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**THE SIZE OF THE INFORMAL ECONOMY AND ITS IMPACT ON  
TAX REVENUES IN ZIMBABWE: 2009-2013.**

**By**

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## **ABSTRACT**

This study estimated the size of the informal economy using time series analysis for Zimbabwe using monthly data for the period 2009 -2013. The study makes use of the indirect approach for measuring the informal economy, the monetary approach which makes use of the money demand model. Ordinary Least Squares (OLS) econometric estimation technique was used to estimate the money demand model for Zimbabwe where money supply growth component (M2) was the dependent variable while inflation rates, tax revenue, industrial index and commercial banks' deposit interest rate were the explanatory variables. Industrial index is taken as a proxy to GDP. From the regression analysis, the model was found to be significant and its estimates turned out as expected and we found out that tax revenue has the greatest impact on money demand hence determining the size of the informal economy. On average the size of the informal economy for the entire period as a percentage of the industrial index averages at 39%, where the highest average of 52% was attained in 2010. Findings of a significant informal economy have implications for the conduct of monetary policy and fiscal policy. The paper further discusses the policy implications of the findings.

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## **DEDICATION**

This thesis is dedicated to my wife Colleta and son Liberty Tinashe Karaga

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## **LIST OF ACRONYMS AND ABBREVIATIONS**

ADF	Augmented Dickey- Fuller
AIC	Akaike Information Criterion
BoPs	Balance of Payments
ECM	Error Correction Model
ESAP	Economic Structural Adjustment Program
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GNP	Gross National Product
ILO	International Labour Organisation
LDCs	Least Developed Countries
UNDP	United Nations Development Fund Programme
IMF	International Monetary Fund
OCHA	United Nations Office for Coordination of Humanitarian Affairs
OLS	Ordinary Least Squares
RBZ	Reserve Bank of Zimbabwe
SMEs	Small and Medium Enterprises
SADC	Southern African Development Community
WB	World Bank
ZIMSTAT	Zimbabwe National Statistics Agency
ZIMRA	Zimbabwe Revenue Authority

# **CHAPTER ONE: INTRODUCTION.**

## **1.0 Introduction**

The general drive of this dissertation is to measure the magnitude of the informal economy in Zimbabwe. The study will make use of the currency demand approach (indirect approach) for the period 2009-2013. This would enable us to establish the extent to which official national accounts misstate real production of goods and services (Cagan, 1958). The method used is based on time series analysis.

Informal economy refers to diversified set of economic activities that are unorganised. Some of the informal economic activities are legal while others are not deemed legal by law. The subject is controversial since it seems there is little agreement on the definition of the informal economy. The meaning of informal economy is different to labour economists, criminologists, macroeconomists and national income accountants.

In the literature, several terms are commonly used to define informal economy. Terms such as, unmeasured, second, cash, shadow, invisible, underground, irregular, parallel, and unofficial, are among others. These expressions are used interchangeably to refer to the same sensation. By its nature, any study which intends to measure the extent of the informal economy must first deal with how to define it. The definition of the informal economy therefore, differs with the objective and the approach of the study. This plays an important role in measuring its size. A useful definition of the informal economy for this study is the one that includes all unreported economic activities monetary transactions that would generally be taxable were they reported to the state tax authorities (Buhn et al, 2007).

## **1.1 Characteristics of the Informal Economy**

International Labour Organisation (ILO, 1972) defines informal economy as the one characterised by easy entry and exit, reliance on indigenous resources, family ownership of enterprises, labour intensive and adaptive technology, skills acquired outside the formal

school system and finally unregulated and competitive markets. In sharp contrast the formal economy is the one characterised by difficulty entry, frequent reliance on overseas or imported resources, large scale operation, capital intensive and often imported technology, formally acquired skills, often expatriate and protected markets through tariffs, quotas, trade licences and others. With regard to the level of skills, about ninety one percent of the informally employed population had not completed secondary or acquired tertiary education (ZIMSTAT, labour Force Survey 2011). According to the same survey, about ninety six percent of the individuals participating in the informal economy reported receiving their remuneration as cash only hence the advocating for the currency demand approach in this study.

Most jobs in the informal economy require little capital, few workers and skills, they are labour intensive, are small scale and many of them are done from home and there is also free entry and exit into the sector. Informal economy encompasses all the jobs that are not recognized as normal income earning sources and sometimes on which taxes are not paid and the activities are not monitored by any form of government or sometimes not included in the GDP of the country. Figure 1 below shows a woman cooking sadza in one of the streets where informal economic activities are rampant in Harare.

**Figure1: One of the Informal Economic Activities Undertaken in Zimbabwe.**



Sourced from Magaba Mbare, Harare

In the 1980s onwards, there has been a growing interest in the informal economies of various countries such as Zimbabwe, Mozambique, Tanzania and more others. Growing interest in the informal economies has been motivated fundamentally due to rapid rise in the size of the informal economies in complete and relative terms. There is convincing substantiation that the size of the informal economies articulated as a proportion of GDP has grown over the past two eras after the attainment of liberation struggle in Zimbabwe. As in Saunders, (2005), rapid intensification in urbanisation, sluggish rate of economic progress, fall in the formal employment, the encouragement of small to medium and micro- enterprises (SMEs) and the so called informalisation of the formal business are all assumed to have caused a rise in the new set of economic activities that are sometimes not recorded or recognised in the country's official statistics.

As cited by Georgiou (2007), Kaldor (1956) and Cagan (1958) were the ones who marked the early beginnings of research into informal economic activity. Despite decades of old evolution in the research on the informal economy, there are still some scepticism on measuring its size and evolution. There are however, complications in vexing to guesstimate size and value of the informal economy. Absence of informal economy data may lead to erroneous macro gauges. It is often speculated that informal economic activities grow at the time when official economy is decreasing. As a result, this may result in flawed policy decisions.

Most developing economies such as Uganda, Ghana, Zambia, Ethiopia, and Nigeria are rooted on informal economy hence; it has become a custom universally for developing countries like Zimbabwe to introduce presumptive tax regimes to bring more and more hitherto unregulated and informal businesses into the tax net. The advantage of presumptive tax on such business entities is that it is relatively simpler and hence reduces the hasssles involved in calculating tax (administrative simplicity). Since the adoption of dollarization in 2009 in Zimbabwe, presumptive tax became payable in US dollars.

Josh et al, (2002), page 27 argued that "The informal economy has been hugely ignored since its evolution, it has been seen as a marginal or residual activity but nowadays it is considered as a central aspect of the economic and social dynamics of any country especially developing

nations”. Therefore, it becomes clear that bringing such a sector into the tax net would do more in enhancing domestic revenue mobilisation in Zimbabwe.

Taxation plays an important role in economic development by sustaining the existence of the government and financing both social programmes and infrastructure investment (Bekoe 2010). It also aids in the allocation of resources, redistribution of income, and restriction of negative externalities as well as protection of domestic industries by imposing tariffs on imports. Many developing countries however fail to generate the tax revenue required to finance their public expenditures (Fuest and Riedel, 2009) and Zimbabwe is not an exception.

Potential tax loss in the informal economy refers to possible amount of tax that might have been collected and can either be due to tax evasion or tax avoidance since the entities are supposed to pay presumptive tax by the tax authorities. Tax evasion is the wilful or deliberate refusal of the tax payer to honour his/her tax obligations. Schneider et al, (2001) define tax evasion as “an illegal reduction of tax payment”. Tax avoidance takes place within the legal context of the tax system that is individuals or firms take advantage of the tax code and exploit “loopholes”, engage in activities that are legal but run counter to the purpose of the tax law.

Tax avoidance usually encompasses special activities with the sole purpose to reduce tax liabilities. Informal economic activities can be classified as either legal or illegal activities. These activities can also be either monetary or non-monetary transactions as shown in table 1.1 below. However, in this study we shall focus on monetary transactions only as we shall assume that informal economic activities are undertaken using cash.

**Table 1.1: Types of informal activities**

Type of Activity	Monetary transactions		Non-monetary transactions	
<b>Illegal activities</b>	Trade in stolen goods; drug dealing and manufacturing; gambling; fraud		Barter of drugs, stolen or smuggling goods Producing or growing drugs for own use. Theft for own use	
<b>Legal activities</b>	<b>Tax evasion</b>	<b>Tax Avoidance</b>	<b>Tax evasion</b>	<b>Tax avoidance</b>
	Unreported income from self-employment. Earnings and resources from unreported work related to lawful goods and amenities	Employee discounts, fringe benefits	Barter of legal services and goods	All do-it- yourself work and neighbour help

Source: Lippert and Walker, (1997) as quoted in Saunders, 2005

## 1.2 Background of the Study

The aim of this section is to trace the history and the role of the informal economy in Zimbabwe from independence year 1980 to 2013 and to comprehend the growth of this economy. Therefore, it is imperative to know the proceedings happening inside the wider economic and political set up. Luebker, (2008) advocated that, ‘the deviations taking place in the informal economy cannot be seen separately from the country’s general economic performance. The creation of jobs in the formal economy is a significant determinant of the size of the informal economy since the informal economy frequently engrosses individuals who cannot find employment in the formal economy.

Statistical data from the IMF shows that the Zimbabwean economy enjoyed a relatively positive and stable economic growth in the first decade of independence (1980-89), with an annual average GDP growth of 4.85%. One of the reasons for this stable growth was a result of low size of the informal economy. The focus of the government policy in the first decade was Growth with equity.

The second decade after independence (1990-99) was marked with policy changes that were adopted to improve growth rates. Amongst the policies, there was ESAP which was introduced in 1991. The adoption of this policy resulted in a fall in formal economic progression to a yearly average of 2.14%. As a result, there was persistence of high poverty levels, unemployment and inequality. Since 2000 until end of 2008, the country’s economic growth trends become consistently negative, with an annual average growth of about negative 5.33%. These declining trends in formal economic activities meant that the country’s informal economy has been on an increasing trend. It is against this background that the size of the informal economy continues to grow yet its contribution to the national development in terms of tax revenue is still minimal.

Soon after the attainment of independence in Zimbabwe the size of the informal economy was close to 10% of national income (Makochekanwa, 2010). Since the size of the formal

economy has been continuously falling, the informal economy has been gradually increasing in size. Malaba (2006), exposed that the share of the informal economic activities to Zimbabwe's GDP has been rising over the years from twenty three percent in 1995 to thirty percent in 2003. Makochekanwa (2010) also estimated the size of the informal economy to be around 52% by the end of 2008. The estimates from these studies are consistent and indicates the there is a negative relationship between the size of the informal economy and formal economy.

Conferring to the Poverty Valuation Study Survey carried out by the United Nations Development Fund Programme (UNDP) together with the Public Service, Labour and Social Welfare Ministry (MPSLSW), it shows that fifty percent of all jobs between 2003 and 2006 were conducted in the informal economy in Zimbabwe. The report by the United Nation (UN) Office for Coordination of Humanitarian Affairs (OCHA) reveals that the country' rate of unemployment was around ninety four percent by termination of January 2009. By the end of 2008, only six percent of the populace was formally employed, depressed from thirty percent in 2003. About 480 000 people only out of the country's estimated 12 million population were formally employed by end of 2008, depressed from 3.6 million in 2003. This is a direct sign of the growth of the informal economy.

Zimbabwe's economically active population continue to grow over the period when formal employment was on decline and the informal economy engaged some of the labour laid off in the formal economy. Economically active population grew on an average of 1.6% from 1980-1989 and 4.8% from 1990-2000 (ZIMSTAT 2004). It is against this background that the informal economy has been increasing while the formal economy was on a decline. Informal economy has therefore made a tremendous contribution to the economy of Zimbabwe by accounting for an immense contribution of income, output and employment in Zimbabwe.

Following the gradual downfall of the Zimbabwean formal economy and the mushrooming of a plethora of informal businesses in the face of economic challenges from 2000 onwards, the Zimbabwean government found its tax revenues shrinking incessantly. ZIMRA at times

failed to meet the finance ministry’s revenue target hence the government, through the tax authorities, decided to widen their tax net by introducing presumptive tax for the informal businesses.

To date revenue flows from presumptive tax have been very insignificant compared to other tax heads. Despite the high levels of economic activity in the informal sector, it seems compliance is an issue to be addressed. Despite measures instituted to capture the revenue inflows from the informal economy, which continues to account for a significant portion of economic activity, revenue contribution to the fiscus remains insignificant (less than 3% of tax revenue, MoF, 2012). This is due to low compliance, low tax morale and even difficulties in dealing with individuals with no fixed location, those on footpath and even on the open spaces.

In light of limited sources of revenue, the significance of presumptive tax cannot be overemphasised. It’s worth noting that, although not perfect, presumptive tax is the only viable option for taxing firms in the informal economy. Zimbabwe adopted the presumptive tax legislation regime in 2005 in order to broaden the tax base following the collapse of the formal economy. Table 1.2 below shows the current rates of presumptive tax that apply to all informal economic activities. The figures in the table are discouraging hence participants would try their level best to conceal their activities.

**The table 1.2: current rates of presumptive tax.**

Operators	Description	Presumptive tax US\$ per quarter or % per month
Omnibuses	8-14 passengers	US\$150 per vehicle
	15-24 passengers	US\$175 per vehicle
	25-36 passengers	US\$300 per vehicle
	37 and above	US\$450 per vehicle
Tax-cabs	All	US\$100 per vehicle
Driving schools	Class 4 vehicles	US\$500 per vehicle
	Class 1 and 2 vehicles	US\$600 per vehicle
Goods vehicles	10 -19 tonnes	US\$1000 per vehicle
	More than 20 tonnes	US\$2500 per vehicle



Hairdressing salon	One premise	US\$1500 per quarter
Restaurants/ Bottle stores	One premise	US\$300 per quarter
Cottage industry (furniture making or upholstery, metal fabrication )	One premise	US\$300 per quarter
Small scale miners	All agents who buy precious metals/stones	2% of gross amount payable
Cross-Border traders	All commercial goods	10% of the value of the goods
Informal traders	All persons receiving rental income in respect of premises where trade is carried	10% of the rental amount per month and 10 of the Proceeds
Commercial Waterborne vessels	Up to 5 passengers	US\$250
	6-15 passengers	US\$500
	16-25 passengers	US\$1000
	26- 49 passengers	US\$1500
	50 and above passengers	US\$2000
	Fishing rigs	US\$350

Source: Zimbabwe Revenue Authority, 2010

The current presumptive rates are prohibitively high. The rates for omnibuses that carries 15-24; 25-36 and 37 passengers and above were \$200; \$400 and \$650, respectively in 2009. In 2010 the rates were revised after the authorities realised that the rates were too high. As a result of these rates, some businesses deliberately hid their activities in order to avoid paying taxes.

The informal economy is common in almost every country regardless of the level of income but is rampant in developing countries. (South Africa 28.4%, Tanzania 58.3%, Uganda 43.1%, Mali 41%, Senegal 43.2% and Zimbabwe 59.4% of GNP in 1999/2000 (Schneider 2002)) Despite researches having been undertaken on the informal economy in Zimbabwe, there is a literature gap on measuring its size, trends in the period 2009 to 2013 where the size to the best of our knowledge has not been econometrically estimated.

### **1.3 Motives of the Intensification in the Informal Economy**

Increase in informal economies is triggering serious problems for governments and policy fabricators in Zimbabwe and around the world. The progression in informal economy is a

result of various reasons. The most essential of these identifiable reasons are increased tax loads together with social security offerings, increased conventions in the official economy especially in the job markets, poor governance and the prevalence of substantial corruption in government operations. In this regard, Zimbabwe is not an exception.

### **1.3.1 Taxes and Social Security**

High tax rates lead to low tax morality which would in turn encourage individuals and organisations to participate in the informal economy in order to avoid payment of taxes. The larger the variance between involvement and after tax earnings from the labour market, the larger the motivation for economic agents to take part in the informal economy. Tax regime and the social security system have a significant influence on the growth of informal economy.

### **1.3.2 Government Regulations**

Johnson et al.,(1997) conducted a research and concluded that countries with more regulations on their economies have larger informal economies. Guidelines such as the attainment of licences, employment market rules, limitations for outsiders and trade constraints, all lead to increase in the cost of labour and as a result cause many people to shift to the informal economy. In Zimbabwe, for example, it takes about three months to register a company which would act as a disincentive for formalisation.

### **1.4 Implications of the Informal Economy**

Informal economy on its own is not a problem but what matters are its implications. The informal economy constitutes an important part for developing countries for example in Africa, it is estimated to represent 43% of the official Gross Domestic Product (GDP) thus being almost equal to the formal economy (UN, World Urbanisation Prospects: the 1999 Revision (2000)). This phenomenon provides short term solutions to the poor households but in the long term, it can seriously challenge economic development for countries.

The primary implication of the informal economy is the loss of government revenue. Size and the growth of the reported income and the tax gap affect the size of government deficits, government debt and tax reform policies (Feige, 1990). Economic planning too will be misleading as the official data will not be accurate. The international comparisons will also be misleading. When the incidence of informality and tax loss are positively related or when they are high, formal traders would carry the totality of the tax burden. This reduces incentive to invest in the formal sector, but encourages investment in the informal economy hence the desire to tax the informal economy.

Some of the informal economic activities if not all are not captured by the official records. This leads to unreliable external trade statistics which hinder the effective formulation, implementation and monitoring of domestic, regional and international trade policies. This would negatively affect the negotiation of trade agreements. Missing trade data impacts negatively on Balance of Payments (BoP) National income data can then complicate the formulation of effective macroeconomic and development policies.

Macroeconomic policies are influenced by the estimates from national accounts hence the skipping of certain economic undertakings could certainly lead to inaccurate policy analysis (Bagachwa and Naho, 1995). Due to unrecorded economic actions, economic variables such as Gross Domestic Product, reserves, consumption, yield and balance of payments approximations will be misleading. Biased economic variables would lead to wrong conclusion about the manipulation of monetary or fiscal policy instruments. GDP especially is widely used; therefore underestimation of it implies that all other variables whose calculations make use of GDP are also affected. This results in crafting of inappropriate macroeconomic policies for the best economic performance by the government (Thomas, 1999).

Colledge (2002) considered a special case when monetary contributions are made or received by a country which depends on its GDP, relative poverty is also measured by per capita GDP, and environmental standards are also measured by carbon dioxide emission per unit of GDP and finally tax burdens which are also computed as ratios of taxes paid to GDP.

The prevalence of a large informal economy creates unfair competition between the informal and the formal economy thereby effectively lowering the official economy's income. In Zimbabwe for instance, those in the metal fabrication industry, for example those in Magaba, Mbare charge lower prices compared to the prices of registered hardware such as Union Hardware. The prices of similar products are slightly different, probably because informal traders are not paying taxes.

### **1.7 Statement of the Problem**

The current estimates of the size of the informal economy in Zimbabwe are not econometrically known. ZIMSTAT carries out Labour Force Surveys after every five years. The last survey was carried in 2011 since 2004 due to financial constraints. The survey revealed that the size of the informal economy was estimated at 84% using the concept of informal employment (Labour Force Survey, 2011). In carrying out such surveys, it assumes that the participation in the official labour force remains constant. We consider the estimates of ZIMSTAT to be unreliable since individuals may work in both the official and informal economies. As a result, such individuals can go undetected and are not considered as part of the informal economy's workforce.

The way of estimating the informal economy used by ZIMSTAT therefore lead to results that are not reliable and hence contributes to weak guesses of the magnitude of the informal economy. Given that there has been a marked improvement in the macroeconomic variables. Real GDP growing from as low as negative 17.7% in 2008 to 5.4% in 2009, 9.6% in 2010, and 11.4% in 2011 (MoF 2013). Capacity utilisation too improved significantly from as low as below 10% in 2008 to high values of 30% in 2009, 41% in 2010, 54% in 2011 before falling to 44% in 2012 and also low levels of inflation below 5%, hence we expect the size to be lower than 84% estimated by ZIMSTAT.

Makochekanwa (2010), estimated the size of the informal economy in Zimbabwe for the period 1980-2008. The share of the informal undertakings in Zimbabwe's Gross Domestic Product has been rising over the years from twenty three percent in 1995 to around thirty percent in 2003 (Malaba, 2006). There is a literature gap in terms of covering the period 2009 to 2013. Therefore it is this gap that this current dissertation intends to fill.

As we have already highlighted, the informal economy is not a problem on its own but what matters are its implications. According to Makochekeanwa, (2010) and Malaba, (2006) it is clear that the size of the informal economy in Zimbabwe has been continuously growing yet its contribution to the national development in terms of tax revenue is still minimal.

Like many other developing countries, (Mozambique, Ghana, Tanzania, Zambia and others), Zimbabwe continues to experience low tax revenue for example 10.2% tax revenue to GDP in 2009 (MoF, 2010). One of the probable reasons is an abrupt increase in the informal economy (Malaba, 2006). Many developing countries fail to generate adequate tax revenue required to finance their public expenditures (Fuest and Riedel, 2009), and hence just like other developing countries, Zimbabwe depends heavily on taxes to generate the much needed revenue for development. The informal economy which goes unnoticed will give rise to government policies whose results might be quite different from the intent (Feige, 1981).

According to IMF, introduction of ESAP in 1991 resulted in a decline in formal economic growth. As a result of the decline in the formal economic activities, this caused persistence of high poverty levels, unemployment and inequality leading to the development of the informal economy. One of the reasons for the existence of the informal economy is the tax burden, that is the greater the tax burden, the greater the incentive for individuals to remain in the informal economy. In Zimbabwe for instance, income tax has been very high above 30% for nearly three decades and this contributed to some economic activities to continue remaining in the informal economy (Chuimya, 2008; De Soto, 1989 and Sookram et al, 2008).

Existence of potential tax loss in the tax system has been cited as the major hindering factor in the mobilization of adequate tax revenue (Bekoe, 2010). Zimbabwe like many other African countries (Zambia, Malawi, Kenya, and Angola among others) is unable to meet its public expenditure targets and inadequate taxation is one of the causes, probably due to an abrupt increase in the informal economy. It is the size of the informal economy and the extent of potential tax loss that is a major cause of concern and not its presence. Lack of information in the informal economy is responsible for distortions in major macroeconomic indicators hence up-to-date estimates of the size and growth are very important in policy formulation. This justifies our desire to undertake this study.

With new businesses immerging in the informal economy, dwindling revenues for the government should be limited. ZIMRA, as the arm of government responsible for mobilising domestic revenues should do more to address the issue of compliance by the target groups. The paradox, however, is that whilst the informal economy is ever expanding, tax revenue remains suppressed especially presumptive tax.

Despite several fiscal reforms implemented to minimize tax burden such as the introduction of presumptive tax, the informal economy continues to be a problem in Zimbabwe. The nature of the informal economy makes it very difficult for its size to be determined because economic agents engaging in such activities are not easily identified by the tax authorities. The presence of a large informal economy implies activities that are liable to tax payments are hidden from the tax authorities and the tax revenues are not collected.

The Zimbabwean economy is perceived to be highly informalised. This negatively affects foreign direct investment (FDI) since foreigners do not normally want to invest in a highly informalised economy. Therefore this current study intends to econometrically estimate the size of the informal economy in order to give a true picture of the country's informal economy so as to unearth the perceived perceptions.

### **1.5 Objectives of the Study**

The general purpose of this study is to measure the magnitude of the informal economy in Zimbabwe using the currency demand approach for the period 2009-2013 so as to establish the extent to which official national accounts misstates real production of goods and services ( Cagan, 1958).

The specific objectives of the study are:

- a. Estimate the size and the trends of informal economy in Zimbabwe for the period 2009-2013.
- b. Estimate the extent to which official national accounts data underestimates the actual production of goods and services.

## **1.6 Research Questions**

- a) What is the size and trends of the informal economy in Zimbabwe?
- b) What is the impact of the informal economy in Zimbabwe on the tax revenues?

## **1.8 Justification of Study**

The methodology for estimating the size of the informal economy has been a growing subject of debate. In Zimbabwe, the nature and dynamics of the informal economy have been analysed by Makochekanwa (2010). However, despite this pioneering work, new estimates are required in Zimbabwe to cover the recovery period. The size of the informal economy of 84% by ZIMSTAT is unrealistic due to macroeconomic improvements which justify a low size of the informal economy compared with the time of economic crisis especially 2006-2008. Continued increase in the size of the informal economy has the primary implication of loss in tax revenue by the state. It is therefore, critical for the government to know its size so as to formulate appropriate policies. The findings of this study are likely to benefit the government.

The desire to know the size, trends of the informal economy nationwide has forced us to undertake this study. The significance of the study is predicated on the grounds that a clear understanding of the size of the informal economy and its implications on tax revenue left uncollected and the factors accounting for its existence are necessary for effective policy formulation and implementation in order to minimize tax loss.

Findings from this study are expected to complement the existing literature on the subject especially on developing economies since most empirical studies on the size of the informal economy focus on developed economies. For instance, the work of Clotfelter (1983), Klovland (1984), Crane and Nourzad (1986), Trehub and Krasnikova (2005), Richardson (2006), (2008) and Schneider et al. (2008)) with a limited number focused on developing countries.

## **1.9 Hypothesis Formulation**

The null hypothesis is that the increase in size of the informal economy in Zimbabwe results in decrease tax revenue against the alternative hypothesis that the increase in size of the informal economy does not reduce tax revenue.

H0: increase in size of informal economy results in decrease in tax revenues

H1: increase in size of the informal economy does not results in reduction in tax revenues

## **1 10 Organisation of the Study**

The rest of the study is organized as follows: Chapter one is the introduction, chapter two focuses on the theoretical and empirical literature whereas chapter three concentrates on the methodology and model for the study. Chapter four is devoted to presentation and discussion of the empirical results. The conclusion and policy recommendations are offered in chapter five.



# **CHAPTER TWO: LITERATURE REVIEW**

## **2.0 Introduction**

This section highlights both the theoretical framework and the empirical literature which underpins the informal economy. Theoretical framework consists of theories on the informal economy such as the dualist, structuralist and legalist paradigms. Empirical literature review section will highlight different recent studies done on the informal economy in both developed and developing nations. The review is not exhaustive but summarises some of the developments in the field and this will help us with an empirical platform that will form the basis for the model development in the next chapter.

## **2.1 Theoretical Framework**

One of the reasons for the small number of empirical research on the informal economy is lack of theoretical framework(s) that explains the behaviour of the informal economy. In fact, the traditional 'classical' and the Keynesian Schools make no explicit reference to the informal economy. It is only in the early 1980s that the informal economy has been incorporated into theoretical models. The reason behind incorporating and considering the informal economy came largely from the new structuralist school (Loayza, 1997; MacAfee, 1980; De Soto, 1989; Kelley, 1994).

There are however three dominant schools of thought that inform the work on the informal economy with which literature can be classified. These can be categorized as structuralist, dualist and legalist schools, as explained below.

### **2.1.1 The Dualist School**

The work was propagated by the International labour Organisation (ILO) in the 1970s and recommends that the informal economy is embraced of borderline activities that provide income for the poor and a safety net in times of crisis. The perseverance of informal

economic activities is largely due to inadequate modern job opportunities created to engage surplus labour.

According to this school, the magnitude of the informal economy will progressively reduce if satisfactory levels of economic growth are realized. The informal economy absorbs the infinite supply of labour unable to enter into formal employment. This would be the case at least until take-off is achieved. Most scholars such as Makocheke, (2010), Malaba, (2006) do acknowledge that the informal economy sometimes provides a discarding ground for laid off workers and waiting place for job seekers. This is obviously the case in Zimbabwe as individuals are forced to enter into the informal economy due to lack of jobs in the formal economy and also due to poverty.

Sir Arthur Lewis, (1954) propounded a theoretical model of economic development. This theoretical model was based on the expectations of infinite supply of labour in most of the least developed countries. As countries develop, industrialisation and modernisation, Lewis assumed that the pool of unlimited supply of labour would be engrossed by the industrial sector. The traditional sector which comprised of trivial traders, small producers and a range of casual jobs would ultimately be engaged into the formal economy and fade as development occurs. In this regard, economic development in LDCs has failed to create enough urban jobs that would be able to absorb surplus labour.

The informal economy as the non-structured sector that has come up in the urban centres due to powerlessness of the industrial sector to engross new entrants is not something that is new to Zimbabwe, but is rampant in most developing countries in Africa, Asia and Latin America. It is also common in industrialised countries, but is not as rampant as in LDCs (ILO and UNDP 1972).

### **2.1.2 The Structuralist School**

This was popularised by Portes (2003) in the late 1970s and early 1980s and propounds that ‘the informal economy should be viewed as coordinated economic units, micro-firms and

workers that serve to reduce input and labour costs. This increases the success of large capitalist firms. In opposite to the dualist model, different forms and modes of production are seen not to co-exist but connected and interdependent.’ The informal economy is linked to the formal economy in capitalist development. The informal economy depends on the formal sector for its demand and supply of inputs, but in a way that leaves very little room for its dynamic expansion. The formal economy in their production processes makes use of cheap labour and inputs from the informal economy.

### **2.1.3 The Legalist School**

This theory was popularised by De-Soto (1989) in the early 1980s and 1990s. According to De-Soto (1989), the informal economy is composed of micro-entrepreneurs who choose to operate informally in order to prevent the costs, time and effort of formalisation. Micro-entrepreneurs will remain operating unceremoniously as long as government rules and guidelines are tiresome and costly. The theory argues that government rules and regulations are responsible for incentivising economic agents to select to operate informally so as to avoid the costs of formal regulation’.

Mc Clain et al (2008) observed that most countries with weak state enforcement systems including African countries, Latin America, and Southern European countries, inadvertently permit businesses to operate informally. Mc Clain et al (2008) also observed that, states with relatively strong implementation seek to control components of informal activity by developing much stricter and more broadly reaching regulations or more operative monitoring and prosecution systems.

The focus on government policies is because these policies have a direct bearing on the growth and expansion of the informal economy. According to Sookram and Watson (2005), governments and other state assistances may view informal business activities as unbearable if and only if it deprives the state of revenue. This was the major contribution of this school of thought to academic knowledge. Heintz and Pollin (2003), suggested most recent theories of informal economy take into account the role of Government guidelines and formal institutional organizations as they enforce costs and limitations on economic agents.

These theories incorporate the larger disputes on the informal economy. That is, arguments such as the informal economy as a deterrent to progress, and over-regulation that averts informal economy from attaining its full prospective. In addition, the informal economy is treated as the machine for growth and development.

The best theory that informs our research is the legalist school of thought. This is because, as a crucial decision and policy maker, it is important for government to realise the impact of their policies on the informal economy. Zimbabwe is currently engaged in national reconstruction and hence it is important for the government to establish policies that are comprehensive and realise the potential and threats the informal economy possesses. Certain aspects of the dualist and the structuralist models are drawn especially those that propose that the informal economy can contribute to the growth and development of the country.

Another supplementary theoretical model of the informal economy is the one by Loayza, (1997). The model advocates that the informal economy materializes when too much taxes and regulations are imposed by the governments that fall short of the capacity to enforce obedience to the economic agents. The conclusion in this theory was that in countries where the tax burden is larger than optimal size and where prosecution is too weak, the relative size of the informal economy was high.

## **2.1 Empirical Literature Review**

According to Georgiou (2007), Cagan (1958) was the first to develop the currency ratio method when he attempted to explain the long-term variation of the ratio of currency to the money supply in the US. Since then, the approach has been used to isolate the resulting “excess” demand for currency in which currency demand is represented as a function of conventional factors. Such factors include the evolution of income, payment practices, interest rates. Other factors cause people to participate in the informal economy, such as the tax burden, tight government directive and the difficulty of the taxation system in a country.

Tanzi (1983) initiated to econometrically estimate the currency demand function for United States for the period 1929 to 1980 so as to estimate the informal economy. Accordingly, informal economic activities were found to be a direct response to higher taxes. His approach suggests that within the informal economy, transactions are mainly conducted with cash payments, in order not to leave behind any evident for monetary authorities to trace. An increase in the size of the informal economy therefore indicates an increase in the demand for currency. The variables included in Tanzi's model are ratio of cash holdings to current and deposit accounts, weighted average tax rate, proportion of wages and salaries in national income, interest paid on savings deposits and finally per capita income. Other studies which have employed Tanzi's currency demand equation include Klovland (1984), Hersoug (1983) and Sookram and Watson (2005). We acknowledge that high taxes are one of the causes for people to participate in the informal economy.

Saunders (2005) estimated the size of the informal economy in South Africa and evaluates its macroeconomic implications. In doing this, he used the money demand approach for the period 1966-2002 using time series analysis. He found out that rapid urbanization, slow speed of economic growth, decrease in the occurrence of formal employment and the promotion of small-medium and micro –enterprises greatly contributed to the recent growth of informal economy in South Africa. The reasons as to why people might prefer to operate in the informal economy are also explored. The results shows that the size of the informal economy for the period of the study stood at an average of 9.5% of GDP. The size for the period 1966-1993 was found to have decreased and after 1993 the size remained relatively constant. Conclusively, the study found out that macroeconomic policy which largely do not take into account the informal economy in its scheming and planning increases the possibility that such policy may have unintended consequences. The variables used were, notes and coin in circulation, nominal interest rates, government revenue to GDP, Gross National Income per capita, general government index and finally final consumption expenditure by households to GDP.

Greenidge et al, (2009) estimated the size of the informal economy in Barbados using the currency demand approach for the period 1972-2007, using time series estimation technique. The variables used were real currency per capita, as the dependent variable, and the explanatory variables were real disposable income, interest rate, rate of inflation, tax rate,

private expenditure as a ratio of GDP and the technological trend variable. In the study by Greenidge, real disposable income and tax rate were expected to have a positive sign while interest rate and trend variable were expected to be inversely related to money demand. Increase in tax would lead to expansion of the informal and hence greater use of cash. The estimates reveal that the informal economy is reasonably quite large and has grown over time to around one-third of the official economy. These findings were found to be consistent with the stylised fact about the Barbadian economy.

Makochekanwa (2010) estimated the size and trends of the second economy in Zimbabwe for the period 1980-2008 using the currency demand approach using time series analysis. Just like Greenidge et al, (2009), he used similar variables and the expected signs were also similar. He found that the second economy on average in Zimbabwe has grown from as low as less than 10% of official GDP at independence to a higher percentage share of 52% by the end of 2009. The estimate obtained are considerably high than those found by most studies on African countries, for instance an average 9.5% of South Africa (Saunders,2005). In Makochekanwa's study, the highest value of 70% was attained in 2008, this is greatly supported by a prolonged decade of economic decline which saw GDP falling by more than 50% between 1999 and 2008. Makochekanwa's study and others are useful in shedding light on the significant role of the informal economy at that time, the changeover period or the dollarization period 2009- 2013 remain absent in the case of Zimbabwe hence it is this gap that the present study intent to cover.

ZIMSTAT (2011) also carries out labour force participation surveys so as to determine the size of the informal economy in Zimbabwe. In carrying out such surveys, it assumes that the participation in the official labour force remains constant. As a result, we consider the estimates of ZIMSTAT to be unreliable since individuals may work in both the official and informal economies. Such individuals can go undetected and are not considered as part of the informal economy's workforce. The method used to estimate the size of the informal economy therefore leads to results that are not reliable and hence the estimates are fragile. According to the survey, the formal economy contributed about 11 percent of the employed population, 84% were considered to be in the informal employment and finally the remaining 5% were not classifiable.

From the empirical studies, it is clear that taxes, interest, income, government regulations and payment practices are the variables used. Since we are using the money demand model, it is imperative to have a brief look on the theories of money demand. Basically, there are two theories of the demand for money which are the transactions demand and the quantity theory of money. These two theories postulates that real money balances depends on scale and opportunity cost variables. Scale variables have a positive effect on money demand and these include income which can either be real or nominal GDP. Opportunity cost variables are inversely related to the demand for money and these include interest rates and the rate of inflation. In general, real money demand balances can be modelled in a functional form including scale and opportunity cost variables and that is where studies on informal economy extract the explanatory variables. Unlike all other studies we will use monthly data.

The use of cash as a means of payment is exactly the case in Zimbabwe, therefore we do acknowledge this as mentioned earlier in the background. Government regulations too are very strict in Zimbabwe for example, the formation of a company which takes about three months. It therefore means that there are restrictions in the formal economy, which are discouraging individuals to formalise their activities.

To the best of our knowledge, there is no study that has attempted to measure the size of the informal economy using monthly data, but using annual data. We choose to use monthly data because of the period of the study in time series analysis. It is easier to identify changes in trends, it is often desirable to remove annual variation and finally monthly data is better for strategic long term forecasting. As a result of all these, we consider our estimates will be close to reality.

## **2.2 Definition of the Informal Economy**

There is a lot of argument on the definition of informal economy; therefore the definition of the informal economy differs with the objective and approach of the study. Greenidge (2009) defined informal economy as any economic activities that do not come into the view of the figures of the national income and Gross National Product. Using this definition, it happens that illegal activities lie within the informal economy, but there are legal activities over that

may contribute for example one who gets extra income through working his spare time but does not report his income is said to participate in the informal economy. Schneider & Klinglmair (2004) also defined the informal economy as all presently unregistered economic activities that do not contribute to the official GDP. They considered the informal economic activities as all market-oriented activities-whether legitimate or illegitimate- that fail to be noticed in the official estimates of GDP.

Schneider (2008) on the other hand, defined informal economy as the one that includes only all legal and market based production of goods and services that are deliberately concealed from governments for the following reasons: (a) To avoid payment of income, value added or other taxes (b) To avoid payment of social security contributions (c) To avoid having to meet certain legal labour market standards such as, minimum wages, maximum working hours, safety standards and (d) To avoid complying with certain administrative procedures such as completing statistical questionnaires or other administrative forms.

There is therefore, lack of consensus in formulating a unified theory of the informal economy or even a precise definition of the components that comprise it, hence a useful definition of the informal economy for this study is the one that includes all unreported economic activities monetary transactions that would generally be taxable were they reported to the state tax authorities (Buhn et al, 2007), hence potential tax loss as a result of these activities.

### **2.3 Components of the Whole Economy**

The total economy is made up of the measured economy (formal economy) and unmeasured economy or the informal economy. The measured economy comprises of the official economy, which follows all laws and regulations and is recorded by national authorities. The fraction of the informal economy is not either accurately recorded or estimated by authorities. Hence, the informal economy may be regarded as the unmeasured portion of the whole economy. The method we will be using to quantify the informal economy in Zimbabwe therefore will force us to limit our definition to those unrecorded activities involving monetary transactions irrespective of the legality.



## **2.4 Methods of Estimating the Informal Economy**

There are basically two major approaches that can be used to estimate the size of the informal economy that are direct and indirect as briefly described below:

### **2.4.1 Direct Approaches**

These are also referred to as micro and include micro-surveys of the informal economy, tax audits and other compliance methods. These approaches can bring a close estimate of the informal economy if they are correctly executed, however it is unlikely that all individuals involved in the informal economy can reveal themselves to the survey and they only provide lower-bound estimates for the size of the activity (Greenidge et al, 2009 and Feige, 1990). Moreover, non-voluntary tax audit by forcing income earners, especially businessmen to reveal their true taxable incomes can face the dilemma that the data used (tax obedience data) may be a subjective sample of the total population.

### **2.4.2 Indirect Approaches**

These particular ways of carrying out a task allow approximations to be obtained from appropriate distinct information. This is because, as stated before, most individuals do not want the relevant liable authorities to know of their connection in the informal economy, and hence try their level best to camouflage their activities. The approaches are also called indicator approach because they employ many economic indicators that give information about the development of non-observed economy over time (Lkhagvajargal, 2004).

Vuletin (2008) classified indirect approaches as: (i) the discrepancy between national expenditure and income statistics; (ii) the discrepancy between the official and actual labour force; (iii) the “electricity consumption” approach of Kauffman & Kaliberda (1996); (iv) the “transaction” approach of Feige (1979); (v) the “currency demand” approach of Cagan (1958) and others; and (vi) the “Multiple Indicators, Multiple Causes” (MIMIC) approach of Frey and Weck-Hanneman (1984).

The “transaction approach” of Feige (1979) and “currency demand approach” of Cagan are jointly called monetary approach and monetary measures are the most widely used methods to estimate the size and evolution of the informal economy. Makochekanwa (2010), Greenidge et al (2009) and Maurine et al (2006) are among others who used monetary measures. Monetary measures are the most widely used methods to estimate the size and evolution of the informal economy.

Transaction approach uses Fischer’s quantity equation, where  $\text{Money} \times \text{Velocity} = \text{Prices} \times \text{Transactions}$ . Assuming constant relationship between money flows related to transactions and the total (official and unofficial) value added, that is;  $\text{Prices} \times \text{Transactions} = k (\text{official GDP} + \text{informal economy})$ . Therefore  $\text{Money} \times \text{Velocity} = k (\text{official GDP} + \text{informal economy})$ . The stock of money and official GDP estimates are known, and money velocity can be estimated. Thus, if the size of the informal economy as a ratio of the official economy is assumed to be known for a benchmark year, then the informal economy can be calculated for the rest of the sample.

Currency (money) demand approach assumes that informal transactions take the form of cash payments, hence an increase in the size of the informal economy will, consequently, increase the demand for currency and this shall be an important assumption in this study.

The size and evolution of the informal economy can be calculated following two steps. First, the difference between the evolution of currency when tax burdens are held at their depressed value and the new products of currency with higher burden of taxation and government regulations is calculated. Second, assuming the same velocity of money used in the informal economy as for legal money in the official economy, the size of the informal economy can then be computed and compared to the official GDP.

## **2.5 Reasons Behind Choosing the Monetary Approach**

We decide to make use of the monetary approach as a result of the following outlined reasons:

**a.** Monetary data are the best data sets in LDCs (Georgiou, 2007 and Greenidge et al 2009).

- b.** Easy to use in simple OLS model (Saunders and Loots, 2005).
- c.** Greater number of individuals participating in the informal sector predominantly uses cash to finance their transactions (According to ZIMSTAT, 2011, about ninety six percent of the individuals participating in the informal economy, reported receiving their remuneration as cash only hence the advocating for the currency demand approach in this study).
- d.** The approach is able to produce time series estimates and was successfully used in Africa (Chipeta; 2005, Bagachwa and Naho, 1995 and others)
- e.** There is no need to distinguish between currency in circulation and bank deposits.

## **2.6 Conclusion**

The forgoing literature review has shown that studies done on the topic under the study considered several factors that affect or determine the demand for money using the currency demand approach to estimate the informal economy. In most studies tax rates were considered as the most significant variable in explaining the existence of the informal economy. On the theoretical framework, the best theory that informs our dissertation is the legalist school of thought. This is because, as an important choice and policy maker, it is vital for government to realise the noticeable effects of their plans of action on the informal economy.

## **CHAPTER THREE: METHODOLOGY**

### **3.0 Introduction**

This chapter discusses the methodology used in the study in measuring the size of the informal economy in Zimbabwe. Ordinary Least Squares (OLS) is the econometric technique to be used, using E-views 7. The chapter will also outline the model specification, defining the variables and sources of data. The first part of the chapter will deal with stationarity tests which are a pre-requisite when using time series data. We shall resort to the use of the indirect approach, the monetary approach as a result of the availability of data and the easy of application. Georgiou (2007) and Greenidge et al (2009) stressed that monetary approach is the best and most commonly used and easily applied approach to estimate the informal economy in developing countries such as Zimbabwe as monetary data are the best data sets in these countries. The approach is also chosen as there is no need to distinguish between currency in circulation and bank deposits. An individual who is involved in the informal economy can easily use demand deposits to finance informal activities.

### **3.1 Data type, Sources and Econometrical Package**

Monthly time series macroeconomic secondary data covering the period 2009-2013 shall be employed. The datasets obtained from a wide range of sources. Information on the currency in circulation and commercial banks' deposit rates are obtained from the RBZ. Tax revenue values are obtained from the Ministry of Finance and finally data for the volume of industrial index and monthly inflation rate variables were from ZIMSTAT.

Since we are using time series data, we check whether the variables are stationary. To identify which of the variables follow a random walk, we check for the presence of unit roots. The study will make use of E-views7 to regress the data.

### 3.3 Key Assumptions in the Money Demand Model.

1. Informal economic activities are a direct response to higher taxes or results from strict and tough tax administration and regulations. (Sookram et al, 2008; De Soto, 1989; Tanzi, 1983).
2. Currency or cash is used for payments only in the informal economy. This is a result of difficulties in entering the formal banking institutions in the informal economy in Zimbabwe. Lack of financial institutions to promote non-cash enables the use of cash (Tanzi, 1983).
3. Speed of money is the same in both the formal and informal economy (Emerta, 2010; Makochekanwa, 2010).
4. We shall assume that informal transactions are undertaken using cash payments in order not to leave any evident for the monetary authorities to trace hence an increase in the size of the informal economy would lead to an increase in the demand for currency (Tanzi, 1983).

### 3.4 Model Specification

Our empirical model using the monetary approach to estimate the informal economy will be in line with the work of Gills (1998), as quoted in Asamne (2010). The difference will be on the inclusion of a proxy to the changes in the size of the informal economy (tax revenue) which would try to explain the demand for money in both the recorded and unrecorded economy hence we will add it in our model. Unlike Gills we resort to the use of monthly data and instead of using GDP, we use industrial index. Tax burdens have in the literature a significant role in shaping the demand behaviour for money holding. The starting point should be Gills (1998) definition of the demand function for money. His model is:

$$M_t = \beta_0 Y_t^{\beta_1} R_t^{\beta_2} CPI_t^{\beta_3} \exp(\varepsilon_t) \dots\dots\dots(1)$$

where M is demand for money, Y is income, nominal GDP which captures demand for money in the recorded economy, R is the lending interest rate by banks, CPI is consumer price index and it is a proxy for inflation and  $\exp(\varepsilon_t)$  is the random error term.

Our model is re-specified as:  $M_t = \beta_0 TAXR_t^{\beta_1} Y_t^{\beta_2} R_t^{\beta_3} INFL_t^{\beta_4} EXP(\varepsilon_t) \dots\dots\dots(2)$

where the variables are explained as in the definition of variables. By taking the logarithms of

the model above and representing it in lower cases, the model is specified as:

$$m_t = \beta_0 + \beta_1 taxr_t + \beta_2 y_t + \beta_3 r_t + \beta_4 inf l_t + \varepsilon_t \dots\dots\dots(3)$$

According to equation (3) above,  $M_t$  (demand for money) is a function of the tax revenue, income, as measured by industrial index growth and is a proxy for GDP, weighted commercial banks deposit interest rate, monthly inflation rates and the error term.

### **3.5.0 Definition of Variables**

Following the monetary approach of estimating the size of the informal economy in Zimbabwe, we apply the money demand model in line with the work of Gills, (1998) and the following monthly time series macroeconomic variables would be required:

#### **3.5.1 Money Demand ( $M_t$ )**

This is the stock of money, measure of money supply, broad money that includes cash, demand deposits plus savings deposits plus less than 30 day deposits (M2). This is the dependent variable.

#### **3.5.2 Tax Revenue ( $TAXR_t$ )**

Tax revenue is an explanatory variable that is computed as the sum of tax on income and profits; tax on goods and services; exercise duties and other indirect taxes and it is a proxy to the changes in the size of the informal economy. Tax revenue is expected to be directly related to money demand. This is because as tax rates increases, the demand for money for transaction and precautionary purposes by individuals increase to finance activities in the informal economy.

#### **3.5.3 Industrial Index ( $Y_t$ )**

It is an indicator that is used for measuring changes in the volume of production. It is used as the proxy to income in the recorded or official economy as measured by the volume of

industrial index. We take it as a proxy for GDP growth and it captures changing payment and money holding patterns or demand for money in the recorded economy. Income in the recorded economy is expected to have a positive sign, that is, as income in the recorded economy increases, we also expect the demand for transaction purposes to also increase, *ceteris paribus*. It is calculated on the last day of business of each month.

#### **3.5.4 Interest Rates ( $R_t$ )**

Interest rate represented by commercial banks' weighted average deposit interest rate and it captures the effect of a change in deposit interest rate on the amount of currency held for transactions by individuals. Interest rate captures the opportunity cost of holding cash. Interest rate is expected to have a negative sign, meaning to say as interest rates increase, the demand for money reduces as the opportunity cost of money would have increased.

#### **3.5.5 Inflation Rates ( $INFL_t$ )**

This is monthly rate of inflation. Inflation rate is a measure of macroeconomic stability; therefore high inflation distorts economic activities and reduces investment in productive enterprises, thus reducing economic growth. Inflation is indeterminable because rising inflation erodes the value of money and it induces rational economic agents to hold real assets. On the other hand, rising inflation causes people to demand more money in order to finance as much goods and services as possible hence the sign can either be positive or negative.

#### **3.5.6 Error Term ( $\exp(\varepsilon_t)$ )**

This is the random error term that captures skipped variables in the model and is normally and independently distributed.

### 3.6 Steps in Calculating Informal Economy

Two equations based on our empirical equation (3) above will be estimated. We first estimate the full model ( $\hat{m}_t$ ) equation which contains both the formal and informal economy variables. Secondly, the estimated model will be the one representing the formal economy (FE) without the informal economy proxy variable, tax rate. Based on our key assumption that informal economy results from strict and tough tax administration and regulations, we set the coefficient of the tax variable zero while coefficient of other variables remain unchanged. The same velocity of money is used in both the formal and informal economy. Comparing the difference in the currency demand at different tax rates ( $\hat{m}_t$ -FE) constitutes currency holdings in the informal economy. We will then multiply ( $\hat{m}_t$ -FE) by the transaction velocity of money (V). Transaction velocity is calculated as  $V = \frac{\text{real GDP growth}}{M2\text{growth}}$  (Emerta, 2010) Therefore, the size of the informal economy can be computed by the expression: ( $\hat{m}_t$ -FE) ( $\frac{\text{real GDP growth}}{M2\text{growth}}$ ) = Informal economy currency (Saunders, 2005).

### 3.7 Multicollinearity Test

We will test for the possibility of multicollinearity using the correlation matrix. The presence of multicollinearity would be seen if there is one of the variables with a coefficient that is greater than 0.8. The exogenous variables that are used in the model are tested for correlation before they are considered as suitable in the model.

### 3.8 Stationarity Tests

Time series data is stationary if and only if its mean and variance are constant through time and the value of the covariance between the two time periods is determined by the distance or lag between the two time periods and not the actual time at which the covariance is calculated (Gujarati, 2003). Regression equations with non-stationary variables have serious limitations.



Among other problems, their t-ratios and the adjusted R-square will be overestimated by a large magnitude. Therefore, all tests become invalid leading to spurious regression problem. In order to avoid the problem of spurious regression, trended data is differenced to generate a stationary series. Although there are several tests of stationarity, such as the graphical method, the correlogram method, Phillips Peron Test and the Augmented Dickey Fuller (ADF) test, this study uses the Augmented Dickey Fuller test. The ADF test is the most popular stationarity test and it was developed by Dickey and Fuller in 1970. ADF is chosen among all other tests because of consistency, accuracy and its ability to correct serial correlation.

### **3.8.1 Augmented Dicky-Fuller test (ADF)**

We tested the stationarity of all the variables at trend and intercept at all levels. Rejecting the null hypothesis implies that the series are stationary. The Dickey-Fuller (DF) test assumes that the error terms are uncorrelated, thus the use of the standard DF test critical values would be invalidated if the error terms in the test is correlated over time, violating the white noise assumption of the DF test. This study used an Augmented Dickey-Fully (ADF) test that takes into account any auto correlation present by adding the lagged values of the dependent variable.

## **3.9 Cointegration Tests**

The study will then estimate the cointegration (long run) model and then use the residuals generated from the long run model to test if a cointegration (long run) relationship exists among the variables included in the model. If it is proved that a relationship exists, an Error Correction Model (ECM) (short run model) is specified. The study uses the Granger causality test to determine the direction of the relationship between variables. Causality in econometrics is defined as the ability of one variable to predict another variable. The two variables, informal economy and tax revenue affect each other.

### **3.9.1 Error Correction Model**

The error correction model was then estimated which will test the adequacy of the estimated equation and the model would be specified as:

$$\Delta M_t = \alpha_0 + \sum_{i=1}^k \alpha_i \Delta M_{t-i} + \sum_{i=0}^k \alpha_i \Delta Z_{t-i} + U_t ECM_{-1} + \varepsilon_t$$

where  $z_t$  is a vector of cointegrated explanatory variables, ECM-1 is the error correction term lagged once and  $U_t$  is a measure of the short term adjustment towards their long run values. However we shall not dwell much in the short run dynamics since we are mainly concerned with the long run relationship.

### 3.10 Conclusion

This chapter outlined the key steps to be undertaken in estimating the size of the informal economy, the econometric tests and the key assumptions used so as to come up with realistic results. The estimation, discussion and interpretation of the results will be presented in Chapter 4.

# CHAPTER FOUR: PRESENTATION AND DISCUSSION OF RESULTS

## 4.0 Introduction

This section is devoted to the presentation of the main findings and discussion of empirical results. Having identified the methodology in the previous chapter, this chapter attempts to test the Zimbabwean data for the validity of this relationship. The research problem at hand is to estimate the long run size of the informal economy. Preliminary data analysis was carried out and the resultant summary statistics are also presented.

## 4.1 Descriptive Statistics

Table 4.1 below provides a summary of descriptive statistics of all the variables used in the study. The variables have sixty (60) observations.

**Table 4.1: Descriptive Statistics**

	<b>M2</b>	<b>INDINDEX</b>	<b>INFL</b>	<b>DEPO_RATE</b>	<b>TAX_REVENU</b>
<b>Mean</b>	2 301 782	152.3322	0.073333	0.188983	2.08E+08
<b>Median</b>	2 647 904	150.7150	0.100000	0.100000	2.15E+08
<b>Maximum</b>	3 466 432	232.8700	1.100000	1.500000	4.20E+08
<b>Minimum</b>	297563.2	55.21000	-3.100000	0.004000	4720122
<b>Std. Dev.</b>	987623.4	33.29109	0.781105	0.259303	88243881
<b>Skewness</b>	-0.592797	-0.389404	-2.509437	2.960797	-0.324023
<b>Kurtosis</b>	2.022240	4.718488	10.63935	13.43181	2.791180
<b>Jarque-Bera</b>	5.904112	8.899357	208.8717	359.7197	1.158926
<b>Probability</b>	0.052232	0.011682	0.000000	0.000000	0.560199
<b>Sum</b>	1.38E+08	9139.930	4.4000000	11.33900	1.25E+10
<b>Sum Sq. Dev.</b>	5.75E+13	65389.51	35.99733	3.967059	4.5E+17
<b>Observations</b>	60	60	60	60	60

According to the table above, tax revenue (TAX\_REVEN), money supply stock (M2) and industrial index (INDINDEX), have the largest variations as shown by the standard deviations of 88243881; 987623.4 and 33.29109, respectively while inflation (INFL) and deposit interest rates by commercial banks (DEPO\_RATE) have the lowest values that are 0.781105 and 0.259303, respectively. Measures of skewness shows that four variables are negatively skewed that is tax revenue; money supply; industrial index and inflation while deposit rate is positively skewed. Jarque-Bera statistic rejects the null hypothesis of normality of deposit interest rate; industrial index and inflation at 1% level of significance except for money supply and tax revenue. In support of the Jarque-Bera statistics, the Kurtosis values of all the variables are close to three indicating that all the variables are normally distributed except for money supply.

## 4.2 Multicollinearity Tests

The exogenous variables are tested for correlation before they are considered as suitable in the model. The results for correlation matrix are illustrated in table 4.2 below. By the rule of thumb, if there is no variable that bears a coefficient greater than 0.8, it means there is no possibility of multicollinearity. All the exogenous variables have the expected signs with the dependent variable except for commercial banks' interest rates. However, what is important are the regression results since the variables are non-stationary. Correlation signs do not show any causation effect between variables and no economic conclusion can be made, but it helps to have a pre-test of the nature of the relationship between the dependent and independent variables as well as to confirm if there is a problem of multicollinearity.

**Table 4.2 Correlation Matrix**

	M2	INFL	INDINDEX	DEPO_RATE	TAX_REVEN
M2	1.00000				
INFL	0.354378	1.000000			
INDINDEX	0.635768	0.503714	1.000000		
DEPO_RATE	0.338765	0.048960	-0.130339	1.000000	
TAX_REVEN	0.913063	0.599378	0.525626	0.274427	1.000000

### 4.3 Stationarity Test

The following are the hypotheses that we use when testing for stationarity using ADF test to determine whether the variable is stationary or not:

$H_0$  = the variable has a unit root (the variable is non-stationary).

$H_1$  = the variable has no unit root (the variable is stationary).

If  $t_c < t_\alpha$  the variable is non-stationary. Accept the Null Hypothesis of non stationarity.

If  $t_c > t_\alpha$  the variable is stationary. Reject the Null Hypothesis of non stationarity.

Unit root test results for stationarity reveals that four variables that are tax revenue, money supply stock, industrial index and commercial banks' deposit rates are not stationary at levels. These variables become stationary after differencing once, hence they are integrated of the order one 1(1). Monthly inflation rates are stationary at levels hence they are integrated of order zero, 1(0). The tables below shows detailed unit root test results for stationarity.

**Table 4.3. ADF Unit Root Tests**

<b>Variables</b>	<b>Trend and Intercept</b>	<b>Intercept</b>	<b>None</b>	<b>Order of integration</b>
<b>Infl</b>	-3.648796 0.0000	-5.185788 0.0000	-4.857481 0.0000	1(0)
<b>Indindex</b>	-7.666065 0.0000	-7.643852 0.0000	-7.442277 0.0000	1(1)
<b>M2</b>	-7.387302 0.0000	-10.79997 0.0000	-2.653020 0.0000	1(1)
<b>DEPO_RATE</b>	-8.684216 0.0000	-8.757953 0.0004	-8.837861 0.0001	1(1)
<b>Tax_Revenue</b>	-6.651520 0.0000	-15.49058 0.0020	-14.43119 0.0051	1(1)

## 4.4 Cointegration Test

The study also estimated the long-run relationship of the variables so as to determine whether a long-run relationship exists or not. Cointegration test using the Johansen method was carried and the following were the results of the test.

**Table 4.4 Johansen Cointegration Results.**

Hypothesised No. of CE(s)	Eigen-value	Trace Statistics	5% Critical Value	Prob*	Max Eigen-value Statistic	5% Critical Value	Prob*
None*	0.779038	160.4189	69.81889	0.0000	87.56630	33.87687	0.0000
At most 1*	0.487661	72.85262	47.85613	0.0001	38.78860	27.58434	0.0012
At most 2*	0.237808	34.06402	29.79707	0.0152	15.75028	21.13162	0.2398
At most 3*	0.201364	18.31374	15.49471	0.0183	13.04127	14.26460	0.0773
At most 4*	0.086895	5.272475	3.841466	0.0217	5.272475	3.841466	0.0217

The trace statistic allows us to conclude that there are at least five cointegrating equations at 5% level of significance while maximum-eigen value statistic indicate two cointegrating equations at 5% level of significance, hence this necessitates the need for the error correction model. The null hypothesis using both tests is that the number of cointegrating vectors,  $r$  is less or equal to a given number against the alternative hypothesis that it is higher than that number. We reject the null hypothesis if the trace and the maximum eigen value statistic is greater than the critical value at 5%.

## 4.5 Long Run Econometric Model Results

Since we are mainly concerned with the long run relationships, we shall not dwell much on the short run model. We obtain the long run relationship by first regressing unrestricted model (equation 3) in levels and we observed that monthly inflation rate was insignificant and carrying the expected sign since its sign can either be positive or negative. As a result we

dropped it. The results for unrestricted model are shown in the appendices. We then estimated the restricted model and the results are shown in table 4.5 below:

**Table 4.5 Results of the Long Run Model**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-499294.0	241483.0	-2.067616	0.0433
DEPO_RATE	622283.7	208987.4	2.977613	0.0043
INDINDEX	6327.431	1955.490	3.235726	0.0020
TAX_REVENUE	0.008286	0.000761	10.89394	0.0000

Adjusted R-Squared = 0.85984

F-Statistic =121.600

Prob(F-statistic) =0.000000

Durbin Watson stat =1.6614273

## 4.6 Diagnostic Tests and Model Evaluation

The long run results indicate that all the variables are statistically significance at 1% level of significance and they bear the correct signs as expected except for commercial banks' deposit rate which has a positive sign but expected to be negative sign since it is the opportunity cost of the demand for money. Adjusted R-Squared which measures the goodness of fit of the model is found to be 86 percent and this indicates that about 86% of the variations in Zimbabwe's informal economy are explained by variations in the changes in the explanatory variables that are in the model. This is quite representative given the fact that a lot of exogenous variables can explain money demand. Durbin Watson statistic of 1.7 is close to two and this shows that there is no serial autocorrelation. The model also fits the data very well as shown by the F-Statistic which is significant at 1% level of significance.

## **4.7 Discussion of the Estimated Results.**

As shown by the results in table 4.5, all the variables are statistically significant. They are different from zero at 1% level of significance and all the variables have their expected signs as in literature except for commercial banks' average deposit interest rate which is carrying a strange sign.

### **4.7.1 Commercial Banks' Deposit Interest Rate.**

The study shows that, commercial banks' deposit interest rates are statistically significant at 1% level of significance and its t-statistic is 2.977613. This depicts that a positive relationship exists between money supply (m2) and commercial banks' deposit interest rate in Zimbabwe. Surprisingly, commercial banks' deposit rates in Zimbabwe are found to be directly related to money supply as opposed to economic theory. Most probably this kind of relationship is due lack of confidence with the banking institutions that was probably caused by the economic crisis (2006-2008). There is high risk and uncertainty associated with the financial institutions in Zimbabwe hence people respond slowly, even if interest rates are increased. Bank charges too, are very high in Zimbabwe which also discourages people from saving. According the FinScope Consumer Survey, conducted by ZIMSTAT in 2011, about 61% of consumers do not have money after living expenses; about 19%, all of their money is put into household pot and 11% do not have money to save at all. All these make the sign not strange in Zimbabwe. Interest rate captures the opportunity cost of holding cash. Interest rate is expected to have a negative sign, meaning to say as interest rates increase, the demand for money reduces as the opportunity cost of money would have increased.

### **4.7.2 Tax Revenue**

Tax revenue is statistically significant at 1% level and its t-statistic is 10.89394. This depicts that there is a positive relationship between money supply and tax revenue. This is in line with economic theory. As highlighted in the definition of variables, a rise in the level of taxation increases the incentive for tax avoidance by economic agents. As the cost of non- tax (informal economy) activities goes down, the demand for informal activities goes up since



the informal activities are facilitated by the use of currency, hence the demand for money goes up.

### **4.7.3 Industrial Index**

Statistical inference revealed that industrial index is significant at 1% at its t- statistic is 3.235726 implying that there is a direct relationship between money supply and industrial index which is a proxy for GDP. The variable is correctly signed according to economic theory. An increase in the volume of economic activities will lead to an increase in the demand for money. The volume of the industrial index increased at the same time with an increase in money supply in Zimbabwe in the period of the study.

### **4.7.4 Inflation**

Inflation is statistically insignificant at all level of significance and as a result it is not shown on the table of results (table 4.5 page 38). Its t-statistic is -0.626525. This depicts that a negative relationship exists between money supply (M2) and inflation in Zimbabwe. The possible explanation is that Zimbabwe is currently relying most on South African products yet the South African rand is depreciating in value against the United States dollar hence the product prices are falling while money supply is gradually increasing.

## **4.8 Estimate of Money in Circulation**

After regressing our empirical model equation, it will be possible to estimate the money in circulation ( $\hat{m}_t$ ) for each month in the sample for the whole economy. Based on our key assumption that the informal economy results from strict and tough tax administration and regulations, we set the coefficient of the tax variable zero assuming a non-tax environment while coefficients of all other variables remain unchanged. By doing so, we will be able to estimate the amount of money that would have been demanded if there were no taxes (**FE**).

We then set the tax variable coefficient to zero in the model so as to get the currency in circulation in the formal economy. The results of the model are shown below:

$$M2 = - 499294 + 622283.7 \text{ Depo\_rate} + 6327.431 \text{ Indindex.}$$

The difference between the two equations, that is the one comprising all the variables and the other one without the tax variable ( $\hat{m}_t$  -FE), gives us an indication of how much currency holding is tax induced. Alternatively, this difference is the estimate of the money demanded in the informal economy so as to undertake informal transactions. Assuming constant velocity of money in both the official and informal economy; we multiply it with the money in circulation in the informal economy so as to get an estimate of the size of the informal economy. Table 4.6 below shows the size of the informal economy in Zimbabwe for the period of the study.

**Table 4.6. Size of Informal Economy in money dollars (\$000) and as a percentage of the industrial index from Jan 2009- Dec 2013.**

Year	Money stock, m2 (US\$000's)	Currency in the economy, Estimated Mt (US\$000's)	Formal Economy Currency (US\$000's)	Informal Economy currency (US\$000's)	Size of informal Economy (US\$000's)	Size of Informal (% of Mt)	Size of informal (% of industrial index)
Jan-09	297563.2	138067.88	98956.95	39110.93	22535.98	16.32	29.56
Feb-09	383182.9	547777.40	126270.51	421506.90	244474.00	63.44	94.99
Mar-09	396825.6	267229.13	39622.91	306852.04	176810.19	66.16	97.69
Apr-09	492277.3	559293.04	163361.07	395931.96	228138.64	40.79	40.87
May-09	536162.4	957661.42	414686.63	542974.79	312865.69	32.67	23.41
Jun-09	695614.6	1243326.58	508902.08	734424.50	423180.29	34.04	22.04
Jul-09	772996.4	1247683.87	471317.14	776366.73	447347.68	35.85	24.15
Aug-09	847158.8	1155452.65	399057.88	756394.78	435839.71	37.72	27.52
Sep-09	953685	1241142.90	531997.20	709145.69	408614.48	32.92	20.83
Oct-09	970262.3	1356397.01	474797.23	881599.78	507983.67	37.45	25.13
Nov-09	1173716	1171553.95	477581.30	693972.65	399871.67	34.13	22.84
Dec-09	1295088	1758616.79	493526.42	1265090.37	728953.50	41.45	27.27
Jan-10	1353238	1339896.88	522189.69	817707.20	772274.82	57.64	27.08
Feb-10	1488666	1499483.22	420001.67	1079481.54	1019504.8	67.99	35.62
Mar-10	1591107	1847943.13	432656.54	1415286.59	1336652.3	72.33	37.60
Apr-10	1606983	1662611.38	411396.37	1251215.01	1181696.6	71.07	41.93
May-10	1669551	1603562.56	350589.76	1252972.80	1183357.0	73.80	45.11
Jun-10	1677233	1965527.10	338314.54	1627212.56	1536803.5	78.19	43.57
Jul-10	1745821	2016806.86	360207.45	1656599.41	1564557.6	77.58	43.57
Aug-10	1910084	1912896.10	360207.45	1552688.64	1466420.2	76.66	43.06
Sep-10	2115494	2185022.44	398931.33	1786091.11	1686854.7	77.20	41.42
Oct-10	1809706	2132818.44	529719.33	1603099.12	1514029.8	70.99	33.10

Nov-10	1909602	2212494.42	510041.02	1702453.40	1607863.9	72.67	34.56
Dec-10	2125671	3094256.28	488970.67	2605285.61	2460534.1	79.52	34.65
Jan-11	2137930	2082899.23	551169.32	1531729.91	1046493.5	50.24	31.19
Feb-11	2219217	2078221.01	538134.81	1540086.19	1052202.6	50.63	31.83
Mar-11	2319629	2382052.12	548321.98	1833730.15	1252823.2	52.59	32.74
Apr-11	2362654	2308724.81	760380.08	1548344.73	1057844.9	45.82	27.83
May-11	2463236	2435042.58	721103.51	1713939.07	1170980.7	48.09	29.44
Jun-11	2618077	2887348.60	651868.47	2235480.14	1527302.9	52.90	31.64
Jul-11	2677731	2329125.74	629785.74	1699340.00	1161006.5	49.85	30.45
Aug-11	2692524	2361438.89	609791.05	1751647.84	1196743.7	50.68	31.57
Sep-11	2679646	2639524.29	579988.85	2059535.44	1407095.7	53.31	34.21
Oct-11	2910405	2275210.38	502541.10	1772669.28	1211105.8	53.23	37.07
Nov-11	2905530	2530879.21	511399.50	2019479.71	1379729.2	54.52	37.60
Dec-11	2999690	2861276.88	516967.64	2344309.24	1601656.0	55.98	38.38
Jan-12	2886598	2541754.36	638540.90	1903213.47	1412982.7	55.59	40.13
Feb-12	3081776	2459760.96	686059.90	1773701.05	1316830.1	53.53	36.66
Mar-12	2908851	3502711.63	1299471.01	2203240.62	1635728.64	46.70	34.15
Apr-12	2980585	2888625.18	942708.39	1945916.79	1444686.4	50.01	38.61
May-12	3056600	2775596.06	771715.30	2003880.75	1487720.0	53.60	40.60
Jun-12	3202017	3222069.72	646815.64	2575254.08	1911918.6	59.34	44.97
Jul-12	3128015	2693966.03	652889.98	2041076.05	1515334.5	56.25	42.32
Aug-12	3143580	2745116.90	648777.15	2096339.75	1556363.4	56.70	42.86
Sep-12	3169351	3440550.10	735652.78	2704897.33	2008168.3	58.37	39.98
Oct-12	3320986	2724938.55	509218.45	2215720.10	1644993.7	60.37	39.08
Nov-12	3154266	2711363.17	481947.22	2229415.95	1655161.7	61.05	40.65
Dec-12	3324423	4034860.23	558349.04	3476511.19	2581029.5	63.97	41.97
Jan-13	3224238	2761293.78	728810.03	2032483.75	1859845.5	67.35	37.56
Feb-13	3247473	2894339.47	749690.55	2144648.92	1962483.4	67.80	37.12
Mar-13	3272099	3242932.39	757536.57	2485395.82	2274287.4	70.13	38.14
Apr-13	3440333	2850955.90	762994.93	2087960.96	1910610.5	67.02	35.34
May-13	3342835	3134038.64	906754.17	2227284.47	2038099.9	65.03	30.62
Jun-13	3273445	3566430.58	899224.52	2667206.06	2440654.8	68.43	32.40
Jul-13	3363333	3248281.06	1036403.2	2211877.84	2024001.9	62.31	26.76
Aug-13	3263955	3083460.56	712438.76	2371021.80	2169628.3	70.36	38.73
Sep-13	3368752	3635544.82	828736.94	2806807.88	2568398.9	70.65	35.31
Oct-13	3340575	3010258.55	830932.80	2179325.75	1994214.8	66.25	31.59
Nov-13	3342435	2993023.69	941326.48	2051697.21	1877427.9	62.73	29.32
Dec-13	3466432	4113908.77	1090748.2	3023160.57	2766374.7	67.24	33.27

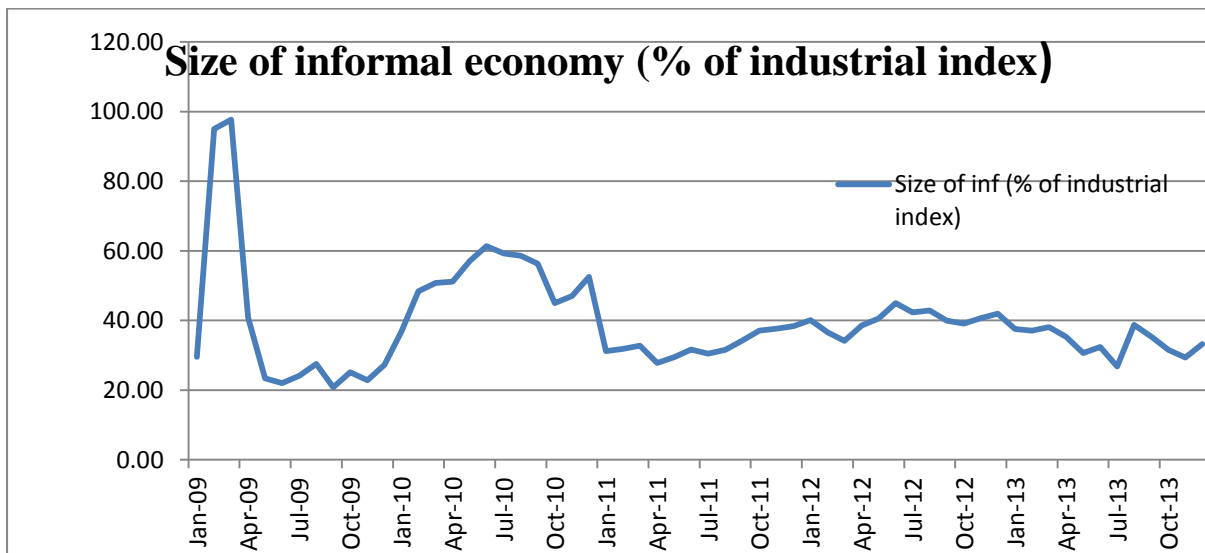
Source: Author' compilation

The average size of the informal economy as a percentage of the industrial index for the entire period of the study is pegged at 39 percent. The average size of the informal economy has a significant part of overall economic activity. The average size of the informal economy

in terms of the aggregate money supply is 57%, meaning to say about 57% of money supply will be circulating in the informal economy. The average sizes for 2009; 2010; 2011; 2012 and 2013 are 38%; 52%; 33%; 40% and 34% respectively. These results are not a surprise in the Zimbabwean case. Since we are using money demand function, in the early days of the introduction of US\$, there were few money circulating, hence a smaller size of the informal economy. With the gradual increase in the level of money supply, the size of the informal economy also increases.

Figure 2 below plots the size of the informal economy as a percentage of the industrial index, from which four episodes can be distinguished in the evolution of the informal economy. The first is from early January to April 2009 where the value was very high, fluctuating at an average of around 66 percent of the industrial index. It then declined drastically to an average of roughly 26 percent as from May 2009 to around January 2010 before increasing to an average size of 51% as of February 2010 to January 2011 before declining gradually again in the last part of the study at around an average of 36 percent.

**Figure 2 Size of the informal economy (% of industrial index)**



The size of the informal economy is highly significant in the beginning of 2009 due to macroeconomic instability prevailing in the country prior to the dollarization period. Most people were forced to enter into the informal economy as a strategy for survival.

Macroeconomic stability encountered in the country also causes company closures and even the relocation of some industries or firms for example Lever Brothers and Colgate Palmolive. This resulted in a reduction in tax revenues especially corporate tax revenue and the only way for the government was to increase the tax rates and by so doing intensifying informal transactions. High tax rates would tend to discourage formalisation and rational economic agents can conceal their revenues by joining the informal economy.

The informal economy is widely viewed as being counter cyclical, that is contracting during booms and expanding during recessions. Since Zimbabwe is currently not in a recession, low levels of informal economy are therefore expected. The results found in this study are in line with this view since the results are lower than those found in other studies (Makochekeanwa, 2010; Schneider,2002) The gradual contraction of the informal economy in the period 2010 to 2013 is probably due to new policies that were crafted by the inclusive government so as to widen the tax base. In the same period, economic agents gained confidence in the government and started seeking work in the formal sector. Most workers, especially government workers, teachers, doctors, lecturers in universities and colleges who have since left the country due to economic hardships were re-engaged and this could be one of the reasons for the decline in the size of the informal economy. Money dealing in the street was completely removed.

The results of this study compared to others studies (Makochekeanwa, (2010), Schneider, (2002) are not very faraway and the difference could be explained by the existence of different governments. The government of National Unity instilled confidence in people such that they become optimistic such that most of the participants started seeking work in the formal economy.

#### **4.9 Error Correction Model (Short Run Dynamic Model)**

The residuals are generated after running OLS at levels and then tested the residuals for unit root. The result shows that the residuals are stationary at levels which show that there is long run relationship. The error term is from the residuals calculated from running an OLS regression model in levels. The dependent variable and the explanatory terms are lagged since past values can also help to explain the current values. We tested the residuals for

stationarity and find out that the residuals are stationary at levels which reveal that there is long run relationship. The results for the model are presented below:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RESID01(-1))	-0.117422	0.046021	-2.551454	0.0138
D(TAX_REVENUE)	0.001263	0.000349	3.620247	0.0007
D(DEPO_RATE)	-161680.7	75085.63	-2.153285	0.0360
D(INFL(-1))	80294.04	30914.75	2.597273	0.0122
D(NFL(-2))	48874.38	22586.76	2.163851	0.0352
D(TAX_REVENUE(-2))	0.000812	0.000374	2.173854	0.0344
Adjusted R-squared	0.604204			
Durbin-Watson stat	2.019107			

The residuals measure the speed of adjustment in the long run. The coefficient 0.12 means that the error correction model adjusts by 12% towards the long run. Since we are mainly concerned with the long run relationship, we will not explain on the error correction model.

#### 4.10 Granger Causality test

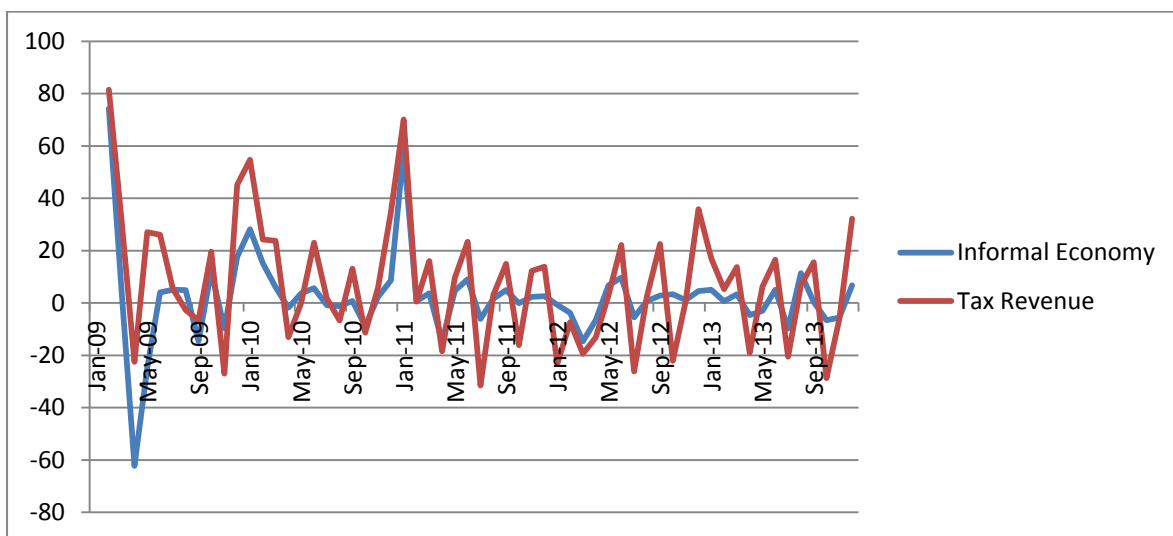
Granger causality is used to examine the relationships that exist between the variables. A variable X granger causes Y if the present Y can be predicted with better accuracy by the past values of X. This test is important to policy makers in any economy because the results can be concluded whether changes or shocks have an impact on real economic activity or not. Based on the causality tests, it is found that money supply granger cause tax revenue at 5%; money supply granger cause inflation at 5% and finally inflation granger cause industrial index at 5% level of significance.

Granger Causality test between tax revenue and the size of the informal economy in Zimbabwe, shows that tax revenue granger cause the informal economy at 1% level of significance. It is therefore proven that the increase in taxes causes an increase in the size of the informal economy, since individuals would need to conceal their activities by participation in the informal economy. The results found are shown in the appendix 2.

### 4.11 Hypothesis Testing

We assessed null hypothesis that the size of the informal economy in Zimbabwe results in decrease in tax revenue by using the correlation between tax revenue and the size of the informal economy. Figure 3 below serves to show the correlation between informal economy and tax revenue.

**Figure 3: The Correlation between Informal Economy and Tax Revenue.**



### 4.12 Conclusion

The Chapter generally outlined the main findings of the study. The size of the informal economy for the period of the study averages around 40 as a percentage of the industrial index. Comparing this with other studies (Makochekanwa, 2010, and Schneider, 2002), this study shows a reduction in the size of the informal economy. This could be because of the Unity Government which has instilled confidence in most people hence they deserted the informal economic activities so as to find work in the formal economy. The following Chapter provides summary of the research and proffers recommendations based on the informal economy's contribution to the whole economy. It also highlights the possible areas for future study.

## **CHAPTER FIVE: CONCLUSION AND POLICY RECOMMENDATIONS**

### **5.0 INTRODUCTION**

The main objective of this study is to measure the size and trends of the informal economy and its impact on the tax revenues in Zimbabwe using the currency demand approach for the period 2009-2013.

An easy and popular method of estimating the size of the informal economy is the one that is based on macroeconomic data under the framework of indirect ways of estimating its size. The monetary data is more or less a reliable data in developing countries such as Zimbabwe than data required by alternative indirect approaches. Hence, we adopted the currency or money demand approach to estimate the size of the informal economy in the country.

The estimation of unreported economy is not an easy task and accuracy may be too difficult. Measuring the informal economy in low-income countries such as Zimbabwe is even more difficult. But we hope that our estimates will provide a useful indication of the magnitude of informal economy which can be used as the springboard for similar studies.

### **5.1 CONCLUSION**

The study concludes that the size of the informal sector in Zimbabwe averages at around 40% which is close to the estimates obtained by other researchers such as Malaba (2006) and Makochekanwa (2010). The size found has implications in the formulation of economic policies such monetary and fiscal policies. In terms of aggregate money supply, around 57% is circulating in the informal sector hence the remaining 43% is circulating in the formal economy.



## 5.2 Proposed Policy Recommendations

The estimates of the informal economy can assist fiscal scientists to funnel their tax policy appropriately.

Tax revenue is found to be positively related to money supply and hence resulting in an increase in the size of the informal economy. Tax rates should not discourage infant establishments hence participatory and encouraging tax is called for. For example the current presumptive tax of US\$1500 for salons for three months may be a discouraging figure to some salons especially those in small towns or those in growth points. Hence policy crafters are encouraged to revisit all the current rates in relation to geographical location. It is also important to consult the interested stakeholders such as the informal participants and the local authorities. Fiscal bodies should work to expand the tax base rather than installing discouraging high tax rates, realizing the innovation, technology transfer, employment, income and growth roles of SMEs requires encouraging tax and subsidy policies.

With new businesses immerging in the informal economy, dwindling revenues for the government should be limited. ZIMRA, as the arm of government responsible for mobilising domestic revenues should do more to address the issue of compliance by the target groups.

Government through local authorities in all provinces, districts should adopt or form a common organisation for all informal economic activities. This will allow the tax authorities to collect tax revenues from an organised organisation representing the will of informal individuals rather than collecting it from individuals. Collection of taxes from individuals may result in higher costs than the tax revenue collected. Such organisations can also help the prospering of the informal economy through facilitating of credit and capital to its members and even attainment of additional skills.

Adoption of the presumptive taxes as has been done in Zimbabwe is some way towards taxing incomes and transactions in the informal economy, however, it would not capture illegal and black market activities. It would also not consciously address the problem of corruption among tax revenue collectors or fraud by the tax payers which is rampant in

Zimbabwe. The problem is probably by the general civil service problem of low rates of pay which we probably think to be breeding corruption. To address this problem, we propose that the government should pay a fixed monthly allowance to all the employees in revenue collecting department.

It is recommendable that policies should be addressed such that there are no restrictions of entry into the formal economy especially high tax rates which may force economic agents to enter the informal economy so as to conceal their revenues. The issue of company formation laws also need to be addressed such that the period is reduced to less than a month.

The presence of the informal economy encourages entrepreneurship and creativity. It also supports official economy since most of the income that is earned in the presence of the informal economy is spend in the formal economy. The presence of the informal economy too may also force prices in the formal economy to fall due to competition in order to remain competitive. The informal economy also absorbs displaced workers from the formal economy. Informal economy enables creation of employment especially in times of shortage of work opportunities. The informal economy also gives families a broad road through which they can come across their needs and become better in their way of life.

The government should engage with banks to develop a credit system whereby informal businesses can borrow small loans with low interest rates to develop and expand their businesses and which they can repay over a period of time. Poverty-eradication programmes and strategies should be developed for individuals in the informal economy.

### **5.3 Limitations of the Study**

Besides having its own strengths there are some problems associated with the use of the monetary demand method and one of the major limitations of this study is the use of unrealistic assumptions as explained in this section. This procedure may underestimate the size of the informal economy, because not all transactions take place using cash as means of payment. At times individuals in the informal economy may be paid in kind. The study assumes that the increase in demand for currency is profoundly to finance informal activities

but however, increases in currency demand may occur because of a slowdown in demand deposits rather than an increase in currency used in informal activities. Finally, it seems arbitrary to assume the same velocity of money in both types of economies.

#### **5.4 Possible Areas for Further Research**

- The impact of globalization on the informal economy in Zimbabwe needs to be investigated empirically.
- There is also need to know what the informal economy could become in the future, rather than knowing what it is presently.
- Finally, there is need for data that is not biased towards urban economy that is there is need for disaggregating of urban and rural data on the informal economy and also need to find the estimate of the economy based on race and gender.
- There is also need to empirically investigate the size of the informal economy using other indirect methods then compare the estimates with that for the monetary approach.

## REFERENCES

- Asamne, E. (2010). The Underground Economy and Tax Evasion in Ethiopia, Ethiopian Policy Research Paper.
- Bagachwa, M. S. D. and A. Naho, (1995). Estimating the Second Economy in Tanzania. *World Development*, Vol. 23(8): 1387-1399.
- Bekoe, W. (2010). Tax evasion and economic growth among selected African countries (1975-2006), PhD Thesis, Department of Economics, University of Ibadan, Nigeria.
- Buhn, A, et al (2007). Size and Development of the Shadow Economy and Do-it Yourself Activities in Germany, CESIFO Working Paper, Category 1: Public Finance, Working Paper No. 2021.
- Cagan, P. (1958). The Demand for Currency Relative to the Total Money Supply, *Journal of Political Economy*, 66:3 pp. 302-378.
- Chiumya, C. (2007). “The Parallel Economy in Malawi: Size, Effect on Tax Revenue and Policy Options”, MPRA Paper No. 9860.
- Clotfelter, C. (1983). Tax evasion and tax rates: An analysis of individual tax returns, *Review of Economics and Statistics*, Vol. 65(3), pp363-373.
- Colledge, M. (2002). Handbook for Measurement of the Non-Observed Economy, Organization for Economic Co-operation and Development, France.
- De Soto, H. (1989). *The Other Path*, New York: Harper and Row.
- Feige, E. L., (1979). “How big is the Irregular Economy?” *Challenge* 22:1, pp. 5-13.
- Feige, EL.(1981). The UK’s Unobserved Economy: A preliminary Assessment, *Economic Affairs*, (1): 205-212.
- Feige, E.L (1990). Defining and estimating informal economies: New Institutional Economics Approach, *World Development*, Vol 18, No 7.
- Fuest, C and N, Riedel. (2009). Tax Evasion, Tax Avoidance and the Tax Expenditure in Developing Countries: A review of the literature, United Kingdom Department for international Development (DFID), Oxford University for Business taxation.
- Georgiou, G. (2007). Measuring the Size of the Informal Economy, A critical review. Central Bank of Cyprus, Euro System. Working Paper Series 2007-1.
- Gills, D.(1998). Measuring the Hidden Economy: Implications for Econometric modelling, *Econometrics Working Paper (EWP) 9809*, ISSN 1485-6441.

Gujarati, D. N. (2003). *Basic Econometrics*. (4<sup>th</sup> edition). New York: McGraw-Hill/Irwin.

Greenidge, et al. (2009). Estimating the Size of the Informal Economy in Barbados, *Business Finance and Economics in Emerging Economies*, Volume 4, No.1.

Heintz, J and R. Pollin. (2003). ‘Informalisation, Economic Growth and the Challenge of Creating Viable Labour Standards in Developing Countries,’ in PERI Working Paper Series, No. 60.

International Labour Office, *Employment, Incomes and Equality: A Strategy for Increasing Productive Employment in Kenya* (Geneva, 1972).

Josh et al, (2002). The Resolution and Concerning Decent Work and the Informal Economy, 90<sup>th</sup> International Labour Conference (ILC) Geneva.

Klovland, T.J. (1984). Tax Evasion and the demand for currency in Norway and Sweden. Is there a hidden relationship? *Scandinavian Journal of Economics*, Vol 86(4), pp423-439.

Lewis, W.A. (1954). *Economic Development with Unlimited Supplies of Labour*. Manchester: The Manchester School, University of Manchester. January: 1-32.

Lkhagvajargal, L. (2004), Country Paper: Mongolia, The Size of Non-Observed Economy in Mongolia, Workshop on Assessing and Improving Statistical Quality, Measuring the Non-Observed Economy, 11-14May 2004, Bank of, Thailand.

Luebker, M.( 2008). Decent work and informal employment: a survey of workers in Glenview, Harare. SRO- Harare Issues Paper No.33/Integrated Working Paper No.91.

Makochekanwa, A. (2010). Estimating the size and trends of the second economy in Zimbabwe, MPRA\_Paper\_37807.

Malaba, J. (2006). “Poverty measurement and gender: Zimbabwe’s experience”, paper presented at the Inter-Agency and Expert Group Meeting on the Development of Gender Statistics 12-14 December 2006, United Nations, New York.

Maurin, et al. (2006). Measuring the size of the Hidden Economy in Trinidad & Tobago, 1973-1999.

McClain, et al.(2008). ‘Incorporating Understanding of Informal Activity in Natural Resource and Economic Development Policy,’ in United States Department of Agriculture, General Technical Report PNW-GTR-755.

Portes et al. (1989). World Underneath: The Origins, Dynamics and Effects of the Informal Economy. In *The Informal Economy: Studies in Advanced and Less Developed Countries*.

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

- Schneider, et al. (2008). The shadow Economy in Germany: A Blessing or a Curse for the Official Economy? *Economic Analysis and Policy*, Volume 38, No.1.
- Schneider, F (2002). “Size and measurement of the informal sector in 110 countries around the world”, paper presented at a Workshop of Australian National Tax Centre, ANU, Canberra, Australia.
- Schneider, et al. (2001). Size and Measurement of the Informal Economy in 110 countries around the World. Available at: [www.relooney.info/SI\\_Expeditionary/Shadow-Economy\\_13pdf](http://www.relooney.info/SI_Expeditionary/Shadow-Economy_13pdf). Accessed on November 2011.
- Sookram, et al. (2008). Characteristics of households in the formal sector of an emerging economy, *Journal of Applied Economics*, 99(1): 1 – 15.
- Sookram, S and P.K, Watson. (2008). ‘Small-Business Participation in the Informal Sector of an Emerging Economy,’ in *Journal of Development Studies*, Vol. 44.
- Sookram, S. & P. K. Watson. (2005). *Tax Evasion, Growth and the Hidden Economy in Trinidad and Tobago*. Sir Arthur Lewis Institute of Social and Economic Studies.
- Tanzi, V. (1983). The Underground Economy in the United States, annual estimates, 1930-1980 *International Monetary Fund, IMF Staff Papers* Vol. 30, pp283-305.
- Thomas, J.J. (1999). Quantifying the Black Economy: *Economic Journal*, Vol. 109(456):381-389.
- Trehub, M.Y., and Kransnikova. (2005). *The Empirical Study of Tax Evasion and its Determinants in Russia*.
- United Nations World Urbanisation Prospects, (1999). Revision 2000.
- Verick, S. (2008). *The impact of Globalization on the Informal sector in African Economic and Social Policy Division*, UNECA, Addis Ababa.
- Vuletin, G. (2008). *Measuring the Informal Economy in Latin America and the Caribbean*, Western Hemisphere Department, IMF Working Paper, WP/08/102.
- The Zimbabwe Revenue Authority website [www.zimra.co.zw](http://www.zimra.co.zw).
- Zimbabwe National Statistics Agency (2011), *Labour force Participation Surveys*.

# APPENDICES

## Appendix 1: Notes on the Econometric Methodology

### Stationarity Tests

In general, time series data is not stationary because most time series contain a clear trend and this implies that past events do influence future events, some series seem to meander, that is they show no particular tendency to increase or to decrease (random walk behaviour), some shocks in the series display a high degree of persistence and some series share co-movements with other series that is they move together (co-integrated series). As a result of all these problems the basic OLS procedures cannot be applied without giving spurious results.

Given this knowledge, testing for the stationarity of the variables is necessary so as to get more reliable results. Stationarity will be done using the ADF test. ADF is used because it reduces the likelihood of serial correlation of the residuals. We will determine the optimal lag length to include in the ADF by using the Akaike Information Criterion (AIC). ADF is run at intercept and trend, at intercept and finally at none.

### Co-integration Analysis

To establish whether long run relationships exist among the variables or not, co-integration test using the Johansen method is used. The concept of co-integration links relationships between integrated processes and the concept of steady state equilibrium (Mills 1990).

Co-integration refers to the existence of a long run relationship amongst given non-stationary variables (Engle and Granger, (1987), Thus, two or more non-stationary time series are co-integrated if a linear combination of these variables is stationary (converges to an equilibrium overtime). the existence of such a long run relationship typically takes place because of the relations of the “stochastic trends” of the given variables. If in the long run, two or more

series move closely together, even though the series themselves are trended, the difference between them is constant.

## Appendix 2: Unit Root Test Results

### Deposit Interest Rate

Null Hypothesis: D(DEPO\_RATE) has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-8.684216	0.0000
Test critical values: 1% level	-4.124265	
5% level	-3.489228	
10% level	-3.173114	

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(DEPO\_RATE,2)  
 Method: Least Squares  
 Date: 05/15/14 Time: 09:20  
 Sample (adjusted): 2009M03 2013M12  
 Included observations: 58 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DEPO_RATE(-1))	-1.149550	0.132372	-8.684216	0.0000
C	-0.000920	0.052787	-0.017422	0.9862
@TREND(2009M01)	0.000289	0.001517	0.190236	0.8498
R-squared	0.578279	Mean dependent var		0.013034
Adjusted R-squared	0.562943	S.D. dependent var		0.292412
S.E. of regression	0.193314	Akaike info criterion		-0.398659
Sum squared resid	2.055376	Schwarz criterion		-0.292084
Log likelihood	14.56111	Hannan-Quinn criter.		-0.357146
F-statistic	37.70891	Durbin-Watson stat		1.956221
Prob(F-statistic)	0.000000			

### Industrial Index

Null Hypothesis: D(INDINDEX) has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.666065	0.0000
Test critical values: 1% level	-4.124265	



5% level -3.489228  
 10% level -3.173114

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(INDINDEX,2)  
 Method: Least Squares  
 Date: 05/15/14 Time: 09:29  
 Sample (adjusted): 2009M03 2013M12  
 Included observations: 58 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INDINDEX(-1))	-1.040706	0.135755	-7.666065	0.0000
C	5.279782	3.704896	1.425082	0.1598
@TREND(2009M01)	-0.088303	0.105287	-0.838687	0.4053
R-squared	0.516791	Mean dependent var		-0.261034
Adjusted R-squared	0.499220	S.D. dependent var		18.90906
S.E. of regression	13.38115	Akaike info criterion		8.075909
Sum squared resid	9848.034	Schwarz criterion		8.182484
Log likelihood	-231.2014	Hannan-Quinn criter.		8.117422
F-statistic	29.41120	Durbin-Watson stat		1.980202
Prob(F-statistic)	0.000000			

## Inflation

Null Hypothesis: INFL has a unit root  
 Exogenous: None  
 Lag Length: 1 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.857481	0.0000
Test critical values:		
1% level	-2.605442	
5% level	-1.946549	
10% level	-1.613181	

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(INFL)  
 Method: Least Squares  
 Date: 05/15/14 Time: 09:32  
 Sample (adjusted): 2009M03 2013M12  
 Included observations: 58 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFL(-1)	-0.389518	0.080189	-4.857481	0.0000
D(INFL(-1))	-0.128245	0.109552	-1.170628	0.2467
R-squared	0.339817	Mean dependent var		0.051724

Adjusted R-squared	0.328028	S.D. dependent var	0.527570
S.E. of regression	0.432470	Akaike info criterion	1.195266
Sum squared resid	10.47369	Schwarz criterion	1.266316
Log likelihood	-32.66271	Hannan-Quinn criter.	1.222941
Durbin-Watson stat	2.230182		

## Money Supply (M2)

Null Hypothesis: D(M2) has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-10.79997	0.0000
Test critical values:		
1% level	-3.548208	
5% level	-2.912631	
10% level	-2.594027	

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(M2,2)  
 Method: Least Squares  
 Date: 05/15/14 Time: 09:37  
 Sample (adjusted): 2009M03 2013M12  
 Included observations: 58 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(M2(-1))	-1.354431	0.125411	-10.79997	0.0000
C	71766.34	14590.93	4.918557	0.0000

R-squared	0.675624	Mean dependent var	661.6776
Adjusted R-squared	0.669832	S.D. dependent var	172581.5
S.E. of regression	99165.76	Akaike info criterion	25.88085
Sum squared resid	5.51E+11	Schwarz criterion	25.95190
Log likelihood	-748.5446	Hannan-Quinn criter.	25.90852
F-statistic	116.6393	Durbin-Watson stat	2.048829
Prob(F-statistic)	0.000000		

## Tax Revenue

Null Hypothesis: D(TAX\_REVENUE) has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 4 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.651520	0.0000
Test critical values:		
1% level	-4.137279	
5% level	-3.495295	

10% level

-3.176618

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(TAX\_REVENUE,2)  
 Method: Least Squares  
 Date: 05/15/14 Time: 09:40  
 Sample (adjusted): 2009M07 2013M12  
 Included observations: 54 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TAX_REVENUE(-1))	-4.097463	0.616019	-6.651520	0.0000
D(TAX_REVENUE(-1),2)	2.197850	0.550701	3.991005	0.0002
D(TAX_REVENUE(-2),2)	1.367033	0.443701	3.080974	0.0034
D(TAX_REVENUE(-3),2)	0.964821	0.280387	3.441029	0.0012
D(TAX_REVENUE(-4),2)	0.487398	0.135709	3.591487	0.0008
C	40570011	11901965	3.408682	0.0013
@TREND(2009M01)	-682811.5	296746.6	-2.300992	0.0259
R-squared	0.905346	Mean dependent var		1743265.
Adjusted R-squared	0.893263	S.D. dependent var		95299454
S.E. of regression	31134937	Akaike info criterion		37.46598
Sum squared resid	4.56E+16	Schwarz criterion		37.72381
Log likelihood	-1004.582	Hannan-Quinn criter.		37.56542
F-statistic	74.92457	Durbin-Watson stat		1.923032
Prob(F-statistic)	0.000000			

## Appendix 2: Regression Results

### Unrestricted Model Results

#### Method: Least Squares

Date: 05/15/14 Time: 13:14  
 Sample: 2009M01 2013M12  
 Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-582200.6	276521.5	-2.105444	0.0398
DEPO_RATE	636767.1	211398.0	3.012172	0.0039
INDINDEX	6859.384	2141.675	3.202814	0.0023
INFL	-45360.92	72400.81	-0.626525	0.5336
TAX_REVENUE	0.008298	0.000765	10.84688	0.0000
R-squared	0.867910	Mean dependent var		2301782.
Adjusted R-squared	0.858304	S.D. dependent var		987623.4
S.E. of regression	371766.7	Akaike info criterion		28.56958
Sum squared resid	7.60E+12	Schwarz criterion		28.74410

Log likelihood	-852.0873	Hannan-Quinn criter.	28.63784
F-statistic	90.34593	Durbin-Watson stat	1.684065
Prob(F-statistic)	0.000000		

From these results, inflation was statistically insignificant although correctly signed, we dropped it and then do another regression for the restricted model and the results are shown below:

### Restricted Model Results

Dependent Variable: M2  
Method: Least Squares  
Date: 05/15/14 Time: 13:18  
Sample: 2009M01 2013M12  
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-499294.0	241483.0	-2.067616	0.0433
DEPO_RATE	622283.7	208987.4	2.977613	0.0043
INDINDEX	6327.431	1955.490	3.235726	0.0020
TAX_REVENUE	0.008286	0.000761	10.89394	0.0000

R-squared	0.866968	Mean dependent var	2301782.
Adjusted R-squared	0.859841	S.D. dependent var	987623.4
S.E. of regression	369744.8	Akaike info criterion	28.54335
Sum squared resid	7.66E+12	Schwarz criterion	28.68298
Log likelihood	-852.3006	Hannan-Quinn criter.	28.59797
F-statistic	121.6500	Durbin-Watson stat	1.661423
Prob(F-statistic)	0.000000		

All the variables are statistically significant at 1% level of significant. Since we are mainly concerned with the long run relationship, the results for the error correction model are not important since they show short run relationships.

### Granger Causality between Informal Economy and Tax Revenue

Pairwise Granger Causality Tests  
Date: 05/22/14 Time: 22:29  
Sample: 2009M01 2013M12  
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
INFORMAL_ECONOMY does not Granger Cause TAX_REVENUE	57	0.79569	0.4567
TAX_REVENUE does not Granger Cause INFORMAL_ECONOMY		7.95859	0.0010

### Appendix 3: Data Variables Used

Year	Inflation	Tax Revenue	Depo- rate	Indindex	Money supply(m2)
Jan-09	-2.3	4720122	0.4	55.21	297563.2
Feb-09	-3.17	25470461.74	0.004	58.56	383182.9
Mar-09	3.07	37032590.32	0.05	67.73	396825.6
Apr-09	-1.1	47783244.28	0.05	99.81	492277.3
May-09	-0.1	65529180.54	0.05	139.53	536162.4
Jun-09	-0.4	88634383.67	0.05	154.42	695614.6
Jul-09	-0.1	93696201.52	0.05	148.48	772996.4
Aug-09	1	91285876.79	0.05	137.06	847158.8
Sep-09	0.3	85583598.17	0.05	158.07	953685
Oct-09	0.8	106396304.4	0.05	149.03	970262.3
Nov-09	-0.1	83752431.98	0.05	149.47	1173716
Dec-09	0.6	152678055.8	0.05	151.99	1295088
Jan-10	0.7	98685397.01	0.05	156.52	1353238
Feb-10	1	130277762.6	0.05	140.37	1488666
Mar-10	1.1	170804560.8	0.05	142.37	1591107
Apr-10	0.1	151003501.3	0.05	139.01	1606983
May-10	0.3	151215641.1	0.05	129.4	1669551
Jun-10	-0.1	196380950.9	0.05	127.46	1677233
Jul-10	-0.1	199927516.9	0.05	130.92	1745821
Aug-10	-0.1	187386995.5	0.05	130.92	1910084
Sep-10	0.1	215555287.6	0.05	137.04	2115494
Oct-10	0.2	193470808.1	0.05	157.71	1809706
Nov-10	0.5	205461428.9	0.05	154.6	1909602
Dec-10	-0.4	314420179.6	0.05	151.27	2125671
Jan-11	1	184857580.4	0.05	161.1	2137930
Feb-11	0.5	185866062.5	0.05	159.04	2219217
Mar-11	0.8	221304627.8	0.05	160.65	2319629
Apr-11	0.1	186862748.2	0.35	164.66	2362654
May-11	0.1	206847582.6	0.3	163.37	2463236

<b>Jun-11</b>	<b>0.2</b>	<b>269790023.6</b>	<b>0.15</b>	<b>167.18</b>	2618077
<b>Jul-11</b>	<b>0.3</b>	<b>205085687.2</b>	<b>0.15</b>	<b>163.69</b>	2677731
<b>Aug-11</b>	<b>0.1</b>	<b>211398484</b>	<b>0.15</b>	<b>160.53</b>	2692524
<b>Sep-11</b>	<b>0.8</b>	<b>248556050.9</b>	<b>0.15</b>	<b>155.82</b>	2679646
<b>Oct-11</b>	<b>0.1</b>	<b>213935467.6</b>	<b>0.15</b>	<b>143.58</b>	2910405
<b>Nov-11</b>	<b>0.5</b>	<b>243721905.3</b>	<b>0.15</b>	<b>144.98</b>	2905530
<b>Dec-11</b>	<b>0.2</b>	<b>282924118.2</b>	<b>0.15</b>	<b>145.86</b>	2999690
<b>Jan-12</b>	<b>0.5</b>	<b>229690256.7</b>	<b>0.42</b>	<b>138.52</b>	2886598
<b>Feb-12</b>	<b>0.5</b>	<b>214059987.2</b>	<b>0.42</b>	<b>146.03</b>	3081776
<b>Mar-12</b>	<b>0.4</b>	<b>265899181.9</b>	<b>1.5</b>	<b>136.76</b>	2908851
<b>Apr-12</b>	<b>0.2</b>	<b>234843928.2</b>	<b>1</b>	<b>129.55</b>	2980585
<b>May-12</b>	<b>0.1</b>	<b>241839337.7</b>	<b>0.7</b>	<b>132.03</b>	3056600
<b>Jun-12</b>	<b>0.2</b>	<b>310795809.5</b>	<b>0.5</b>	<b>131.96</b>	3202017
<b>Jul-12</b>	<b>0.2</b>	<b>246328270.7</b>	<b>0.5</b>	<b>132.92</b>	3128015
<b>Aug-12</b>	<b>-0.2</b>	<b>252997797.8</b>	<b>0.5</b>	<b>132.27</b>	3143580
<b>Sep-12</b>	<b>0.5</b>	<b>326441869.2</b>	<b>0.5</b>	<b>146</b>	3169351
<b>Oct-12</b>	<b>0.3</b>	<b>267405273.4</b>	<b>0.05</b>	<b>154.47</b>	3320986
<b>Nov-12</b>	<b>0.1</b>	<b>269058164</b>	<b>0.05</b>	<b>150.16</b>	3154266
<b>Dec-12</b>	<b>0.1</b>	<b>419564469</b>	<b>0.15</b>	<b>152.4</b>	3324423
<b>Jan-13</b>	<b>0.1</b>	<b>245291304.7</b>	<b>0.15</b>	<b>179.34</b>	3224238
<b>Feb-13</b>	<b>1</b>	<b>258828013.1</b>	<b>0.15</b>	<b>182.64</b>	3247473
<b>Mar-13</b>	<b>0.2</b>	<b>299951221.4</b>	<b>0.15</b>	<b>183.88</b>	3272099
<b>Apr-13</b>	<b>-0.1</b>	<b>251986599.6</b>	<b>0.1</b>	<b>189.66</b>	3440333
<b>May-13</b>	<b>-0.2</b>	<b>268800925.7</b>	<b>0.1</b>	<b>212.38</b>	3342835
<b>Jun-13</b>	<b>-0.1</b>	<b>321893080</b>	<b>0.1</b>	<b>211.19</b>	3273445
<b>Jul-13</b>	<b>-0.4</b>	<b>266941568.6</b>	<b>0.1</b>	<b>232.87</b>	3363333
<b>Aug-13</b>	<b>-0.1</b>	<b>286147936.5</b>	<b>0.1</b>	<b>181.67</b>	3263955
<b>Sep-13</b>	<b>0.1</b>	<b>338740994.8</b>	<b>0.1</b>	<b>200.05</b>	3368752
<b>Oct-13</b>	<b>0</b>	<b>263013004.3</b>	<b>0.005</b>	<b>209.74</b>	3340575
<b>Nov-13</b>	<b>0.1</b>	<b>247610090.6</b>	<b>0.14</b>	<b>213.91</b>	3342435
<b>Dec-13</b>	<b>-0.1</b>	<b>364851625.5</b>	<b>0.5</b>	<b>202.12</b>	3466432