
1990	64.396	2.083	5.317
1991	72.844	3.148	7.470
1992	73.302	4.284	10.128
1993	74.219	5.042	11.834
1994	74.091	5.163	12.132
1995	73.563	3.833	9.042
1996	74.075	3.260	7.661
1997	73.770	4.208	9.911
1998	73.206	3.043	7.200
1999	72.271	2.641	6.294
2000	75.016	4.355	10.160
2001	73.737	3.812	8.982

2002	65.231	3.392	8.593
2003	65.933	3.307	8.322
2004	66.474	3.298	8.258
2005	66.859	3.285	8.197
2006	67.985	3.413	8.434
2007	69.612	3.232	7.876
2008	68.789	3.347	8.213
2009	68.467	3.419	8.412
2010	68.237	3.751	9.247
2011	69.057	4.464	10.928
2012	69.982	4.485	10.895
2013	74.108	5.690	13.367
2014	73.819	6.124	14.419
2015	73.910	6.749	15.881
Mean	**64.969**	**4.436**	**11.359**
STD	**6.098**	**1.349**	**3.655**
CV	**0.094**	**0.304**	**0.322**

Note: Data on actual tax revenue (% GDP) were computed from International Financial Statistics Yearbook (1981, 1986, 1998), World Economic Outlook(WEO), Bank of Sierra Leone Annual Report and Statement of Accounts (2000, 2012, 2015). STD=Standard deviation, CV= Coefficient of variation.
Source: Own calculations.

Table 5: Growth of the underground economy

Period	Relative Size of Under-ground Economy (%)	Average Tax Evasion (%)
1960 – 1970	59.80	5.25
1971-1989	60.09	4.50
1990 – 2001	71.89	3.80
2002 -2015	69.18	4.14

Source: Own calculations.

Table 6: Augmented Dickey-Fuller and Phillip Perron unit root tests

Variable	ADF			PP		
	Level	First difference	Decision	Level	First difference	Decision
RGDP	3.943	-4.416*	I(1)	3.089	-4.446*	(1)
URGDP	3.873	-4.967*	I(1)	3.873	-5.033*	I(1)

Notes: * significant at 1 % level.
Critical values ADF : 1% -3.555   5% -2.916   10% -2.596
                 PP : 1% -3.555   5% -2.916   10% -2.596
Source: Own calculations.

Table 7: Unrestricted cointegration rank test (trace)

Hypothesized	Trace	0.05	
No. of CE(s)	Statistic	Critical Valye	Prob**

None	16.7434*	15.4947	0.04696
At most 1	2.7518	3.8417	0.1549

Source: Own calculations.

Table 8: Unrestricted cointegration rank test (maximum eigenvalue)

Hypothesized No. of CE(s)	Max-Eigen Statistic	0.05 Critical Value	Prob**
None	9.9852	14.2646	0.2129
At most 1	2.7582	3.8415	0.1849

Source: Own calculations.

Table 9: VAR lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2921.629	NA	2.13e+47	114.6521	114.7279	114.6811
1	-2789.008	249.6391	1.37e+45	109.6081	109.8354*	109.6950
2	-2783.411	10.09642*	1.29e+45*	109.5455*	109.9243	109.6903*
3	-2780.850	4.418147	1.37e+45	109.6020	110.1323	109.8046
4	-2780.341	0.838922	1.57e+45	109.7389	110.4207	109.9994
5	-2775.903	6.961009	1.56e+45	109.7217	110.5550	110.0401

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
Source: Own calculations.

Table 10: Toda and Yamamoto causality test (wald tests)

VAR Granger Causality/Block Exogeneity Wald Tests

Dependent variable: RUGDP

Excluded	Chi-sq	df	Prob.
RGDP	11.36698	2	0.0034
All	11.36698	2	0.0034

Dependent variable: RGDP

Excluded	Chi-sq	df	Prob.
RUGDP	8.137333	2	0.0171

All	8.137333	2	0.0171

Source: Own calculations.

Table 11: Vector autoregression estimates

	RUGDP	RGDP
RUGDP(-1)	0.108656	-1.198284**
	(0.35726)	(0.42973)
	[0.30414]	[-2.78849]
RUGDP(-2)	0.443277	0.901969
	(0.53880)	(0.64809)
	[0.82271]	[1.39174]
RGDP(-1)	0.861540*	2.143936*
	(0.29911)	(0.35978)
	[2.88037]	[5.95910]
RGDP(-2)	-0.482507	-0.778424
	(0.49411)	(0.59433)
	[-0.97652]	[-1.30976]
C	-3.70E+11**	-2.86E+11
	(1.6E+11)	(2.0E+11)
	[-2.26234]	[-1.45296]
RUGDP(-3)	0.419067	0.377608
	(0.42431)	(0.51037)
	[0.98765]	[0.73987]
RGDP(-3)	-0.250181	-0.324912
	(0.34219)	(0.41160)
	[-0.73112]	[-0.78939]
Adj. R-squared	0.969781	0.973527
F-statistic	279.1240	319.7145
Log likelihood	-1463.804	-1473.592
Akaike AIC	55.50203	55.87138
Schwarz SC	55.76225	56.13161

Notes:** Significant at 1%, * Significant at 5%.
Source: Own calculations.

Cointegration and Causality Tests

Table 6 provides the results of the unit root test on real Y_{ot} ($RGDP_t$) and real Y_{ut} ($URGDP_t$). The results reveal that both variables are integrated of order one. With this results we proceeded to test for cointegration between them using Johansen and Juselius (1990) and Johansen (1995) method.

The results are presented in Table 7 and 8. The Trace test indicates one cointegrating relationship at better than 5 percent level while the maximum eigenvalue test indicate absence of any long-run equilibrium relationship. We next proceeded to test for direction of causality between the underground economy and the formal economy using Toda and Yamamoto (1995) approach. From the information criterion we selected an optimal lag length of 2 and dmax =1 from the ADF and PP unit root tests. We estimated the 2-equation vector autoregression (VAR) system and applied the Wald test to determine if the coefficients of the lagged RGDP variables (excluding the extra ones) are jointly zero in the URGDP equation and also if the coefficients of the lagged URGDP variables(excluding the extra ones) in the RGDP are jointly zero. The results are presented in Table 10 while the full VAR regression results are presented in Table 11.

From the results (Table 9) we find causality between the formal economy and the underground economy in Sierra Leone and that causality is bi-directional. We reject the hypothesis that RGDP does not granger cause URGDP at better than 1% and reject the hypothesis that URGDP does not granger cause RGDP at better than 1.7%. Growth in the formal economy stimulates growth in the formal economy and vice-versa. Thus, our results are inconsistent with the dualist school of thought that insists that there is no linkage between them but consistent with the structural school of thought that maintains that both economies are inter-related and dependent. From the VAR regression results (Table 11) it is clear that the coefficient of lagged RGDP in the URGDP equation is positive. This implies that increases in formal economy GDP may induce variations in underground economic activity. In the same way the negative coefficient of lagged URGDP in the RGDP equation implies that increase in underground economic activity induces a negative variation in the formal economy GDP.

Macroeconomic Policy concerns

There are eight significant macroeconomic policy implications suggested from the findings of this study. First, the findings of large underground economy in Sierra Leone suggest that government has been under-stating the total production of goods and services in Sierra Leone economy. The Sierra Leonean economy is larger than what is reported in official national account series and efforts must be made to integrate the formal and underground economy.

Second, it is meaningless to carry out a robust macroeconomic policy for development planning and programme formulation without considering the underground economy. Third, innovative strategies need to be developed to collect some of the tax lost to underground economy to promote fiscal balance.

Fourth, expansionary fiscal policy (through reduction in effective tax rate) to promote formal economy RGDP growth will also have expansionary effect on the size of the underground economy. Both the relative size of the underground economy (Y_{ut}/Y_{ot} or URGDP/RGDP) may increase or it may decrease. It has been shown (Giles and Tedds 2000) that a tax cut may lead

to a fall in URGDP/RGDP ratio and therefore that the size of the underground economy falls while the formal economy RGDP increases. The increase is due to direct stimulation of this fiscal policy and partly to recording of some of the previously unrecorded output in the underground economy. Government revenue may even rise due to the tax cut by virtue of increase in the tax base. This, of course will depend on the extent of the tax cut, "and the initial effective tax rate" (Giles, Tedds and Werkneh 1999). There is need for the government to experiment on tax cut.

Fifth, given that inflation is one of the drivers of the underground economic activity, Bank of Sierra Leone monetary policy aimed at combating inflation will also have an indirect effect on the underground economy GDP.

Sixth, the findings of cointegration between formal economy and underground economy suggest that the two economies move together, and hence that there is an equilibrating mechanism that brings them together when there is a shock. Thus, any adverse economic effect that propels economic agents to "go underground" are temporary, and not permanent.

Seventh, the formal economy and underground economy are integrally linked and they contribute to the overall economy of Sierra Leone. "Supporting the working poor in the" underground economy is one of the important pathways to attacking poverty and fighting inequality.

Eight, the quality of institutions in Sierra Leone is an important driver of underground economy. This variable is not usually considered in previous studies. Government should endeavour to strengthen the quality of its institutions for good governance and confidence building.

CONCLUDING REMARKS

An important challenge to development policy making and macroeconomic management in Sierra Leone is the conspicuous absence of credible statistic and systematic evidence on the underground economy. Despite the wide ranging underground economic activities and processes in Sierra Leone, knowledge of the size, trends and dynamics of the underground activity are scanty and remain inadequate. In this study an attempt has been made to estimate the size of the underground economy of Sierra Leone in the period 1960-2015, and examine the implications for macroeconomic policy. The results revealed that the relative size of the underground rose from 58.8% in 1960 to 62.05% in 1968, fell slightly to 58.2 in 1980, rose sharply to 75% in 2000 and fell moderately to 73.9% in 2015. The mean size of the underground economy was estimated at 64.97%.

The results showed that the relative size of the underground economy was fairly stable at 60% between 1960-1989, rose rapidly to 71.9% on average during the civil war years 1990 -2001 and fell marginally to 69.2% during the period 2002-2015. The mean tax evasion was estimated at 4.34% of GDP. The estimated value for extent of tax evasion is large and should not be ignored given that the actual mean tax revenue during the period was about 11.36% of GDP.

The results revealed cointegration between formal GDP and underground economy GDP. Causality test between the formal economy and the underground economy indicates bi-directionality with causality running from both ways (from RGDP and URGDP).

The policy implications are straightforward. The total size of the Sierra Leone economy is larger than what is given in official government reports. Government Economic Statistic Division must make conscious efforts to collate data on the underground economy. Given the large size of the underground economy, policies on national economic development that does not incorporate the underground economy will be unrepresentative of the entire economy. Therefore, it is misleading and misguided.

Expansionary fiscal policy to promote growth and development of the formal sector will affect the underground economy given the existence of bi-directional causality between formal and underground GDP. The underground economy and formal economy are integrally linked. Both contribute to the overall economy. Consequently, "supporting the working poor in the underground economy is one of the important pathways to attacking poverty and fighting inequality".

Overall, the estimates for the underground economy in Sierra Leone are considerably larger than those obtained for other African countries (Zimbabwe 30.35% 1980-2009, Tanzania 36.93% 1968-1990, South Africa 9.5 % 1966-2002, Ghana 40% 1983-2003). This is not surprising given the collapse of infrastructure and other formal support services in Sierra Leone arising from more than a decade of civil war in the country.

REFERENCES

Ahumada, H., Facundo, A. and Alfredo, C. (2006). The Demand for Currency Approach and the Size of the Shadow Economy: A Critical Assessment. Berkeley Program in Law and Economics, Working Paper Series. http://www.escholarship.org/uc/item/6zn9p98b

Arrelano, M. and Bond, S. (1991). Some tests of specification for panels data: Monte Carlo evidence and application to employment equations. Review of Economic Studies 58(20 277–297.

Asiedu, Edward and Stengos, Thanasis (2014). An empirical estimation of the underground economy in Ghana. Economic Research International.

Bagachwa, M.S.D. and Naho, A. (1995). "Estimating the second economy in Tanzania," World Development, (23)8, pp. 1387–1399.

Bank of Sierra Leone (2009). Annual Report and Statement of Accounts for the Year ended 31 December 2009. Freetown.

Bank of Sierra Leone (2010). Annual Report and Statement of Accounts for the Year ended 31 December 2009. Freetown.

Bank of Sierra Leone (2012). Annual Report and Statement of Accounts for the Year ended 31 December 2009. Freetown.

Bank of Sierra Leone (2015). Annual Report and Statement of Accounts for the Year ended 31 December 2009. Freetown.

Barrett, C.B., Reardon, T. & Webb, P. (2001). Nonfarm income diversification and household livelihoodstrategies in rural Africa: Concepts, dynamics, and policy implications. Food Policy, 26, 315–331.

Becker, K.F. (2004). Fact Finding Study: The informal economy. Department of Infrastructure and Economic Co-operation (Sida). Available at: http://www.ncbi.nlm.

Breusch, T. (2005b). Estimating the Underground Economy Using MIMIC Models. Avaialable at http://econwpa.repec.org.eps/em/papers/0507/0507003.pdf

Buehn, A., Schneider, F. (2008). MIMIC models, cointegration and error correction: an application to the French shadow economy.

Chambwera, M., Macgregor, J., Baker, A. (2011). The Informal Economy: A primer for development professionals on the importance of the informal economy in developing countries, London:IIED (International Institute for Environment and Development).

Castells, M., Portes, A. (1989). World underneath: the origins, dynamics, and effects of the informal economy" in Portes, Castells and Benton(eds.), The Informal Economy. Studies in Advanced and Less Developed Countries. Baltimore. Md. The John Hopkoms University Press.

Chen, M.A. (2007). Rethinking the Informal Economy Linkages with the Formal Economy and the Formal Regulatory Environment, UNU World Institute for Development Economics Research (UNU-WIDER).

Chen, M.A. (2012). The Informal Economy : Definitions , Theories and Policies, Cambridge, MA: Women in Informal Employment: Globalizing and Organizing (WIEGO). Available at: http://wiego.org/sites/wiego.

Chipeta, C. (2002). The second economy and tax yield in Malawi. AERC Research Paper 113.

De Ferranti, D. et al., (2003). Inequality in Latin America and the Caribbean: breaking with History, Washington, DC: The International Bank for Reconstruction and Development/the World Bank.

De Soto, H. (1989). The other path: the invisible revolution in the Third World. New York, Harper and Row.

Dickey, D.A., Fuller, W.A. (1979). Distribution of estimators for autoregreesive time series with a unit root. Journal of American Statistical Association. 74, 427–431.

Federico, V. (2007). The Curse of Natural Resources and Human Development: A New Perspective on Institutions.

Frey, B.S., Schneider, F. (2000). Informal and underground economy in International Encyclopaedia of Social and Behavioural Sciences, Ashenfelter, O. (eds.) Elsevier Science Publishing Company. Amsterdam.

Fiege, E.L. (1979). How big is the irregular economy. Challenge. 22(4) 768-781

Geneva Social Observatory (GSO) (2005). Mapping the informal economy: Phase one 13 African Countries.

Giles, D.E.A, Tedds, L. M., Gugsa, W. (1999). The Canadian underground and measured economies: Granger causality results. Department of Economics, University of Victoria, Canada.

Giles, D.E.A. (1999). Measuring the hidden economy: implications for econometric modelling. The Economic Journal 109(456) 370–380.

Giles, D.E.A. (1999). Modelling the hidden economy in the tax-gap in New Zealand. Working paper, University of Victoria, Canada.

Giles, D.E.A., Tedds, L.M. (2000): Taxes and the Canadian Underground Economy, Canadian Taxes Foundation, Toronto.

Granger, C.W.J.(1969). Investigating causal relations by econometric models and cross spectral methods. Econometrica 37, 424-438.

Guttmann, P. M. (1977). The subterranean economy. Financial Analysis Journal, 33(6), 24–8.

Harding, P., Jenkins, R. (1989). The myth of the hidden economy. Open University Press. USA.

Hart, K., (1973). Informal Income Opportunities and Urban Employment in Ghana. The Journal of Modern African Studies, 11(01), 61–89.

International Labour Organization (ILO) (1972). Employment, Incomes and Equality: A strategy for increasing productive employment in Kenya. Geneva. International Labour Office, 223–232.

International Monetary Fund (IMF) (1981). International Financial Statistics yearbook. Washington, D.C.

International Monetary Fund (IMF) (1986). International Financial Statistics yearbook. Washington, D.C.

International Monetary Fund (IMF) (1999). International Financial Statistics yearbook. Washington, D.C.

Johansen, S. and Juselius, K.(1990). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregression models. Econometrica 59, 1551–1650.

Johansen, S. (1995). Likelihood-Based Inference in Cointegrated Vector Autoregressive Models. Oxford. Oxford University Press.

Kelley, B. (1994). The informal Sector and the Macroeconomy: A computable general equilibrium approach for Peru. World Development 22(9) 1393–1411,

Koopmann, T. (1947). Measurement without theory. Review of Economics and Statistics 29, 161–172

Korsu, Robert A. and Amaoh, Lordina (2015). The underground economy in ECOWAS countries: A dynamic panel estimation of the size and tax impact. AERC Work in Progress Report.

Lewis, W.A. (1954). Economic Development with unlimited supplies of labour. Manchester. The Manchester School, University of Manchester.

MacAfee, K. (1980). "A Glimpse of the Hidden Economy in the National Accounts", Economic Trends, 136(1), 81–7.

Macias, Jose Brambila(2008): Modeling the informal economy in Mexico. A Structural equation approach. MPRA 8504. Also available at http://mpra.ub.uni-muenchen.de/8504/

Makochekanwa, A. (2010). Estimating the size of the second economy in Zimbabwe. MPRA No. 37807. Moser, Caroline O.N. (1978):Informal sector or petty commodity production: dualism or dependence in urban development. Wiego. World Development 6(9-10) 1041-1064.

Ocran, M.K. (2009). "Estimating the size and trends of the second economy in Ghana", final report presented at the AERC Biannual Workshop, November 29 -3 December.

Ogbuagbor, J. E. and Malaolu, V.(2013):. and causes of the informal sector of the Nigerian economy: evidence from error correction MIMIC model. Journal of Economics and Sustainable Development. 4(1) 85-103.

Palmer, R., (2007). Skills for work?: From skills development to decent livelihoods in Ghana's rural informal economy. International Journal of Educational Development, 27(4), 397–420.

Partnership Africa Canada (2009): Killing Kimberly? Conflict Diamonds and Paper Tigers. Occasional Papers 15, Ottawa.

Perry, G. et al.,(2006):Poverty reduction and growth: virtuous and vicious circles, Washington, DC: The International Bank for Reconstruction and Development/ the World Bank.

Perry, G.E. et al.(2007): Informality: Exit and Exclusion, Washington DC: The International Bank for Reconstruction and Development/the World Bank.

Phillip, P.C.B. Perron, P.(1988):Testing for a unit root in times series regression. Biometrika 75(2) 335–346.

Portes, A., Castell, M., Benton, L. (1989). World underneath: the origins, dynamics and effects of the informal economy. In the informal economy: studies in advanced and less developed countries. Edited by Portes, A., Castell, M. & Benton, L. Baltimore. John Hopkins University Press.

Putzel, L. et al. (2014). Formalization of natural resource access and trade Insights from land tenure , mining , fisheries , and Formalization of natural resource access and trade, Bogor, Indonesia: CIFOR (Center for International Forestry Research)

Saunders, S. (2005). Estimates of the informal economy in South Africa: some macroeconomic policy implications. PhD thesis, Faculty of Economics and Financial Sciences,

Saunders, S., Loots, E. (2005). Measuring the informal economy in South Africa. South African Journal of Economics and Management Sciences 8(1), 92–101

Sethuraman, S.V. (1976). The urban informal sector: concept, measurement and policy. International labour Review 114(1).

Schneider, F., Enste, D.H. (2003). Shadow Economies: Size, Causes and Consequences. Journal of Economic Literature 38(1), 77–114

Smith, P. (1994). Assessing the size of the underground economy: the Canadian statistical perspectives. Canadian Statistical Perspectives, Canadian Economic Observer 11,16–33.

Soltani, K.,, Osman, A. (2016). A report of the informal economy in Sierra Leone. Draft paper for the export group meeting on accounting for the informal sector in national accounts.

www.ecastats.uneca.org/acsweb/portals/o/economic%statistics/ accessed 20th December, 2016.

Tanzi, V. (1980). The underground economy in the United States: Estimates and Implications. Banco Nazionnale del Lavoro Quarterly Review, 135, 427–453

Tanzi, V. (1982). The underground economy in the United States and abroad. Lexington, Mass. USA

Tanzi, V. (1983). The underground economy in the United States: annual estimates, 1930-1980. IMF Staff Papers 30, 283–305.

Taylor, L. (1979). Macro-models for developing countries. New York. McGraw Hill.

Taylor, L. (1983). Structuralist Macroeconomics. New York. Basic Books.

Thomas, J.J. (1999). "Quantifying the black economy : 'measurement without theory' yet again". Economic Journal 109(456) 381-389.

Thomas, R.L. (1998). Introductory Econometrics: Theory and Applications. Longman, New York.

Toda, H., Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. Journal of Econometrics, 66, 225–250.

Tokman, V. (1978). Informal-formal sector relationship. CEPAL Review First Half of 1978, 99–134.

Ulandssekretariat (2014). Sierra Leone Labour Market Profile 2914.

United Nations Development Programme (UNDP) (2016). UNDP 50 years. UNDP around the world. www.sl.undp.org/contents/sierraleone/en/home/countryinfo.html. Accessed 19th December, 2016.