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Measuring the Shadow Economy and Tax Evasion in Zambia: Using the Monetary Method

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Abstract

This study presents an estimation of the size of the Zambian shadow economy. The methodology employed is based on the monetary method. The monetary method estimates a money demand equation. The cornerstone of this approach is the assumption that currency is the primary means of payment in the shadow economy. The variables of interest include Cash holdings (M1/M2), GDP per capita growth, M1/M2-lagged, deposit interest and real interest rate. The major conclusions of this study are that; the size of the shadow economy has decreased as a proportion of GDP from 22.2 per cent in 1972 to 17.8 per cent of GDP in 2013; the total value of tax evasion has increased from ZKW67, 547.29 to ZKW4, 078,665,331.00 in 2013 and the evidence also demonstrates that the rate of growth of the informal economy has been, on occasion higher than the formal economy.

Key words: Shadow economy, Cash Holdings, GDP, Tax Evasion

INTRODUCTION

This study presents an estimation of the size of the Zambian shadow economy. The methodology employed is based on the monetary method. The monetary method estimates a money demand equation in the manner suggested by Tanzi (1980, 1983).

Estimating the size of the shadow economy is important because it reveals the size of the distortion in the national statistics. This is so because a major challenge for national tax systems is how to tax unreported and under-declared economic activities.

This paper is organised into five sections beginning with the introduction. The second section presents a brief review of the literature. Section three presents the data sources, data description and methodology of this study. Section four presents the results. Section five concludes.

LITERATURE REVIEW

This study uses the monetary approach to estimate the shadow economy. The cornerstone of this approach is the assumption that currency is the primary means of payment in the shadow economy. A number of researchers have contributed immensely to its evolution:

Guttmann (1977) based on the assumption that there is a stable relation between the ratio of currency to demand deposits and formal activities and suggested that a rise in the ratio signalled an increase in the shadow economy. A major criticism of the Guttmann (1977) approach was that it ignores the effect of financial innovations on the currency to demand ratio.

Feige (1979) followed a different route by employing the Fisher quantity theory of money to estimate the Gross National Product. The difference between the derived figure and that from national statistics was assumed to be the estimate of the shadow economy.

Tanzi (1980, 1983) however, introduced a novel model that was based on a currency demand function developed by Cagan(1958) and the equation of exchange.

DATA SOURCES, DATA DESCRIPTION AND METHODOLOGY

This study uses an indirect method known as the monetary approach which employs an aggregated data set to estimate a money demand equation in order to determine the size of the informal/ underground economy in South Africa. The monetary method is used extensively in the literature to estimate the underground economy. This approach has been utilised by (Filho, 2012; Ahumada, Alvaredo and Canavese, 2007; Iqbal, Qureshi and Mahmood, 1998; Greenidge, Holder and Mayers, 2005; Ahumada, Alvarado, Canavese and Grosman, 2009; Ahmed and Ahmed, 1995;shabsigh, 1995; Haque, 2013) It is based on the concept that the underground economy's activities are concealed from authorities and therefore depend on currency to carry out transactions. It follows therefore, that the underground economy uses relatively more cash than the visible economy.

A surge in informal activity increases money demand. Consequently, variables that influence the underground economy such as direct and indirect tax burden, should ideally be included in the estimated money demand equation. In this paper, government expenditure ratio to GDP is used to represent the tax burden, also included is real GDP per capita, real interest rates (to incorporate opportunity cost of holding cash) and the ratio of currency to money supply or M2.

Data Source

Annual data on currency in circulation, M1 and M2, Real GDP per capita annual growth rate, Government expenditure are drawn from the World Bank data base. Data are collected from 1965 -2013. The theoretical justification for the selected variables in the empirical model is as follows:

(i)   This research hypothesizes that as the taxation level increases economic agents are encouraged to evade taxes through the use of currency and thereby raising the demand for currency and consequently, the ratio of currency holdings to money currency/M2 (coefficient is expected to be negative).

(ii)   The real interest rate is included as it is expected that a higher real interest rate may increase the opportunity cost of currency holdings thereby leading to a decline in currency demand. Consequently, the effect of an increase in real interest rate on the demand for currency is expected to be negative (Coefficient is expected to be negative).

(iii) An increased level of economic development reflected and defined in terms of annual growth rate in per capita gross domestic product is anticipated to decrease the demand for currency as economic development is assumed to replace currency by other financial instruments. Consequently, we anticipate a decline in currency/M2 ratio when the economy experiences rapid economic growth. (The coefficient sign is expected to be negative).

Data Description

Data used in this model are currency money supply ratio, Government expenditure, and real rate of interest. The most widely used measure of broad money is M2. This is the main measure of the money supply and is the economic indicator generally used to measure the amount of liquidity in the economy as it is relatively easy to track. For tracking the variable that induces economic agents to conceal transactions, we use government expenditure as ratio of GDP.

Methodology

The model estimation is based upon the work of Tanzi (1980, 1983) model but with some modification to suit the Zambian economy. Moreover, currency demand methods including those of Tanzi (1980, 1983) original model are built upon the regression model with multiple time series variables. As previously alluded to the model has been utilised by (Bagachawa and Naho, 1994; Filho, 2012; Ahumada, Alvaredo and Canavese, 2007; Iqbal, Qureshi and Mahmood, 1998; Greenidge, Holder and Mayers, 2005; Ahumada, Alvarado, Canavese and Grosman, 2009; Ahmed and Ahmed, 1995; Shabsigh, 1995; Haque, 2013). The first step is to specify and estimate a demand function for currency with the following assumptions.

Model assumptions

- All activities in the underground economy rely on currency for transactions. This includes RTGS and debit cards and mobile money. Even where taxes were absent, the currency ratio would be impacted by illegal and criminal activities such as gambling or smuggling to name a few.
- The velocity of money for currency in the underground economy is the same as that of narrow money M1

or that of the legal money or an average of these two.

- The higher the government expenditure as a proportion of GDP the larger the underground economy and the money demand.

The second step is to run the model again and set GE equal to zero to obtain an estimate of the amount of cash demanded in the absence of incentives to conceal transactions.

The third step is to obtain the difference between observed currency and the currency under no incentives which will reveal the hidden economy.

The fourth step is to multiply the above result by the velocity of circulation**.**

Empirical Model

The basic regression equation for the currency demand as suggested by Tanzi (1980, 1983), is the following:

$$Cr= f (RGP+GE+Ri + Depint+ (m1/m2)_{t-1}$$

Where,

Cr = Currency holdings ratio

RGP= real GDP per capita growth rate (annual)

GE = Government expenditure % of GDP

Ri = Real interest rate

Depint = Deposit int rate (annual)

$(M1/M2)_{t-1}$ = Lagged currency ratio

EMPIRICAL RESULTS

The model summary in table 1 below highlights that R squared= 0.870 implying that cash holdings can be explained by the predictor variables. (i.e. that the variables explain 87 per cent of cash holdings) That variation in demand for currency can be explained by the estimated ANOVA analysis equation.

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.933[a]	.870	.851	9.22534

a. Predictors: (Constant), M1M2 - Lagged, Real Interest Rate (%), Government Expenditure (%) GDP, GDP Per Capita Growth (%), Deposit Interest

The ANOVA analysis displayed in table 2 highlights that the F-statistic indicates a perfect fit with the equation. Each included variable contributes to the model.

Table 2: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19315.613	5	3863.123	45.391	.000[b]
	Residual	2893.635	34	85.107		
	Total	22209.248	39			

a. Dependent Variable: Cash Holdings

b. Predictors: (Constant), M1M2 - Lagged, Real Interest Rate (%), Government Expenditure (%) GDP, GDP Per Capita Growth (%), Deposit Interest

The coefficients of the predictor variables in table 3 indicate that the predictor variables are statistically significant at the 0, 05 level of significance. Furthermore, it sustains that Real interest rate contributes the greatest weight, followed by GDP per capita growth , Government expenditure, lagged M1M2 and Deposit interest in that order. As can be seen the predictor variables had significant positive regression weights indicating that

economic agents were expected to have higher cash holding balances. Interestingly, deposit interest, GDP per capita and real interest have positive signs. After accounting for M1/M2-lagged, Government expenditure, real interest rates and deposit interest rates and rising wealth (GDP per Capita) were positively related to cashholdings implying that they were contributing to increased shadow transactions.

Table 3: Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	38.210	12.795		2.986	.005
Deposit Interest	.494	.170	.244	2.903	.006
Real Interest Rate (%)	1.250	.098	.839	12.717	.000
GDP Per Capita Growth (%)	1.172	.440	.198	2.665	.012
Government Expenditure (%) GDP	.801	.374	.170	2.139	.040
M1M2 - Lagged	.508	.166	.238	3.066	.004
a. Dependent Variable: Cash Holdings					

Correlations matrix

Table 5 below reports the results of 14 correlations. Statistical hypotheses are:

H_0:　$p = 0$ [there is no actual correlation]

H_A: $p \neq 0$ [this is a correlation]

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The research hypothesis was supported. That observed cash holdings correlate significantly with (null hypothesis was rejected); real interest rate, GDP per capita growth, m1m2. The null hypothesis was accepted in regard to deposit interest and Government expenditure.

Table 4: Correlations		Deposit Interest	Real Interest Rate (%)	GDP Per Capita Growth (%)	Government Expenditure (%) GDP	Cash Holdings	M1/m2
Deposit Interest	Pearson Correlation	1	-.065	-.202	-.502**	-.061	-.628**
	Sig. (2-tailed)		.687	.205	.001	.703	.000
	N	41	41	41	41	41	41
Real Interest Rate (%)	Pearson Correlation	-.065	1	.258	-.175	.879**	.384*
	Sig. (2-tailed)	.687		.100	.268	.000	.012
	N	41	42	42	42	41	42
GDP Per Capita Growth (%)	Pearson Correlation	-.202	.258	1	-.258	.431**	.347*
	Sig. (2-tailed)	.205	.100		.095	.005	.023
	N	41	42	43	43	41	43
Government Expenditure (%) GDP	Pearson Correlation	-.502**	-.175	-.258	1	-.088	.137
	Sig. (2-tailed)	.001	.268	.095		.582	.382
	N	41	42	43	43	41	43
Cash Holdings	Pearson Correlation	-.061	.879**	.431**	-.088	1	.640**
	Sig. (2-tailed)	.703	.000	.005	.582		.000
	N	41	41	41	41	41	41
M1/m2	Pearson Correlation	-.628**	.384*	.347*	.137	.640**	1
	Sig. (2-tailed)	.000	.012	.023	.382	.000	
	N	41	42	43	43	41	43
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

Furthermore, in order to arrive at the estimates of the shadow economy and tax evasions, it is necessary to compute the components of illegal money, legal money, tax evasion and velocity of money as indicated below:

Illegal money

Subsequent to the estimation of currency demand above, the size of the shadow economy and tax evasion were computed as follows (Iqbal, Qureshi and Mahmood, 1999; Ahmed and Hussain, 2008):

The equation for the level of illegal money can be expressed as follows:

$(IM)= [(M1/M2) t – (M1/M2) wt.]$……(2)

Legal money

The difference between the sum of currency (M1) and total money supply (M2) and the estimated illegal money yields legal money (LM).

The equation for legal money can be expressed as follows:

$LM = M2 – IM$ ……………. …(3)

Velocity of money

The income velocity (IV) of money can be expressed as an equation as follows:

$IV = GDP/LM$ …… (4)

It is assumed that the velocity of illegal money is the same as that of legal money. Thereafter an estimate of the shadow economy can be obtained by multiplying illegal money by the income velocity of money. The equation for the shadow economy can be expressed as follows:

$SE = IM * IV$ ………. …(5)

Tax Evasion

Finally the level of total tax evasion (TE) in Zimbabwe can be computed multiplying the estimates of the shadow economy (SE) by government expenditure (GE/GDP) as follows:

$TE = SE * (GE/GDP)$ ……….(6)

Estimates of the Shadow Economy and Tax evasion

The size of the underground economy and tax evasion

The estimates of the level of the shadow economy and tax evasion in Zambia for the period 1971-2013 are reported in table 5 below. The results therein report that the shadow economy grew fromZKW297,185.90in 1972 to ZKW21,548,541,127.00in 2013. Column (f) indicates that the shadow economy as a proportion of GDP was around 22.2per cent in 1972 whichdeclined to17.8 per cent in 2013. The level of tax evasion is reported in column (e). It indicates that the rise of tax evasion from ZKW67547.30in 1972 toZKW 4,078,665,331.10 in 2013. The estimates of tax evasion are based on a firm assumption that that incomes in the shadow economy would be taxed at the same rate as those in the formal or visible economy.

As concerns the growth rates of the shadow economy as compared to the formal economy reported in column (g) and (h) reports that the shadow economy grew at rates of 6.2, 25.5, 198.9, -3.2, 6.4, and 35.3 in 1973 1980, 1990, 2000, 2010, 2013, correspondingly, while growth rates in the visible economy for the same periods were 15.8, 13.2, 51.3, 26.1, 16.8, and12.2.

This apparent higher growth rates of the shadow economy appears to be a crucial factor contributing to government fiscal deficit. This because government expenditure expands with the overall economy (including formal and informal), whereas tax revenues for obvious reasons, grow at the slower pace of the formal economy.

Table 5: Estimates of the Shadow Economy and Tax Evasion in Zambia

(Zambian Kwacha)

Year	Illegal Money (a)	legal Money (b)	Velocity of Legal Money (C)	Shadow Economy (d)	Shadow Economy (% of GDP) (f)	Tax Evasion (e)	Growth rate of shadow Economy (g)	Growth rate of GDP % (h)
1971	0	318520	370.7	0		0.0	0.0	0
1972	62008.344	279071.656	479.3	297185.903	22.2	67547.3	0.0	13.3
1973	68112.298	342697.702	463.4	315640.1039	19.9	65389.8	6.2	18.7
1974	64599.29	376050.71	498.1	321767.594	17.2	58921.7	1.9	17.9
1975	106005.978	387734.022	405.2	429564.0392	27.3	115100.9	33.5	-16.1
1976	125880.612	497599.388	386.4	486396.6125	25.3	122440.3	13.2	22.4
1977	147772.935	550917.065	360.6	532813.6969	26.8	140821.2	9.5	3.3
1978	122447.015	516962.985	435.4	533097.1628	23.7	127382.4	0.1	13.3
1979	158692.912	673467.088	395.0	626885.3385	23.6	149157.4	17.6	18.2
1980	185320.53	721779.47	424.5	786594.8299	25.7	200679.8	25.5	15.2
1981	221878.091	756851.909	460.5	1021777.052	29.3	289055.0	29.9	13.8
1982	290522.575	1018727.425	352.9	1025314.344	28.5	284012.6	0.3	3.2
1983	280796.365	1173353.635	356.3	1000606.885	23.9	241416.9	-2.4	16.3
1984	342453.75	1361296.25	362.2	1240464.282	25.2	311965.1	24.0	17.9
1985	402286.434	1699523.566	416.1	1673957.075	23.7	399251.0	34.9	43.4
1986	875313.59	3186466.41	406.8	3560955.513	27.5	956276.1	112.7	83.3
1987	1023797.406	5241792.594	411.4	4211759.075	19.5	859187.9	18.3	66.3
1988	1208004.361	8917765.639	345.6	4175296.818	13.5	620733.9	-0.9	42.9

1989	1836679.5	14890820.5	370.6	6806218.731	12.3	934237.4	63.0	79.0
1990	3764880.08	20971519.92	540.4	20347190.05	17.9	3871531.4	198.9	105.4
1991	0	48806600	447.2	0	0	0.0	-100.0	92.6
1992	0	0	0.0	0	0	0.0	0.0	160.9
1993	0	208559400	710.6	0	0	0.0	0.0	160.2
1994	34859979	297139821	753.9	262805017.3	11.7	34445127.4	0.0	51.1
1995	63695315.56	452474178.4	664.1	423031426	14.07	65324718.4	61.0	34.2
1996	102161845.1	594712950.9	664.2	678578995.4	17.2	123957148.6	60.4	31.4
1997	122185641.6	749323927.4	686.0	838167024.3	16.3	146422786.1	23.5	30.1
1998	138484718.1	956256136.1	630.4	872958628.2	14.5	137795776.5	4.2	17.3
1999	144404530.7	1253509610	596.5	861432382	11.5	111231798.2	-1.3	24.1
2000	184850912.7	2244201817	451.0	833672862.7	8.2	79102806.8	-3.2	35.4
2001	213632870.8	2427070106	543.6	1161322652	8.8	117468630.6	39.3	30.4
2002	322542554.2	3061954342	533.1	1719596237	10.5	203915245.2	48.1	23.7
2003	470783757.5	3759079293	546.7	2573803076	12.5	358635216.3	49.7	25.9
2004	769142446.9	4812442799	540.1	4154320962	15.9	714893672.7	61.4	26.5
2005	854115725.5	4909148279	652.7	5574726201	17.4	1030213933.3	34.2	23.3
2006	1236978870	7064892738	545.8	6751538526	17.5	1258310409.0	21.1	20.3
2007	1491282626	8908177807	518.6	7733287632	16.7	1384834867.2	14.5	19.8
2008	1786426620	11028685435	497.2	8882893166	16.2	1542805437.6	14.9	18.7
2009	1989514050	11807393369	547.2	10887551211	16.8	1963224642.5	22.6	17.8
2010	2325566421	15590969949	498.2	11584834995	14.9	1876801036.2	6.4	20.2
2011	2969810978	18834968597	495.5	14716316972	15.8	2505511489.0	27.0	20.2
2012	3356287873	22342700433	474.5	15925418680	15.0	2596827927.3	8.2	13.6
2013	3890826830	21808161476	553.8	21548541127	17.8	4078665331.1	35.3	13.9

CONCLUSIONS AND POLICY IMPLICATIONS

This paper has estimated the existence of a shadow economy and tax evasion in Zambia over the period 1971- 2013using the monetary method as employed by Tanzi (1980, 1983) and by Iqbal Qureshi and Mahmood (1999) among others. The cost of the shadow economy and its increasing size must be large. Particularly, when one estimates the loss of tax revenues and the demand on government services by the economic activities taking place in the shadow economy may be a major contributing factor for any fiscal deficit. This leads to an implied higher uncertain cost of doing business particularly when the element of discretion that is exercisable by public officials is pervasive, acts as a deterrent to the implementation of a private sector –led development strategy.

The major conclusions of this study can be summarised as follows:

a) The size of the shadow economy has decreased as a proportion of GDP from 22.2 per cent to 17.8 per cent of GDP in 2013.
b) The total value of tax evasion has increased from ZKW67, 547.29 to ZKW4, 078,665,331.00in 2013.
c) The evidence also demonstrates that the rate of growth of the informal economy has been, on occasion higher than the formal economy.

This study does not attempt to present a detailed plan that would reduce the size of the informal economy. Actions required for reform agenda include economic liberalisation, fiscal discipline (austerity), greater space for the private sector, tax reforms consisting of lower rates and a broadening of the tax base, enhanced transparency in decision-making, and policy consistency are some of the areas in which policy alterations need to be made.

Isolated piece-meal actions would be a hindrance. Corruption in particular requires a comprehensive measure of reforms in order to successfully tackle the problem and should be a crucial plank in the reforms of government.

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