Journal of International Trade, Commerce, and Economics
ISSN 3065-1417
Volume 12 Issue 2
April-June 2024
Impact Factor: 7.88
Enquiry: contact@continentalpub.online
Published by Continental Publication | https://continentalpub.online/index.php/jitce

EXPLORING ZIMBABWE'S PARALLEL ECONOMY: METHODS OF MEASUREMENT AND KEY FINDINGS

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Abstract: *A pervasive challenge in analyzing African economies, including Zimbabwe, lies in the dearth of reliable and consistent official statistics, as noted by Yeats (1990). Zimbabwe's Central Statistical Office (CSO), tasked with gathering national statistics, particularly on production activities, grapples with significant shortcomings. These include incomplete coverage and inaccurate estimates of the activities surveyed. Such deficiencies undermine the integrity of economic data, complicating efforts to assess and formulate effective policy interventions. This abstract addresses the critical issue of data reliability in Zimbabwe's economic analysis, highlighting the constraints imposed by deficiencies in official statistics. Drawing upon insights from Yeats (1990) and other relevant literature, the paper examines the challenges facing the CSO and their implications for economic policymaking and analysis. By elucidating the extent of incomplete coverage and inaccuracies in statistical estimates, the study seeks to foster a deeper understanding of the limitations inherent in Zimbabwe's data infrastructure.*

Keywords: *Zimbabwe, Central Statistical Office (CSO), Official statistics, Data reliability, Economic analysis.*

1 INTRODUCTION AND BACKGROUND

1.1 Introduction

One of the major problems encountered when analyzing African economies is the absence of reliable, accurate and consistent official statistics (Yeats, 1990), and Zimbabwe is no exception. In fact, Zimbabwe 's Central Statistical Office (CSO), the country 's bureau mandated with the collection of national statistics, including production activities, suffer from at least two weaknesses, namely incomplete coverage as well as inaccurate estimates of the activities covered. The incompleteness and inaccurateness of statistical data arises due to the fact that many of the activities, especially those in the informal sector, are either misreported or under recorded. In most instances, the required information is deliberately concealed from public authorities either because the agents are involved in illegal (black market) activities or where such (parallel market) activities are legal, but there is a deliberate intention to evade government controls. Thus, gathering statistics about who is engaged in second economy activities, the frequencies with which these activities are occurring and the magnitude of them becomes difficult because all individuals engaged in them wish not to be identified, leading to no recording of enormous activities (Schneider, 2002). The misstatement and omission of these ―second economy‖ activities from official statistics imply that macroeconomic measures are not robust enough for meaningful analysis, development planning, policy and program formulation (Bagachwa and Naho, 1995).

Vol. 12 No. 2 | Imp. Factor: 7.8860
DOI: https://doi.org/10.5281/zenodo.14288217

Overall, a precise definition for second economy seems quite difficult, if not impossible, as ―the informal economy develops all the time according to the _principle of running water 'adjusting to changes in taxes, to sanctions from tax authorities and to general moral attitudes, etc.‖ (Mogensen, et al. 1995. p. 5). This study considers second economy in line with Bagachwa and Naho (1995. p. 1388) who considers second economy as ―… to include all economic activities according to national income conventions but are presently not captured by official national accounts statistics and may be broadly conceived of as consisting of three categories: informal sector, parallel and black-market activities‖.

Statistical data from the International Monetary Fund (IMF) indicates that the economy of Zimbabwe enjoyed a relatively positive and stable economic growth in the first decade of independence (1980 to 1989), with average annual gross domestic product (GDP) growth of 4.85%. Introduction of Economic Structural Adjustment Program (ESAP) in 1991 whose objectives were never realized as the decade of the 1990s generally saw a decline in formal economic growth to an annual average of 2.14%, a persistence of high poverty levels, unemployment and inequality. Since 2000, the country 's economic growth trends became

consistently negative until end of 2008, with an annual average of around minus 5.33%.

Although actual figures of the country 's share of the second (informal) economy are scant both in terms of contribution to GDP and employment, Malaba (2006) indicates that the contribution of the informal production activities to Zimbabwe 's GDP has been growing over the years from 23% in 1995 to 30% in 2003, while Schneider (2002) estimates the share of informal economy to be 59.4% of gross national product (GNP) in 1999/2000. According to Poverty Assessment Study Survey (Zimbabwe) conducted by the United Nations Development Fund (UNDP) in collaboration with Ministry of Public Service, labor and Social Welfare (MPSLSW), 50% of all jobs between 2003 and 2006 were in the informal sector, while the report of United Nations '(UN) Office for Coordination of Humanitarian Affairs (OCHA) shows that Zimbabwe 's unemployment rate was 94% by end of January 2009. OCHA report figures indicated that ―At close of 2008, only 6% of the population was formally employed, down from 30% in 2003, with only 480 000 people out of the country 's 12 million population having formal jobs by end of 2008, down from 3.6 million in 2003 ‖[1].

The above information therefore indicates the extent to which formal production activities and formal sector employment has rapidly shrank over the years. Given that Zimbabwe 's economically active population grew over a period when formal employment was on decline, it stands to reason that the informal sector absorbed some of the labor displaced in the formal sector. As a result of the incomplete coverage of national accounts statistics particularly with respect to the informal sector it can be argued that GDP figures for the country are biased downwards or under-estimated.

[1] OCHA report as quoted in: The Zimbabwean Newspaper (29 January 2009), ―Zim unemployment skyrockets‖, available at: http://www.thezimbabwean.co.uk/index.php?option=com_content&task=view&id=18101&Itemid=103

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DOI: https://doi.org/10.5281/zenodo.14288217

1.2 Justification of the study

Given the fact that macroeconomic policies are influenced by estimates from the national accounts, the omission or undue reporting of certain economic activities could easily lead to faulty policy analysis (Bagachwa and Naho, 1995). Unrecorded economic activities implies that economic variables such as GDP, savings, consumption, productivity and balance-of-payments estimates will be biased and this will in turn lead to the wrong conclusion about the manipulation of monetary and fiscal policy instruments. Underestimation of GDP further implies that other variables whose calculations involve GDP are also affected. For instance, an underestimation of
GDP will imply an overvaluation of both public deficit to GDP (public deficit/GDP) ratio and debt to GDP (public debt/GDP) ratio (Ahumada, Alvaredo and Canavese, 2006), while GDP per capita will be undervalued. The end result will be the inability of government in instituting appropriate macroeconomic policies for optimal economic performance (Thomas, 1999). Moreover, it is not possible to make much sense of income distribution without taking account of, for example, informal sector incomes. As Jamal and Weeks (1988) argues, with wage earners resorting to unrecorded food provisioning and trade, and farmers to non-farm income sources including remittances, it is misleading to take formal wages or prices in rural areas as even proxy indicators of welfare or income distribution.
Despite the importance of a good understanding of the size and trends of second economy, not much has been done in quantifying the size and trend of this economy on Zimbabwe. Literature on the country ‘s informal sector has focused predominantly on the nature and characteristics of the informal sector (for instance, Dhemba, 1999) and empirical research on quantifying the contribution of the informal economy to GDP over time has not been done. As such, Zimbabwean policy makers have to often rely on irregular point estimates of the informal economy. Some examples of point estimates of Zimbabwe ‘s second economy include Schneider (2002) study which used the currency demand approach and concluded that the informal economy accounted for 59.4% of GDP in 1999/2000. Malaba (2006) indicates that Zimbabwe ‘s informal sector contributed 23% towards GDP in 1995 before increasing to 30% by end of 2003.

Whilst these and other studies have been useful in highlighting the important role of the informal economy at that particular time, time series estimates remain absent in the case of Zimbabwe. It is this gap in the literature that the present study attempts to fill. With annual time series estimates, this study provides further insights into the trends and size of the second economy over the years to help figure out the degree of underestimation in the GDP estimates generated for the years covering 1980 to 2008. Awareness on the part of policy makers that the informal sector of the economy forms part of the total economy is a necessary pre-condition for the development of appropriate monetary and fiscal policy to meaningfully stimulate broad economic growth.

1.3 Study questions and objectives

In the light of the preceding discussions two research questions comes to the fore and these includes:

i. What are the factors that determine the growth of the second economy in Zimbabwe?

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ii. What is the size of the informal economy in Zimbabwe?

iii. What are the trends in the size of the informal economy particularly over the period 1980 to 2008?

The overall aim of the proposed research is to estimate the magnitude and changes in the ―second economy‖ in Zimbabwe in order to establish the extent to which official national accounts misstate actual or real production of goods and services. The specific objectives are therefore to:

i. Identify the variables that determine the growth of the second economy in Zimbabwe.

ii. Estimate the size and trends of the second economy in Zimbabwe between 1980 and 2008.

iii. Estimate the extent to which the official national accounts data understates actual or real production of goods and services.

2 CAUSES OF SECOND ECONOMY IN ZIMBABWE

The fact that there is still no consensus on the definition of second economy has resulted in corresponding multitude of possible factors advanced as causes of this economy. Thus, literature on the subject matter has advanced multiple reasons as the major causes behind the existence and growth of the second economy. Table 1 provides some of the reasons which caused the growth of the second economy in the case of Zimbabwe over the years.

Table 1: Reasons behind existence and growth of second economy

	Reasons	Intuition	Proponents
1	Tax burden (high tax)	The greater the tax burden, the greater will be the incentive for individuals to remain in the second economy. In the case of Zimbabwe, the income tax has been above 30% for nearly 3 decades and this contributed to some economic activities to continue remaining in the informal economy.	Chuimya (2008); De Soto (1989); Alanon and Gomez-Antonio (2005); Sookram et al. (2008)
2	Foreign exchange controls	Presence of foreign exchange controls or shortages (e.g., foreign currency black market) provides an avenue for illegal transfer, foreign exchange contrabandist and development of fake statements for import-export activities and these are all better done in second economy. For Zimbabwe, foreign currency shortages and accompanying black market of foreign currency has been part of the economy since the early 1980s. Nevertheless, the Zimbabwean financial system experienced critical shortages of	Dabla-Noris et al (2008) ; Hesam (2003)

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		foreign currency especially in 1987 and then from 2000 until 2009.	
3	High Unemployment	The greater the number of unemployed, the more will be individuals willing to find a job in the second economy (Ahn and De la Rica, 1977; and Alanon and GomezAntonio, 2005). As pointed before, the Poverty Assessment Study Survey (Zimbabwe) conducted in 2006 indicated that 50% of all jobs between 2003 and 2006 were in the informal sector, UN-OCHA shows that Zimbabwe 's unemployment rate was 94% by end of January 2009. OCHA report figures indicated that ―At close of 2008, only 6% of the population was formally employed, down from 30% in 2003, with only 480 000 people out of the country 's 12 million population having formal jobs by end of 2008, down from 3.6 million in 2003‖.	Ahn and De la Rica (1977); Alanon and Gomez-Antonio (2005)
4	Restrictive business	Excessive degree of regulations forces individuals to undertake certain activities within the scope of second	Alanon and Gomez-Antonio
	regulatory environment	economy (Alanon and Gomez-Antonio, 2005). According to World Bank 's doing business rankings, the country 's rank, especially in the years since 2000 has been sliding with the country being ranked 156th of out the 183 countries of the world in 2010.	(2005)
5	High level of poverty	If individuals have low disposable income, that is poor, they are mostly likely to be willing to do various jobs, some of them in the second economy (Alanon and GomezAntonio, 2005 and Ocran, 2009). The country 's poverty rates over the recent years has been above 80 percent, with the GDP per capita[2] falling from US$755 in 1980 to around US$265 by 2009.	Alanon and Gomez-Antonio (2005); Ocran (2009)

[2] The measure of individual purchasing power or financial ability to acquire necessities (food, shelter, health, cloth etc)

DOI: https://doi.org/10.5281/zenodo.14288217

6	High inflation	High inflation implies increased seigniorage or inflation tax and this accentuates the effect of taxes upon individuals, thus increasing the effective tax burden on tax payers. This forces some individuals to go into second economy (Alanon and Gomez-Antonio, 2005 and Ocran, 2007). Although the country's annual inflation rates in the first decade of independence (1980-1990) was below 20 percent, by July 2008 the month-on-month rate was estimated at 231.2 million percent, with the International Monetary Fund (IMF, 2009) estimates the hyperinflation rate to be 489 billion as of September 2008, while independent analysts, for instance, Steve Hanke (2008) put this inflation rate at 6.5 quindecillion novemdecillion percent (that is 65 followed by 107 zeros) as of December 2008.	Alanon and Gomez-Antonio (2005); Ocran (2007)
7	High rate of return	High rate of return on second economy operations provides an incentive for individuals to enter this type of economy (Bagachwa and Naho, 1995 and Ocran, 2009). The fact that second economy activities are not currently taxed in Zimbabwe means that there is relatively a high rate of return as the owners of such businesses pocket all the profits.	Bagachwa and Naho (1995); Ocran (2009)
8	Limited pursuit by tax collectors	The fact that revenue agencies do not understand fully the immense revenue potential of the sector or have limited resources cause them not to vigorously pursue tax collection in this sector, thus acting as an incentive to operate in second economy (Bagachwa and Naho, 1995; Chipeta, 2002 and Ocran, 2009). For Zimbabwe, currently, the Zimbabwe Revenue Authority (ZIMRA) does not pursue the activities of the second economy as far as tax collection is concerned. This might be, among other things, due to minimal if not negative rate of return, whereby the	Bagachwa and Naho (1995); Chipeta (2002); Ocran (2009)
		potential revenue to be collected from second economy activities will be lower than the costs expanded by ZIMRA to collect the same tax revenue.	

DOI: https://doi.org/10.5281/zenodo.14288217

9	Easy entry and exit	The fact that moving in and out of the second economy is relatively easy is an incentive for individuals to quickly consider this sector (Ocran, 2009). In the case of Zimbabwe, any individual can start his or her own informal economic activity and in most cases without any regulations required to be undertaken.	Ocran (2009)
10	Social security contribution burden	High social security contribution is an incentive for individuals to remain in the second economy (Sceneider, 2002 & 2005 and Hesam, 2003). Although the country has a statutory board, the National Social Security Authority (NSSA) in place, social security contributions, especially in the recent decade has not been a major burden to most economic activities.	Sceneider (2002 & 2005); Hesam (2003)

Source: Author

3 LITERATURE REVIEW

3.1 Approaches to measure the second economy

According to Tanzi (1982), the size of the second economy can be quantified in three different ways. Firstly, speculation by various interest groups and institutions can be used to quantify this sector with the aim of increasing the awareness that the phenomenon exists and that it should be taken on board in government decision making. Secondly, educated guesses can advance contribution figures, though these figures will in most cases not be well defined and maybe incomparable to other statistics. Lastly, there are well-defined, unambiguous approaches which make it easier for comparisons to be made between different time periods or between the second economies of different countries (Saunders and Loots, 2005). According to literature, these well-defined approaches can be categorized into direct approach, indirect approach and the model approach.

3.1.1 Direct Approach

The direct approach relies on well-designed surveys and samples which will normally be based on tax audits and voluntary responses, among other sources of data (Schneider and Enste, 2003). The surveys usually provide point estimates hence they are useful in estimating changes in the size of the second economy. Nevertheless, the surveys are normally unable to cover all sections of a given population and as such the outcomes may only provide lower bounds of the possible size of a given second economy.

3.1.2 Indirect Approach

The indirect approaches are normally referred to as indicator approaches and they use secondary data sources to (indirectly) estimate the size of the informal economy (Saunders and Loots, 2005). These approaches are mostly macroeconomic in character and tend to use indicators that contain information

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DOI: https://doi.org/10.5281/zenodo.14288217

about how the unrecorded economy evolves over time (Ocran, 2009). The main assumption underpinning this approach is that the indicators have ―traces‖ of the development of the second economy that can be used in estimation. The most popular indicators that can act as indicators of the size of the second economy include the following:

i. Discrepancy method/approach

This set of methods uses the discrepancies in national income statistics and labor in estimating the size of the informal economy.

In the *national income discrepancy*, the discrepancy between the estimates of GDP according to the expenditure approach and the income approach may be attributed to the (unobservable) second economy (Hartzenberg and Leiman, 1992).

In the *labor discrepancy approach*, the discrepancy between the official and the actual labor force statistics may be attributed to the fact that individuals work in the second economy (Loots, 1991)

ii. Electricity consumption approach

In this approach, electricity is assumed to be the best physical indicator of overall economic activity, and as such any discrepancy between actual electricity consumption and usage patterns and official projections is caused by the second economy (Dobozi and Pohl, 1995; and Lacko, 1998)

iii. Monetary approach

There are two sub-categories under this approach:

The Guttmann method: The method is based on four main assumptions namely; (1) high taxes and the business regulatory framework are the main causes of the emergence of a second economy, (2) only cash is used in the conduct of business transactions in the second economy[3], (3) the ratio of cash to demand deposits (currency ratio, C/D), is solely driven by changes in taxes and the regulatory framework and (4) there was a given point in time where either no second economy existed or where it was very negligible. Consequently, it is assumed that the currency ratio of that period should have remained unchanged and that any changes is only due to changes in the level of tax and regulations. Thus, any increases in the currency ratio can be directly attributed to the additional cash being used in the second economy activities.

The Fiege method: This method argues that in addition to cash holdings, players in the second economy also use other financial instruments such as cheques and bills in conducting their transactions. Using the total volume of transactions and income in the economy Fiege proposes an equation for estimating the size of the second economy. Given that total transactions in the economy includes intermediate and second-hand goods among others while GDP only covers final goods and services, the assumption is that the difference between the GDP figures and the total volume of transactions can be attributed to second economy.

[3] Since these business entities are not registered, and some of the work requires small amounts of payments, the use of formal bank transfers and cheques is inapplicable

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DOI: https://doi.org/10.5281/zenodo.14288217

iv. Currency demand approach

This approach makes two assumptions, firstly that the currency ratio is affected largely by both legal and illegal factors, and secondly that the velocity of money in both the official and second economies is the same. The model also assumes that the second economy 's existence is as a result of the high tax burden and consequently, people move to the second economy just to avoid the high tax burden that characterize the official economy. The second economy is generated by first estimating the currency equation with the tax variables and then estimating the same equation again but this time imposing a zero-tax rate value. The difference between the two equations represents the currency in circulation in the second economy (Bagachwa and Naho, 1995; and Schneider and Enste, 2003).

3.1.3 Model Approach

The model approach is based on the assumption that the informal economy can be seen as an

―unobservable variable‖ which is influenced by a variety of causes (tax burden, regulation and high transaction costs etc.). This model thus examines a number of exogenous and endogenous variables that lead to the existence and growth of the second economy over time, and in the process, infers the size of the second economy over time (Giles 1999a, and Frey and Schneider, 2000).

3.2 Empirical review

Although existence and growth of second economy is not an unfortunate development existing only in developing world, but rather a permeating phenomenon bedeviling even transition (e.g., South American) and developed (e.g., OECD[4]) economies as indicated by Schneider (2002) study, this section will only present time series empirical studies that were done on the African continent.

Ocran (2009) quantitatively examined the evolution of the second economy in the case of Ghana for the period covering 1960 to 2007. The research employed the currency demand approach as analytical framework for the achievement of its objectives. The study found existence of an upward trend in the size of the second economy as a proportion of the officially recorded GDP. Specifically, the paper found that the size of the second economy as a proportion of the official GDP estimates increased steadily from 14% in 1960 to 18% by 1977. Although the share declined thereafter, it however started picking up again from 1983 to a new high of 30% between the periods 2003 to 2004.

Saunders and Loots (2005) employed the currency demand approach in analyzing the contribution of the second economy to the South African economy for the period covering 1966 to 2002. The study found out that although the size of the informal economy averaged 9.5% of GDP for the whole period, there was however a clear decline in the size of the second economy relative to recorded (formal) GDP during the period 1967 to 1993. However, from the period the country got independence (i.e., 1994)

[4] Organization for Economic Corporation and Development and these includes such countries as Australia, Canada, USA, UK, Switzerland, France, Germany and Denmark, among others.

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onwards, the size of the second economy was moving sideways, with the contribution ranging between 7.2% and 8.4% of recorded GDP.

Chipeta (2002) study employed the Tanzi (currency demand approach) method in estimating the size of Malawi 's second economy for the years 1972 to 1990. The study found that Malawi had a large second economy that was significant in relation to the size of the official economy, measured by its GDP. At the same time, the rate of growth of the second economy GDP exceeded the rate of the growth of the official economy GDP during the same period.

The empirical study by Bagachwa and Naho (1995) investigated the size and growth of the second economy in Tanzania for the period covering 1968 to 1990. The study employed the currency demand approach and found that the second economy ―seems to have grown from a

low level of less than 10% of official GDP during the late 1960s to a sizeable proportion of over

20% after the mid- 1980s‖ (p.1393). The study concluded that in the case of Tanzania, indications were that, over time the second economy has become a major source of livelihood, employment, and incomes for the majority of the households.

4 METHODOLOGY

4.1 Estimating the size of the second economy

Although most of the approaches referred above can be potentially used for estimating the second economies of developing countries like Zimbabwe, this study proposes to adopt the currency demand approach for a number of reasons. Firstly, it can be assumed that a greater proportion of second economy participants use cash predominantly to finance their transactions. Secondly, this approach has been used successfully in the context of other developing countries, especially in Africa (Bagachwa and Naho, 1995; Scheneider and Enste, 2003; Chipeta, 2002; Saunders and Loots, 2005; and Ocran, 2009). Thirdly, it is easy to use in a simple ordinary least squares (OLS) model that allows for a stepwise analysis of the explanatory variables (Saunders and Loots, 2005). Fourthly, data availability supports the choice of the currency demand approach for the proposed study. Finally, this approach is capable of producing time series estimates of the second economy which can then be used to estimate the growth of the second economy.

4.2 Model specification

The model which can be used to estimate the magnitude of the second economy can be specified as follows:

$$Y \square f \square X_1, X_2, \square \square \qquad (1)$$

where Y, the dependent variable, may represent the ratio of currency in circulation outside banks either to demand deposits, to a narrowly defined money supply, or to money broadly defined. Y may also represent real currency holdings, that is, cash in public hands deflated by the general consumer price index. X_1 is a set of explanatory variables traditionally considered to be the major determinants

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of Y; X_2 are the proxies for variables that stimulate second economy activity; u is the stochastic disturbance term.

When the variables that stimulate second economy activities are assigned their respective lowest historical values, then the regression equation yields the estimate of the demand for currency of the formal economy. It is then possible to estimate currency holdings with and without second economy activity. The difference gives an estimate of the currency held in the second economy which, when multiplied by the income velocity of money, gives an indication of the size of the second economy.

It is important to note that the empirical model to be estimated will be a variant of Tanzi's model and is underpinned by two key assumptions. Firstly, we assume that transactions in the informal economy are conducted with cash. Secondly, the velocity of money in the second economy is the same as that in the formal economy.

The empirical demand for currency equation to be estimated for Zimbabwe borrows from Bagachwa and Naho (1995), Saunders and Loots (2005) and Ocran (2009) and can be stated as follows:

$$\ln M_t = \alpha_0 + \alpha_1 \ln Y_t + \alpha_2 \ln IR_t + \alpha_3 \ln RPFC_t + \alpha_4 \ln BExr_t + \alpha_5 \ln ATR_t + \alpha_6 Trend_t + \varepsilon_t \quad (2)$$

Where: M = currency (notes and coins) holdings with the non-bank public

Y = Real income

IR = nominal interest rate

RPFC = Ratio of private final consumption expenditure to GDP

BExr = ZW$/US dollar black market exchange rate

ATR = Average tax rate

T = Time trend

As it can be seen, Equation (2) includes traditional arguments, namely, the real income Y which is used as the transactions variable and is expected to bear a positive sign; and the nominal interest rate *(IR)* capturing the opportunity cost of holding currency in lieu of holding alternative financial assets (e.g., savings deposits). An increase in nominal interest rate will induce savers to adjust their portfolio by switching part of their savings held in some form of currency into savings accounts. The rate of interest is expected to change inversely with the level of currency holdings. The share of private final

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consumption expenditure in national income *(RPFC)* represents the Mitchell- Hawtrey effect[5] and when it increases, people need to hoard more currency in order to meet relatively increased purchases of goods and services.

The remaining variables and as commonly used in previous studies, *BExr*, *ATR* and *Trend* stand to capture the amount of currency necessary to run the second economy (underground) activities[6]. The first variable *BExr* captures the expected depreciation of the black-market exchange rate and influences positively the use of currency in second economy transactions. In expectation of local currency depreciation, for fear of capital loss, savers will tend to substitute their domestic currency denominated assets for more stable foreign-denominated financial assets or to buy precious metals such as gold and diamond. The overvaluation of the domestic currency as measured by the discrepancy between the official and the parallel exchange rates (i.e. the black/parallel market premium) and control of the foreign exchange market stimulate not only the black/parallel market for hard currencies but also other illegal transactions such as smuggling, under-invoicing of exports and over-invoicing of imports, etc.

ATR is proxy, and captures currency held as a result of income tax evasion. In an effort to cushion the tax burden resulting from tax increase, the economic agents react by conducting part of their economic activities underground. As cash is the most convenient instrument in carrying out second-economy activities, tax rate increases will be directly related to cash holding. *Trend* is a proxy for modernization of the economy and the increased sophistication of the banking system. Increase in sophistication makes it easy for monetary authorities to detect second economy transaction, and thus a negative relationship between growth of second economy and trend will be expected.

To estimate the size of the second economy, the technique suggested by Tanzi (1983) is employed as explained by Ocran (2009). Two equations based on Equation (2) will be estimated. We first estimate the full model (FM) equation which contains both formal and second economy variables. The second estimated model will be representing the formal economy (FE), that is, without second economy variables *BExr*, *ATR* and *Trend*. The difference (FM - FE) constitutes the currency holdings in the second economy. When this is multiplied by the transaction velocity of money, V (V=GDP/M) the estimation of the size of the second economy is obtained.

4.3 Stationarity test

The importance of the stationarity phenomenon arises from the fact that almost all the entire body of statistical estimation theory is based on asymptotic convergence theorems i.e., the weak law of large numbers, which assume that all data series are stationary. Nevertheless, in reality, non-stationarity is

[5] According to this effect two factors influence the relative use of currency over the business cycle. First, relatively more currency is required per unit of transaction in retail transactions than in other types of transactions. Second, the increase in the share of wage incomes relative to total factor incomes should result in a cash-use increase. Wages are usually paid in cash rather than by check which are more often used for other forms of factor incomes.

[6] Given different behaviors across countries, one cannot be wrong to also assume that these variables can also apply to formal economies

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extremely common in macroeconomic time-series data such as money, inflation, consumption and exchange rates. Thus, treating non-stationary series as if they were stationary will bias the Ordinary Least Squares (OLS) and thus result in misleading economic analysis. That is the model will systematically fail to predict outcomes and can also lead to the problem of spurious (nonsensical/misleading) regressions where R-squared is approximating unity, *t* and *F*-statistics look significant and valid. In essence, the problem lies with the presence of nonsensical regression that arises where the regression of non-stationary series, which are known to be unrelated, indicates that the series are correlated. Hence, there is often a problem of incorrectly concluding that a relationship exists between two unrelated non-stationary series. This problem generally increases with the sample size, and is not normally solved by including a deterministic time trend as one of the explanatory variables in order to induce stationarity.

Thus, to avoid inappropriate model specification and to increase the confidence of the results, time series properties of the data are investigated. Although there are a number of methods used to test for stationarity and the presence of unit roots, the method used here is the Augmented Dickey-Fuller (ADF) test. By definition a series is stationary if it has a constant mean and a constant finite variance. On the contrary, a non-stationary series contains a clear time trend and has a variance that is not constant overtime. If a series is non-stationary, it will display a high degree of persistence i.e. shocks do not die out. A series X_t is said to be integrated of order *d*, denoted as I(*d*), if it must be differenced *d* times for it to become stationary[7]. For example, a variable is said to be integrated of order one, or I(1), if it is stationary after differencing once, or of order two, I(2) if differenced twice. If the variable is stationary without differencing, then it is integrated of order zero, I(0). The ADF regression test can be written as:

$$\Delta\chi_t = \beta_0 + \lambda\chi_{t-1} + \beta_1 t + \sum_{t=2}^{p} \gamma_i \Delta\chi_{t-1} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots (3)$$

Where *t* is the time trend, *p* is the number of lags; ε_t is a stationary disturbance error term. The null hypothesis that x_t is non-stationary is rejected if λ_1 is significantly negative. The number of lags (n) of Δx_t is normally chosen to ensure that regression residual is approximately white noise.

To this end, Table A1 of the Appendix provides unit root test results (ADF test) and the tests indicate that all the variables, with the exception of BExr are stationary at first difference, that is, they are I(1) variables.

4.4 Data sources

The study employed the time series data covering the period 1980 to 2008 from a number of sources. M1 (notes and coins); nominal interest rate (IR), black market exchange rates (BExr) and average tax rate (ATR) data series were obtained from the Reserve Bank of Zimbabwe (RBZ). Real income (or GDP) and the ratio of private final consumption expenditure to GDP (RPFC) data figures were obtained from the International Monetary Fund (IMF).

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DOI: https://doi.org/10.5281/zenodo.14288217

5 ESTIMATES OF THE SIZE OF THE SECOND ECONOMY

5.1 Results

The estimated results of Equation (2) are presented in Table 2. Before interpreting individual coefficients, it is important to note that estimation indicates that the model fits the data well as evidenced by value of both R^2 (adjusted R^2). The R^2, which measures the ―goodness of fit‖ of the equation, is satisfactory at 81 per cent, indicating that 81 per cent of the variations in Zimbabwe 's second economy are explained by variations in the changes in the various explanatory variables used in the model.

Considering the individual results tabulated, it is observed that the signs of all estimated coefficients, with the exception of interest rate (*IR*) are in line with theoretical principles. It is noteworthy that the coefficients for all the variables with the exception of interest rate (IR) and *Trend* are significant at a 1% level of significant. Whereas the variables have been applied in logarithmic form in the model, the estimated coefficients are indicative of elasticity concept. In other words, the percentage of variations in a dependent variable is indicative of variation in an independent variable for a variation unit. As an illustration, a percent increase in average annual company tax rate is expected increase second economy activities by 0.59%. Considering the coefficients obtained, the greatest effect of the variables reflecting second economy on currency ratio is that of the indicator of gross domestic product (Y) and the smallest effect is that of the variable ratio of private final consumption expenditure to GDP (RPFC).

Table 1: Regression results (Dependent variable D(lnM1)

Variable	Coefficient	Standard Error	t-statistic	Probability
D(lnY)	3.28	0.81	4.1	0.000
D(lnIR)	0.11	0.29	0.37	0.72
D(lnRPFC)	0.31	0.10	3.11	0.001
lnBExr	0.25	0.03	7.9	0.000
D(lnATR)	0.59	0.18	3.2	0.004
Trend	-0.007	0.012	-0.57	0.57
R^2	0.84	Adjusted R^2	0.81	

Source: Author
Key: D = 1st difference
Ln = logarithm

Overall, Table 1 shows that in the case of Zimbabwe both black market exchange rate and annual average (company) tax rate propagate second economy activities.

Figure 1: Trends in the size of the second economy in Zimbabwe, 1980 - 2009

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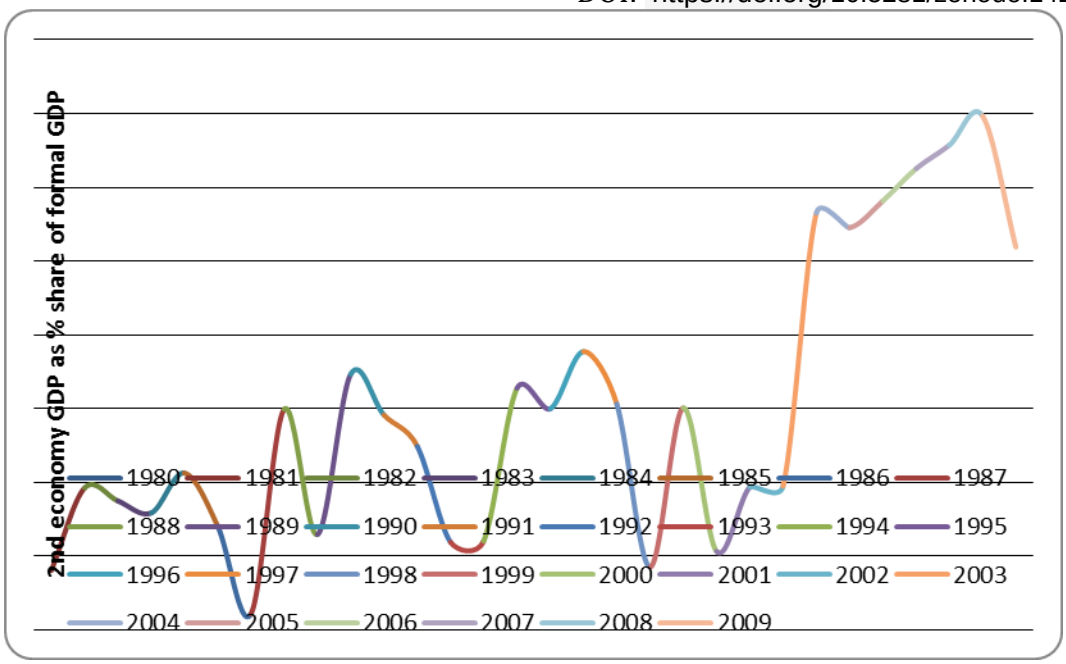

Source: author construction

Figure 1 and Table 2 provides results pertaining to the second economy. Specifically, Figure 1 shows the calculated trend depicting the evolution of the second economy in Zimbabwe for the period 1980 to 2008. Table 2 on the other hand indicates the annual figures of the second economy in actual GDP (US$) values, as a share of formal GDP as well as it annual growth
rates.

Table 2: The formal and second economy in Zimbabwe

Year	FGDP (US$b)	2ndGDP (US$b)	2ndGDP/FGDP (%)	FGDP % growth	2ndGDP % growth
1980	5.4	0.4	8.1	10.7	
1981	6.4	1.2	19.3	12.5	138.6
1982	6.9	1.2	17.5	2.6	-9.1
1983	6.2	1.0	15.9	1.6	-9.4
1984	5.1	1.1	21.3	-1.9	34.2
1985	5.6	0.8	14.1	7	-33.8
1986	6.2	0.1	2.2	2.1	-84.6
1987	6.7	2.0	29.9	1.1	1,281
1988	7.8	1.0	12.9	7.6	-56.8
1989	8.3	2.9	34.7	5.2	168.0
1990	8.8	2.6	29.2	7	-15.9

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1991	8.2	2.0	24.9	7.1	-14.5
1992	6.7	0.8	11.9	-8.4	-52.2
1993	6.5	0.8	12.1	2.1	1.3
1994	6.9	2.3	32.8	5.8	171.8
1995	7.1	2.1	30.0	0.2	-8.5
1996	8.8	3.3	37.7	9.7	25.9
1997	9.0	2.8	30.6	1.4	-18.8
1998	6.3	0.5	8.5	0.1	-72.2
1999	6.0	1.8	30.1	-3.6	252.7
2000	5.7	0.6	10.7	-7.3	-64.6
2001	5.7	1.1	19.4	-2.7	81.8
2002	5.6	1.1	19.5	-4.4	0.7
2003	5.1	2.9	56.5	-10.4	189.7
2004	5.0	2.8	54.5	-3.8	-3.5
2005	5.0	2.9	58.2	-5.3	6.7
2006	4.9	3.1	62.5	-4.8	7.5
2007	4.7	3.1	65.7	-5.7	5.1
2008	3.2	2.2	69.7	-14.1	6.0
2009	5.4	2.8	51.9	4.7	-25.5

Source: IMF for FGDP and FGDP % growth; and author calculations for others
Key: FGDP = Formal GDP; 2nd GDP = Second Economy GDP

5.2 Results discussion

Using OLS and corresponding regression output, the size of the second economy in the case of Zimbabwe has been calculated. The formal GDP (FGDP), second economy GDP (2nd GDP), the ratio of the second economy GDP to formal GDP (2nd GDP/FGDP) are calculated and presented in Table 2. Since the calculations of the second economy are estimated indirectly (and by its very nature not directly observable), it is emphasized that these estimated values are only broad estimates and should therefore be interpreted with caution.

While the size second economy averages 30 percent of GDP (2nd GDP/FGDP) over the whole period, there is a clear increase in the size of the second economy relative to formal GDP for the 1980 to 2009, with the share of second economy rising sharply from a relatively low value of 8 percent in 1980 to the peak value of 70 percent in 2008 before subsiding to 52 percent by end of 2009.

The estimates of this study are relatively higher when compared to previous second economy point estimates which included Zimbabwe (among others Malaba (2006), Schneider (2002)). For instance, this paper estimates that for 1995 and 2003 the second economy as a percentage of formal GDP was 30 percent and 56.5 percent respectively. Malaba (2006) used point estimation approach and estimates that the second economy contributed around 23 percent and 30 percent respectively towards the formal GDP. While this study estimates the share of second economy as a percentage of formal GDP to be 30.1 percent and 10.7 percent for the years 1999 and 2000 respectively, Schneider (2002) estimates the

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share of informal economy in Zimbabwe to be 59.4 percent of gross national product (GNP) respectively for the same years.

Overall, the estimates obtained from this study are considerably higher than those obtained by most studies on African countries and this is not a surprise given that the country has experienced a prolonged decade long economic decline which resulted in GDP falling by more than 50 percent between 1999 and 2008. For instance, Ocran (2009) study on Ghana the size of the second economy as a proportion of the official GDP estimates increased steadily from 14% in 1960 to a higher value of 30% between the periods 2003 to 2004. Bagachwa and Naho (1995) study on Tanzania found that the second economy grew from a low level of less than 10% of official GDP during the late 1960s to a sizeable proportion of over 20% after the mid- 1980s.

5.2 Conclusion

The second economy in Zimbabwe have grown from a low level of less than 10% of official GDP at independence in 1980 to an all-time high share of 70 percent in 2008 before subsiding although to a still high percentage share of 52% by end of 2009. Overall, the estimates obtained from this study are considerably higher than those obtained by most studies on African countries and this is not a surprise given that the country has experienced a prolonged decade long economic decline which resulted in GDP falling by more than 50 percent between 1999 and 2008[7].

5.3 Policy recommendations

The existence of such a sizeable sector of unrecorded domestic and international economic transactions has several implications relevant for policy. First, it suggests that considerable efforts will need to be made by the national accounts section in the Central Statistical Office (CSO) to establish systematic estimates of the major components of the second economy with a view of incorporating these into the official national account's series. Otherwise, the national accounts will not be the best for meaningful economic analysis and policy formulation.

Second, coexistence of informal, parallel and black-market activities in the second economy casts doubt on a blanket policy for the economy. Whereas it is desirable to reduce the extent of parallel and black-market activities by reducing the extent of government controls and restrictions, the study also recommends promotion of informal sector activities through selective intervention mechanisms aimed at easing capital, technology and market constraints facing the sector. There should also be need to design an explicit policy for enhancing the informal sector.

Finally, the results suggest that the real total economy is healthier than the gloomy picture painted by official statistics. There is indeed a justifiable need to pay extra attention to the mobilization and use of existing idle and second-economy resources.

[7] Although a number of factors such as the second economy itself or recession might have caused the high share of second economy in total economic activities especially from 1999, the exact contribution of each of these factors is beyond the scope of this study.

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Appendix: Stationarity test results

Table A1: ADF Unit root test

Series	Model	Level		1st difference	
		ADF	Conclusion	ADF	Conclusion
Ln_M1	τ_τ	3.18	Non stationary	-3.4*	Stationary
	$\tau\mu$	6.73		-2.0*	
	τ	4.98		-1.4	
Ln_Y	τ_τ	-2.8	Non stationary	-4.9***	Stationary
	$\tau\mu$	-2.1		-5.1***	
	τ	-0.2		-5.2***	
	τ_τ	-1.0		-4.5***	

DOI: https://doi.org/10.5281/zenodo.14288217

Ln_ IR	**τμ**	0.42	Non stationary	-4.3***	Stationary
	τ	2.7		-3.8***	
Ln_RPFC	**τ_τ**	-2.4	Non stationary	-8.1***	Stationary
	τμ	-1.1		-7.8***	
	τ	0.57		-7.8***	
Ln_BExr	**τ_τ**	-3.3*	Stationary		
	τμ	-2.3			
	τ	-1.9*			
Ln_ATR	**τ_τ**	-7.3	Non stationary	-5.8***	Stationary
	τμ	-1.9		-5.2***	
	τ	-1.0		-5.2***	

*(**)[***] Statistically significant at a 10(5)[1] % level

Key: τ_τ = Means Trend and Intercept

: τ_μ = Means intercept

: τ = Means None

Ln_M1 = logarithm of M1; ln_Y = logarithm of GDP; Ln_IR = logarithm of interest rate; Ln_RPFC = logarithm of ratio of private final consumption expenditure to GDP; Ln_BExr = logarithm of ZW$/US dollar black market exchange rate; and Ln_ATR = logarithm of average annual (company) tax rate