

Quantifying the size and trends of the shadow economy in the Kingdom of Eswatini

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Abstract

There is a growing body of literature about the drivers, size, and trends of the shadow economy. This paper quantifies the size and assesses the trends of the shadow economy in Eswatini over a period of 16 years. Using gross domestic product as a development indicator and other macroeconomic variables from government and international institutions the paper employs a structural equation model in the form of the Multiple Indicator Multiple Cause approach to determine the drivers of the shadow economy in Eswatini as well as to quantify its size. The results show that taxation (direct and indirect), self-employment, agricultural value added, and regulations were the causes for the development of the shadow economy in Eswatini. The results also indicate that the shadow economy in Eswatini was at 37.4 percent of the formal economy or gross domestic product in 2016. This means that the current gross domestic product of the country has been underestimated by E20.5 billion due to the exclusion of economic activities taking place outside of the formal economy when computing gross domestic product.

Keywords: Shadow economy; Multiple Indicator; Multiple Cause; Eswatini.

1. Introduction

Interest in understanding the shadow economy emanates mainly from the policy implications for government revenue. The shadow economy is widely referred to as the informal sector or parallel economy. For the purposes of this study, the term shadow economy is adopted. Generally shadow economic activities are a result of government's inability to monitor all economic activities which can be attributed to time and resource constraints (Hassan & Schneider, 2015).

Researchers attempting to quantify the shadow economy are often faced with an intricate task in determining which activities constitute the shadow economy. Shadow economic activities can be in the form of unregistered business operation or subsistence income generating projects. Schneider (1994a, 2003, 2005, and 2011) provides a definition of the shadow economy, which is a useful starting point in the theoretical discussions of the shadow economy. The shadow economy can be broadly defined as an amalgam of all unregistered economic activities that would contribute to the overall national income (gross domestic product) if monitored (Schneider 2003).

Some definitions exclude constitutionally unlawful activities while others incorporate them. What is common in all definitions is the neglect of household income generating informal economic activity for sustenance purposes. While the definition applied in the estimation determines the size shadow economy, there is general consensus that the shadow economy accounts for a sizable portion of the economy especially in developing countries. If all these economic activities are officially registered they would be liable to taxation and government regulation (Hassan & Schneider, 2015).

For the purposes of this study, the shadow economy encompasses all legal but unregistered economic activities that would, if monitored, contribute to the overall gross domestic product.

There has been increasing evidence that suggests that shadow economic activities have reached remarkable proportions globally (Schneider *et al.*, 2010). Worldwide, the shadow economy accounts for approximately 13.7 percent of the world's gross domestic product (GDP).¹ Additionally, the Organizations for Economic Cooperation and Development (OECD) (2009) established that

¹ Calculated from 10 trillion U.S dollars' contribution of the global shadow economy (Neuwirth 2011) divided by 72.924 trillion U.S dollar's value of the global gross domestic product (World Bank 2011) which is yields 13.7 percent.

almost 1.8 billion of the global population is, in one way or another, employed in the shadow economy.

Generally, developed countries regulate, through policy, shadow economic activities such that they remain below 10 percent. However, the literature does not provide a similar benchmark for developing countries. By identifying the driver of the shadow economy, this paper will assist policy makers by providing information on which factors need to be altered in order to influence the size of the shadow economy in the country.

The subsequent sections of this paper are organised as follows. Section two discusses the relationship between the shadow economy and the mainstream economy. In section three the paper presents the theoretical framework of the shadow economy. In section four, the paper presents the data and methodology utilised in quantifying the size of the shadow economy. Section five presents a summary of the results and discussions. Section six presents the conclusions of this paper and section seven provides the policy implications and recommendations.

2. Literature

2.1. The relationship between the shadow economy and the formal economy

The shadow economy is a multi-dimensional, multi-faceted phenomenon, which inevitably accompanies the formal economy throughout the world (Krstic & Schneider, 2015). Most countries have large shadow economies; however, developing countries have a larger shadow economy. Schneider (2009), who provides empirical evidence that the contribution of the shadow economy to GDP is quite significant accounting for 40 to 50 percent in the developing world, corroborates this. The shadow economy has varied outcomes on a country's social and economic environment which can be relatively stable and acceptable to extremely counter-productive to the countries stability and long-term development prospects (Hassan & Schneider, 2015). As a result, robust interest on having an understanding of the shadow economy has increased in recent years.

Traditionally, there has been mixed perceptions regarding to the relationship between the shadow economy and the mainstream economy. In general, there are three schools of thought surrounding the relationship between the shadow economy and the mainstream (official economy). The perspectives are dualist, legalist and neo-structural framework (Wilson, 2011)

According to the neo-structuralist school of thought, economic growth is reliant on structural changes. Therefore, when certain key sectors undergo positive transformation, growth can flourish. Thus, neo-structuralist view the shadow economy as a hindrance to the development of the formal economy (Williams & Round, 2011). Their argument is that shadow economic activities are unproductive and destructive to the mainstream economy by eroding the potential tax base of a country by reducing tax compliance, increasing the budget deficit and ultimately weakening the overall economic growth (Schneider, 2010). Hence, the shadow economy has a reductive effect on the economy by virtue of distortion of national statistics (growth, unemployment, income distribution etc.). In addition, national policies become weak as they are drawn from distorted statistics. Additionally, the shadow economy promotes rent seeking and free riding as those in the shadows enjoy public services and infrastructure without contributing much towards the provision of this public facilities and services. Therefore, the shadow economy has an antagonistic effect on the development of the economy because it shrinks the size of the formal economy.

According to the second school of thought the legalist, the shadow economy may not be holistically negative to the development of the mainstream economy (De Soto, 1989). This view claims that shadow economic work diminish if the cost of doing business is easy to verify using evidence carefully compiled. In actuality, the official economy and the shadow economy exist in parallel, which gives way to the allocation of resources sub-optimally and also gives opportunity for distortion (Schneider & Enste, 2000). On one hand, the shadow economy promotes allocation distortion as a result of under-use of resources and factors of production. While on the other hand income generated in the shadow economy is largely spent in the formal economy. Furthermore, Schneider & Enste (2000) provides evidence in Germany that 2/3 of the income obtained from shadow economic activities was reinvested back into the formal economy. The view presents informal workers as entrepreneurs oppressed by stringent regulations that are difficult to follow.

Moreover, Jutting and de Laiglesia (2009) provide support of this view by stating that the shadow economy acts as a buffer for unemployment because it provides income generating opportunities to those people that cannot find ruminative occupation in the mainstream economy. The shadow economy also acts an incubator for entrepreneurship and enterprises because those in the informal sector have shown business acumen, creativity, dynamism and innovation (Williams & Round, 2011). Thus, the shadow economy has strong

linkages with the Small and Medium Enterprises (SME) sector because some SMEs are directly or indirectly connected to shadow economic activities. This positive outlook of the shadow economy has emerged from the fact that shadow economic activities provide means of livelihood for both rural and urban people unable to find work. In general shadow economic activities are low income activities that provide enough income for people to sustain their existence. Therefore, in its entirety the shadow economy acts as a complimentary force to the official economy.

The last school of thought, the dualist view, asserts that the shadow economy will vanish with development; specifically economic growth or adequate government support to employment creation (Wilson, 2011). This perspective argues that the relationship between the informal and mainstream economics and structural changes in the mainstream economy would reduce the shadow economy. Dualist view states that the shadow economy can only be a positive phenomenon only if harnessed and brought into the official economy (Williams & Round, 2011). This emergent discourse was developed from the view that the informal sector acts as a platform for enterprises, entrepreneurship and is an asset, but only if these ventures can be nurtured and transitioned into the formal economy (International Labour Organization, 2002; Rennoy *et al.*, 2004 & Small Business Council, 2004). Such enterprises, if formalised, it was argued, would contribute to the development of enterprises and the achievement of fuller employment.

In recognition of the unparalleled economic potential that can be gleaned through the informal sector, amongst other things, Eswatini adopted the Agenda 2030 for Sustainable Development in 2015. In so doing committed herself to creating decent work and economic growth in goal number eight of the Sustainable Development Goals (SDGs). Target 8.3 of decent work and economic growth specifically advocates for the promotion of development policies that encourage the formalization and growth of micro, small, and medium enterprises. Thus, harnessing and transitioning shadow economic activities into the formal economy will result in decent work for those in the shadows, thus ultimately stimulating economic growth. Furthermore, decent work is the blue-print to achieving all the 17 sustainable development goals.

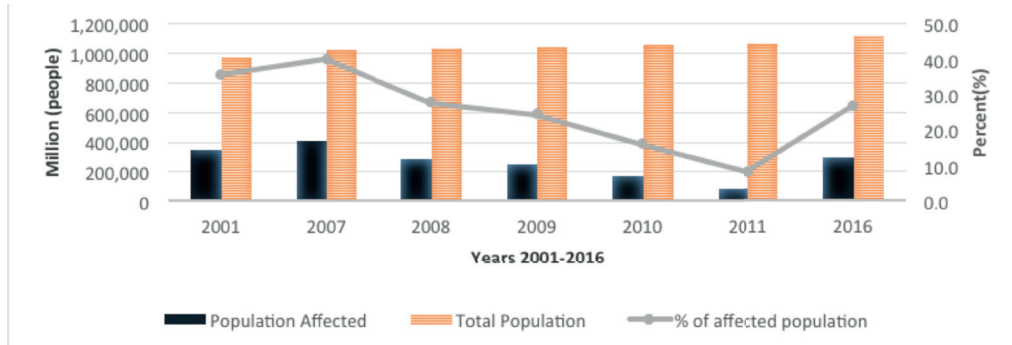
The “deshadowisation” initiative views the shadow economy in a positive light and advocates that deterrents such as stricter sanctions to change the cost benefit ratio, coupled with lucrative incentives encourage informal enterprises to formalise their operations (Novoseletsky, 2000). To achieve this, the simplification

of reporting systems and the registration process must provide an incentive for people to leave the shadow economy and formalise their economic activities.

The economy of Eswatini over the past 16 years has shown signs of resilience in times of severe recurrent droughts and economic shocks. In 2001/2002 the economy of Eswatini experienced a severe drought which affected 35.75 percent of the population (National Disaster Management Agency ([NDMA], 2016) as well as the economic downturn as a result of the September 11 bombing of the World Trade Centre. These events escalated the inflation rates to 11.68 percent. Shortly after recovering from the drought and economic crisis of 2001/2002, the economy of Eswatini was affected by another economic downturn. This recession was a result of the worst drought in recent history affecting 40.11 percent of the population (NDMA, 2016) and the global financial melt-down of 2007/08. As a consequence of these events the inflation was increased to a record-high 12.63 percent. Just as the economy was recovering from the drought and world financial crises in 2007/08, yet another economic crisis and mild drought was experienced in 2011/12. This drought affected 16.08 percent of the households in Eswatini (NDMA, 2016). Moreover, the government of Eswatini was faced with a budget crisis with the government struggling to pay salaries of public sector workers. This fiscal crisis was a direct consequence of the decline in the South African Custom Union (SACU) receipts, a historical high level of expenditure by the government and a high salary cap as well as the lack of access to domestic and foreign borrowing by the government. This factors triggered the inflation to raise from raise from 6.10 in 2010/11 to 8.94 percent in 2011/12 which was not as high compared to the previous years.

Jutting and de Laiglesia (2009) provides evidence that the size of the shadow economy grows rapidly in periods of economic crisis because people that lose their employment tenure in the mainstream economy are absorbed by the informal sector. This has prompted the question; how big is the shadow economy in Eswatini and how has it affected the national income in times of drought and economic turmoil? The answers to these questions will be pertinent for a developing economy such as Eswatini, which is on a mission to resuscitate economic growth and also entering the last phrase of implementing the National Development Strategy (NDS). Figure 1 shows the impacts of drought on the population from the year 2001 up to 2016. It depicts the number of people that were affected by the drought as a proportion of the total population. Furthermore, Figure 1, illustrates the trends of the impact of drought on drought years over a period of 15 years.

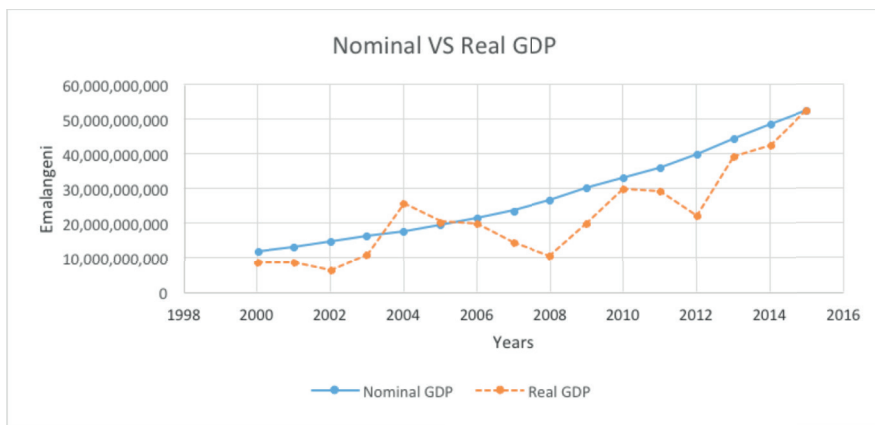
FIGURE 1: IMPACT OF DROUGHT ON THE POPULATION



Source: National Disaster Management and Central Statistics Office (2016)

While Figure 2 shows the growth trends of the nominal and real GDP over the past 15 years beginning from 2000 up to 2015. Figure 2, depicts how the economy of Eswatini had grown in the past 15 years both in nominal and real terms. This was done to illustrate the impacts of drought and economic shocks on the economy.

FIGURE 2: TRENDS OF GDP GROWTH IN ESWATINI



Source: Central Statistics Office (2016)

2.2. Conceptual framework for the shadow economy

Numerous empirical and theoretical studies have been conducted on the shadow economy in order to determine the key role of this phenomenon in the functioning of the economy. However, due to the cumbersome nature of estimating the size of shadow economic activities using direct methods because of the hidden nature of such activities, researchers have opted on developing indirect methodologies.

This section reviewed the most important literature that concentrates on estimating the shadow economy and analysis of its determinants.

Empirical evidence from Hassan and Schneider (2015), in their analysis of the Egyptian shadow economy found that the main causes of the shadow economy in Egypt were tax burden (direct and indirect tax), the size of the agricultural sector, quality of institutions, self-employment and regulations. Whereas, Schneider and Enste (2000) in their estimation of the size of the shadow economy in 76 developing, transition and OECD countries found that high taxes, social security contributions and the intensity of regulations were the main drivers of the shadow economy, especially in OECD countries. Dell'Anno *et al.* (2007) in their analysis of the shadow economy in three Mediterranean countries: France, Spain and Greece found that, there are different causes for the existence of the shadow economy in each country. In France the main drivers of the shadow economy were found to be tax burden, labour force participation, and self-employment. Whilst, in Spain the main causes of the shadow economy were found to be unemployment and public employment. Whereas, in Greece the causes of the shadow economy were found to be unemployment rate and self-employment. Utilizing these studies as the theoretical base, the studies assumed the drivers of the shadow economy in Eswatini to be the tax burden (direct and indirect tax), the size of the agricultural sector, institutional quality of governance institutions, unemployment and self-employment levels.

2.3. Modelling the size of the shadow economy in Eswatini

Throughout literature there are various approaches that are employed to quantify the size and growth of the shadow economy. However, this is still a difficult task, mainly because shadow economic activities are cash based and occur off the books because people in the shadows do not want to be exposed to the authorities while they conduct their activities. Nonetheless, there are direct and indirect approaches that can be used to quantify the shadow economy. The direct approach includes methods such as surveys and discrepancy approaches. The methods depends on survey sample based on voluntary replies, tax audits and other compliance methods. The limitation of this method is that, it depends on questions asked by the survey and other similar surveys. Resultantly, it is difficult to measure and compare informal economies in different countries. Additionally, this method uses a questionnaire, hence may be susceptible to moral hazard because respondents are not keen on admitting fraudulent behaviour or reporting their taxes information. Whereas, the indirect approach includes methods such as the currency demand approach (CDA) and the structural equation model (SEM) such as the multiple indicator multiple cause (MIMIC) model.

The MIMIC model is a special case of structural equation model with a latent (unobservable) variable. The MIMIC model has advantage over direct methods because this technique examines the covariant structure between the observed and measurable causes and indicator simultaneously to obtain information about their relationship as well as the unobserved (latent) variable (Buehn & Schneider, 2008). Additionally the MIMIC model is applied on time series data to derive estimation of the shadow economy. For the purpose of our analysis the MIMIC model was used because it had the advantage of differentiating between causal factors and indicators. Also, the MIMIC model is complimentary to both the direct and indirect method (Buehn & Schneider, 2008). The MIMIC model is a theoretically-based approach that attempts to confirm the impact of a set of exogenous variables on the latent variable (shadow economy), while simultaneously confirming the effects of the latent variable on the macroeconomic indicators (Farzanegan, 2009). Thus, the MIMIC model serves to testing economic theory as opposed to being an explanatory technique (Schneider, 2010). It is used to postulate the linkages between the latent variable and the observed variables based on literature (Farzanegan, 2009). According to Trebicka (2014) the first paper to apply the MIMIC approach in the estimate the shadow economy was by Frey and Weck-Hannemen (1984) in the review of 17 OECD countries. This method has evolved over time with Aiguer et al. (1988) further adjusting the method in the dynamic model MIMIC (DYMIMIC) in their assessment of the shadow economy in the USA economy. Gile (1999) further adjusted the method to be accommodative of time series data more specifically unit root on the evaluation of the New Zealand shadow economy.

3. Methodology

3.1. Description of data

To quantify the size and assess the trends of the shadow economy, this paper used annual macroeconomic time series data from year 2000 up to 2016. Literature informed the selection of five macroeconomic variables for the econometric model. These are: tax (expressed as a share of GDP); agricultural value added (share of agricultural contribution to GDP); institutional quality of governance institutions (an index used to measure institutional quality and governance in Africa); unemployment rate (an indicator that shows unemployment as a proportion of the total labour force); self-employment (people that are formally registered to own private business as a percentage of the total population).

The real GDP rebased to 2016 to account for inflation was used as an indicator to measure the presence shadow economy. Other indicators used to

infer the presence of the shadow economy included money supply and total employment. Money supply is defined as the total currency in circulation outside the banking system while total employment rate was measured as the number of people employed as a proportion of the total population. The section below provide theoretical base for the selection of this macroeconomic indicators and the assumed hypothesis for testing. These indicators are divided into two classifications namely the drivers and the indicators of the shadow economy.

Annual time series data was obtained from various government institutions and other international institutions such as the Mo Abraham foundation. Tax revenue data was obtained from the Eswatini Revenue Authority (SRA). While, agricultural value added, unemployment, inflation, population, labour force, GDP and employment data were requested from the Central Statistics Office (CSO). Regulation data was obtained from the Ibrahim Index for African Governance (IIAG) database, and self-employment data was acquired from the Ministry of Commerce business registration unit and business licensing unit. Lastly, money supply data was attained from the Central Bank of Eswatini.

3.2. Driver of the shadow economy

Throughout literature, there are numerous factors that contribute to the growth and development of the shadow economy. These factors may be country specific and vary from one country to the next. For the purpose of this analysis; tax burden, the size of the agricultural sector, institutional quality of democratic institutions, unemployment and self-employment are assumed to be the main drivers of the shadow economy in Eswatini. This variables were selected based on available annual data during the period of the study. Furthermore, this variable are justified by literature because they are the most commonly documented drivers of the shadow economy worldwide.

3.2.1 Tax burden

In general, the usual starting point of quantifying the size of the shadow economy is to assess the relationship between the tax burden and the shadow economy. Throughout literature, the tax burden has been widely documented as the most popular cause for the growth and development of the shadow economy globally.

The tax burden is of massive concern to economists worldwide because it influences the labour-leisure decision trade-off and also contributes to the labour supply in the shadow economy (Alañón & Gómez-Antonio, 2005; Schneider, 2005; Hassan & Schneider, 2015). The greater the gap between the net salary for a worker and the total labour expenses in the official economy, the more

reasons for the workers to evade paying taxes and operate in the shadows (Schneider, 2012). In addition, the tax burden has a direct influence on the prices of goods and services in the formal economy as it stimulates an increase in the cost of production for goods and services. Therefore, SMEs operating in developing economies like Eswatini, are incentivised to operate in the shadows so as to avoid taxes and minimise their costs of production. When using MIMIC approach, the direct and indirect tax burden is quantified by the share of total tax burden on GDP.

Hypothesis 1: The higher the tax burden, the bigger the size of the shadow economy, *ceteris paribus*.

3.2.2. The size of the agriculture sector

The importance of the agricultural sector has a momentous influence on the size of the shadow economy in most developing economies like Eswatini (Vuletin, 2008). With agriculture viewed as the backbone of the economy in Eswatini, most people in the rural economy are engaged in agricultural activities. Additionally, rural folks are easily absorbed by the sector, since means of agricultural production such as land and labour are easily accessible.

With the poverty levels in rural areas estimated at 69 percent, agriculture is conceived as the main source of livelihood contributing 70 percent of the economic activity in rural areas (Comprehensive Agricultural Sector Policy, 2005). This sector contributes through food and income generation to support the livelihoods of rural dwellers. The size of the agricultural sector was quantified by the share of agricultural contribution to GDP.

Hypothesis 2: The more dominant the agricultural sector, the larger the size of the shadow economy, *ceteris paribus*.

3.2.3. Institutional quality of governance institutions

As part of the primary work in understanding the trends and size of the shadow economy, it is of great importance to understand the effects of the quality of public institutions. Good rules of law, by securing property rights and enforceable contracts, provide an incentive for people to stay in the formal economy and amplify the costs of operating in the shadows. However, the opposite is true, where corruption, bureaucracy, lack of transparency along with poor-public service delivery and weak rule of laws are often concomitant with a very large size of the shadow economy (Schneider, 2010; Hassan and Schneider, 2015). To measure the effects of institutional quality on the Shadow economy the Ibrahim

Index for African Governance (IIAG) was utilised. This index provides an annual assessment of the quality governance in all the 54 African states.

Hypothesis 3: The more efficient the quality of governance, the smaller the size of the shadow economy, *ceteris paribus*.

3.2.4. Unemployment

In spite of the vast literature on the shadow economy, the causal correlation with regards to unemployment and shadow economy still remain unclear. However, Schneider *et al.* (2010) provides evidence that the unemployment rate has a massive influence in the size of the shadow economy in developing economies as well as in developed economies like the OECD countries. Tanzi (1999) remarks that the labour force in the shadows is extremely heterogeneous incorporating unemployed people and the non-official labour force such as the retired veterans, illegal immigrants, minors and homemakers. Another challenge associated with shadow economy emanates from the fact that some people may have two occupations, one in the formal economy and another in the shadows so that they can supplement their formal remuneration. This makes it difficult to effectively quantify the shadow economy because of the two jobs held by one person. In this sense unemployment was faintly correlated to the shadow economy.

Hypothesis 4: The higher the unemployment rate, the bigger the size of the shadow economy, *ceteris paribus*.

3.2.5. Self-employment level

Throughout, literature the amount of self-owned businesses as a percentage of labour force in the official economy is perceived as a direct implication of the shadow economy. Hypothetical the assumption was that the self-employed are more incentivised to avoid following the tax regulations because they have a higher number of deductible expenses from both their tax base and personal income taxes. Also as a result of direct interaction with their clientele they can collude with their customers to dodge indirect taxes (Hassan & Schneider, 2015). Self-owned businesses are motivated to hire informal and irregular employees because they have fewer internal and external auditing controls compared to formal organizations and bigger firms (Dell'Anno *et al.*, 2007). Given, the prominence of the Small and Medium Enterprise (SMEs) sector in Eswatini and its dependence on the shadow economy directly and indirectly. The shadow economy acts as an incubator for entrepreneurship and enterprises because some of them started in the informal sector and graduated to the formal sector as they grew bigger.

Hypothesis 5: The higher the rate of self-employment the bigger the size of the shadow economy, *ceteris paribus*.

3.3. Indicators of the presence of the shadow economy

After comprehensively reviewing, the various drivers influencing the size of the shadow economy in Eswatini, the MIMIC model permits to account for the different indicators that show the presence of the shadow economy.

3.3.1. Real Gross Domestic Product (variable of scale)

With reference to literature, there is no consensus with regards to the relationship between the shadow economy and official economy. On one hand various scholars such as Alanon and Gomez-Antonio (2005) postulate a positive correlation between the official economy and the shadow economy. The shadow economy permits for underprivileged people to find ways to sustain their livelihood by producing and selling cheap products as income generation activities. While, in contradiction other authors Schneider and Enste (2000); Dell'Anno and Schneider (2003) find an inverse relationship between these two variables. An increase in the size of the shadow economy leads to a decrease in the official economy because resources and factors are absorbed by the shadow economy creating a depressing effect on the growth of the official economy (Schneider & Enste, 2013; Alanon & Gomez Antonio, 2005).

In the analysis, the real GDP (base year 2016) was used as an indicator to reflect the existence of the shadow economy in Eswatini and to test the relationship between the shadow economy and the official economy. In view of the fact that the shadow economy cannot be directly observed, the Real GDP was set as our reference variable and it was expected to have a negative sign. The value of Real GDP is fixed to -1 throughout the different model specifications.

Hypothesis 6: The larger the shadow economy the lower the GDP is, *ceteris paribus*.

3.3.2. Currency in circulation

Generally, activities in the shadow economy are off-the books cash based transactions to bypass detection by tax authorities and the government reporting system. Thus, such transactions are not done through credit/debts or check or bank transaction to conceal them. According to the Central Bank of Eswatini, money supply increased as a consequence of an increase in the currency circulation outside the bank system which rose by an annual rate of 6.17 percent

in 2011, increased further to 22.6 percent in 2012 and grew to 29.01 percent in 2013. However, in 2014 the money supply, substantially dropped to -0.8 percent reaching critical levels as a result of the deficit in the balance of payment in Eswatini. Studies by numerous authors including Dell'Anno *et al.*, (2007) and Schneider *et al.*, (2010) provides empirical proof that there is a positive and significant correlation between the size of the shadow economy and the currency in possession of the public. For that reason, in the MIMIC model money growth was used as an indicator. In this analysis a time series of M1² is used.

Hypothesis 7: The larger the size of the shadow economy, the larger the currency held by the public, *ceteris paribus*.

3.3.3. Total employment

The third and final indicator used in the MIMIC model was total employment as a share of total population. The shadow economy has the ability to attract economic agents from the formal economy to work informally, thus leading to a decline in the availability of human resource in the mainstream economy. Numerous authors, such as Dell'Anno *et al.*, (2007), Schneider *et al.* (2010), incorporated total labour force participation as an indicator of the increased informal activities shown in the reduction of the labour force rate. Although, the general definition of the labour force rate comprises total workforce willing and able to work; therefore, employed and unemployed. In that regard it was argued that focusing exclusively on total employment permits for the accurate measurement of the size of the shadow economy because of the mobility of the economic agents to operate in the shadow economy (Hassan & Schneider, 2015).

Hypothesis 8: The bigger the shadow economy, the lower the total employment rate, *ceteris paribus*.

Globally there are numerous causal and indicators that have been utilised to quantify the size of the shadow economy. Some of this variables include the rate of corruption, level of bureaucracy in government institutions, the intensity of regulations, lack of access to financial resource, institutions that are resistant to change, government subsidies, social security contributions and disposable income. Due to insufficient data on these variables for the period of the study (2000 to 2016) for the case of Eswatini, these variable were omitted in the MIMIC model.

² M1 also called narrow money, includes coins and notes in circulation and other money equivalent that are easily convertible into cash.

3.4. Methods and Procedures

The ability of the MIMIC model to differentiate between causal factors and indicators rendered it sufficient for the task. Furthermore, the MIMIC model is complimentary to both direct and indirect method (Buehn & Schneider, 2008). When using the MIMIC model, it is crucial to have a theoretical base as justification for the correlation between the latent variable and the observed variable, duly because this model tests the hypothesized relationship by examining its consistency with the actual data. The MIMIC model is divided into two components, the structural model and the measurement model. The structural model (equation 1) is utilised to show the latent variable η_t (shadow economy index) which is linearly determined by a set of exogenous casual variables (X_t). Where, γ is a vector of parameter to be estimated, and the subscript t denotes time.

$$\eta_t = \gamma' X_t + \zeta_t \quad (1)$$

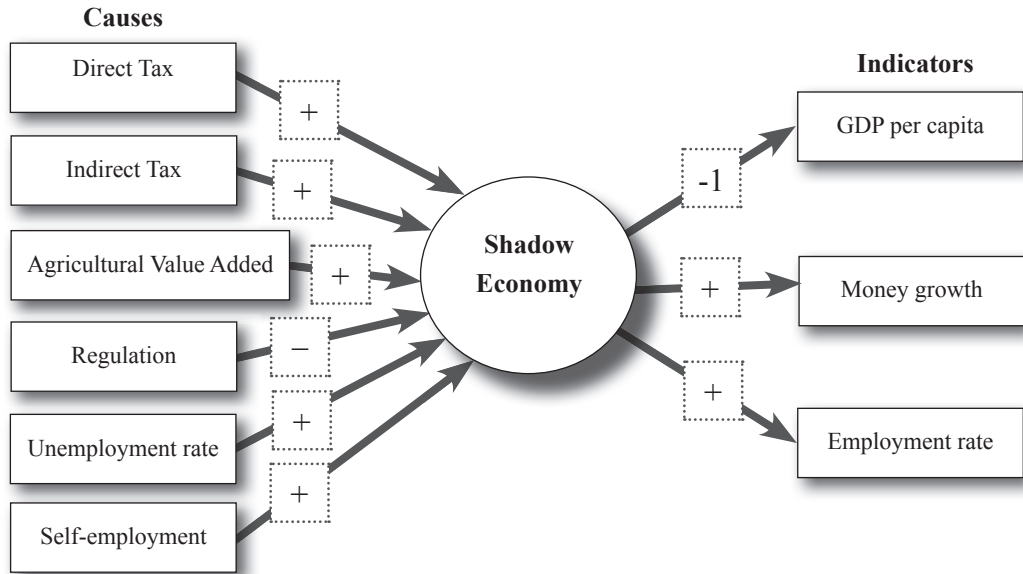
Whereas, the measurement model (equation 2) connects the latent variable to a set of chosen indicators $\{Y_t: \text{real GDP (Y}_1\text{), money growth (Y}_2\text{) and employment rate (Y}_3\text{)}\}$ and estimate the impact of the shadow economy on these indicators. Similarly, λ is a vector of parameters to be estimated and ε_t is a errors satisfying white noise. The unobservable variable is portrayed in terms of the observable variables and is shown as:

$$y_t = \lambda \eta_t + \varepsilon_t \quad (2)$$

The MIMIC model approach acknowledges that there are numerous factors that influence the growth of the shadow economy in a country and observes their effects over a period of time as shown by the path diagram in Figure 3.

To quantify the size and trends of the shadow economy in Eswatini, the MIMIC model was utilised using the Stata software version 14.0. A structural equation model was developed to assess the causality among the used variable such as direct tax, indirect tax, agricultural value added, regulation, unemployment rate and self-employment contribute to the development of the shadow economy. A measurement model was also developed to link the shadow economy to a set of indicators such as real GDP, money growth and employment rate.

FIGURE 3: THE GENERAL STRUCTURE OF THE MIMIC MODEL AND THE HYPOTHESIZED RELATIONSHIP BETWEEN VARIABLES



The model was specified and its parameters were subsequently estimated using the maximum likelihood method (ML). The parameters estimated were then used to predict the latent variable (shadow economy) and to calculate the MIMIC index percent from the estimated parameters (Schneider *et al.*, 2009).

$$\hat{\eta}_t = \frac{\tilde{\eta}_t}{\tilde{\eta}_{2016}} \eta_{2016}^* \quad (3)$$

$\hat{\eta}_t$ is the calculated MIMIC index at time t ; it estimates the shadow economy as a percentage of the official economy. $\tilde{\eta}_t$ is the estimated value of the latent variable at time t ; $\hat{\eta}_{2016}$ is the estimate of the shadow economy in the base year 2016 and η_{2016}^* is the exogenous estimate of the shadow economy in 2016. The exogenous shadow economy is the exterior estimate, base value of the shadow economy in 2016, derived from previous studies.

Special attention was paid to the data stationarity test since annual macroeconomic data was utilised. In most cases macroeconomic variables do not satisfy the underlying assumption of stationarity due to cyclical trends as a result of seasonality and economic shocks. Hence, the problem of spurious regression may arise. To overcome the challenge of spurious regression, the time series is transformed into a stationary one. The annual time series data was tested for unit root using the Augmented Dick-Fuller (ADF) test and the

Phillips-Parron (PP) test at level. The results of the two stationarity test were conflicting as the ADF test showed unit root while the PP test showed that the time series had no unit root, it was stationary. To reconcile the two unit root test, the data was then tested for normality to assess if the time series was normally distribution. Form the normality distribution it was determined that the results of the ADF test were normally distributed and the PP test results were dropped because they were not normally distributed. Using the ADF results the time series was differentiated once to remove the unit root in the time series and make it stationary.

After the data was tested for stationarity, it was further tested for co-integration, to determine if there was a long run relationship between the independent variable and the error term. The Engle and Granger two-step approach was used to test if all the six causal variables are co-integrated with each of the three indicator variables. The Engle and Granger two-step test showed all the causal variables were not co-integrated with each of the three indicator variables. This meant that the shadow economy had no long run relationship with all it indicators. Therefore, the data could be fitted into the MIMIC model to quantify the size of the shadow economy in Eswatini.

To specify the MIMIC model all variables were differenced once, in particular real GDP (Y1), money growth (Y2) and Employment (Y3) were transformed to logarithm (model specification 1) and then further transformed to log-difference (model specification 2) in order to improve their distribution to normal.

4. Results and Discussions

Table 1 presents results, starting with a MIMIC model 6-1-3 (six causes, one latent variable and three indicators). The iterative process of model specification involved eliminating insignificant variables in order to reach the best model specification. The best specification is MIMIC 2-1-2 for model 1 and MIMIC 4-1-1 for model 2. The results show that from specification 1, the main drivers of the shadow economy are indirect taxation, self-employment, and formal employment. Contrary to expectation, there is an inverse relationship between the size of the shadow economy and self-employment. In consonance with expectation, taxation is positively associated with the size of the shadow economy. This implies that as the tax burden increases so does the size of the shadow economy. Worth noting is that tax evasion through opting to operate in the informal sector can be a cost to the society. Since government uses taxes to provide public goods (such as road infrastructure), theoretically at least, some

of which are used by businesses. In light of this view, informal businesses are free riding on the formal sector's contribution. However, informal businesses can also create a stimulating effect since part of the income creates demand for goods and services produced in the formal economy.

With regards to specification 2 (MIMIC 4-1-1), the results in Table 1 show that indirect tax, agriculture value added, regulation, and self-employment are positively associated with the size of the shadow economy. This implied that an increase of these variables is associated with an increase in the size of the shadow. The positive relationship between the shadow economy and regulation is contrary to expectation. Similar to specification 1, self-employment is positively associated with the size of the shadow economy.

To evaluate the model fit, the chi-square and the Root Mean Square Error of Approximation (RMSEA) measurement statistics are utilised. The chi-square was used for testing the model against the alternative that the covariance matrix of the observed variables was constrained. A smaller value indicated a better model fit. The results of the model show a good model fit with a $\chi^2 = 3.66$ at the MIMIC 2-1-2 specification and a $\chi^2 = 10.13$ at the MIMIC 4-1-2 specification. Whereas when using the RMSEA test which accounts for the error of approximation in the population, a value of 0 indicates a good model fit. The results of the model show a good model fit with a RMSEA = 0.228 at the MIMIC 2-1-2 specification and a RMSEA = 0.00 at the MIMIC 4-1-2.

Contrary to a priori expectation, unemployment has no impact on the magnitude of the shadow economy in Eswatini. This implies that high level of unemployment in Eswatini does not directly translate into a relatively large size of the shadow economy. This is consistent with Hassan and Schneider (2015) who found a similar result for the Egyptian economy. This result implies that Emaswati are more inclined towards job seeking than entrepreneurship. Such inclination might be a factor of the education system that leans towards white-collar jobs in the detriment technical and vocational education and training.

TABLE 1: MIMIC MODEL RESULTS

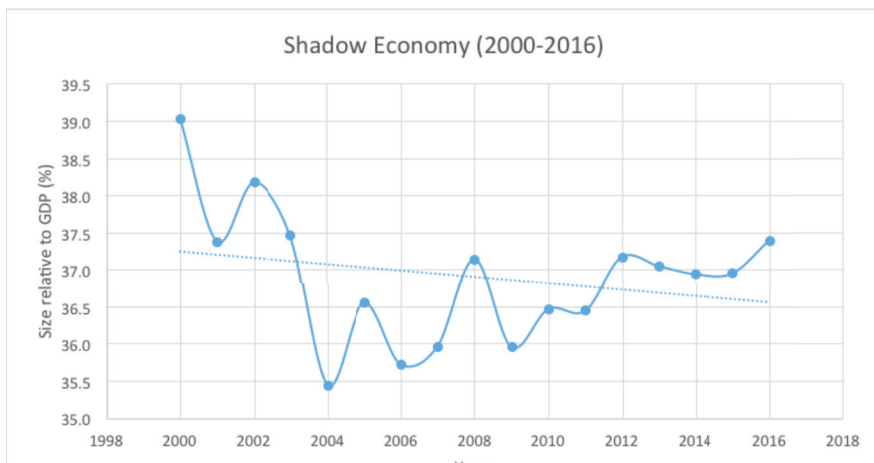
Models	Direct Taxation	Indirect Tax	Agricultural Value Add	Regulation	Unemployment	Self-Employment	Money Growth	Employment	Chi square (p-value)	RMSEA
Model Specification 1										
6-1-3	37.58 (1.92)**	67982.76 (2.03)**	-6.91 (0.58)	-0.01 (0.07)	-4.32 (0.83)	-134.46 (3.51)***	-0.07 (0.32)	-0.21 (3.24)***	15.44 (0.2804)	0.112 (0.314)
6-1-2	23.59 (1.54)	69340.37 (2.05)**	-4.09 (0.35)	0.11 (0.59)	0.15 (0.04)	-129.13 (3.36)***		0.21 (3.54)***	5.56 (0.4742)	0.000 (0.500)
3-1-3	27.43 (1.64)*	61511.53 (1.90)**				-120.73 (4.15)***	-0.07 (0.32)	0.21 (3.24)***	7.85 (0.3462)	0.090 (0.373)
3-1-2	20.43 (1.37)	67349.59 (2.12)**				-126.19 (4.44)***		0.21 (3.54)***	4.39 (0.2221)	0.170 (0.238)
2-1-2		70594.97 (2.11)***				-111.94 (4.01)***		0.21 (3.54)***	3.66 (0.1606)	0.228 (0.172)
Model Specification 2										
6-1-3	-3.41 (0.29)	63930.67 (3.18)***	18.95 (2.66)***	0.26 (1.88)*	0.49 (0.16)	32.45 (1.41)	-0.37 (0.69)	-0.03 (0.69)	39.43 (0.0002)	0.381 (0.000)
4-1-2		61597.05 (3.27)***	18.85 (2.92)***	0.23 (2.15)**		33.68 (1.66)*		-0.03 (0.71)	10.13 (0.0383)	0.309 (0.045)
4-1-1		61597.05 (3.27)***	18.85 (2.92)***	0.23 (2.15)**		33.68 (1.66)*			17.734 (0.000)	0.000 (1.000)

Source: Authors' own compilation using Eswatini's macroeconomic data from various sources (2017)

Notes: The absolute z-statistics is reported in parentheses. ***, **, *, denotes significant at the 1%, 5%, and 10% levels respectively. The goodness of fit for the MIMIC model is tested using the chi-square test and the root mean square error of approximation (RMSEA) test.

The study used the structural equation model to estimate an index time series for the shadow economy. The estimated trend of the of the Eswatini shadow economy as a proportion of the official GDP is shown in Figure 4. The shadow economy was calibrated according to the amount recorded in 2016, the base year. This value was taken from Schneider (2005) and Schneider *et al.*, (2010) studies and represents 37.4 percent of the official economy. The size and trend of the shadow economy in Eswatini, from 2000 to 2016, ranges between 35.4 percent (in year 2004) and 39.0 percent (in year 2000). At the end of the period under review, the shadow economy of Eswatini was equivalent to 37.4 percent of the formal economy.

FIGURE 4: SIZE AND TREND OF THE SHADOW ECONOMY OF ESWATINI AS A PROPORTION OF GDP



Source: Authors' own compilation (2017)

5. Conclusion

The study sought to quantify the size and analyse the trend of the shadow economy in Eswatini over a, from year 200 to 2016, using the MIMIC model. From the results, it apparent that the shadow economy accounts for a significant proportion of the official economy of Eswatini and its magnitude has been declining however at a slow rate over this period. The findings show that the shadow economy in Eswatini was equivalent to 39 percent of the GDP at the beginning of our analysis and declined gradually to 37.4 percent in 2016. This means that if all these economic activities were registered and regulated they would contributed an additional 37.4 percent to the 2016 GDP value of the country. In currency value, it means the country's GDP would have increased by

E20.5 billion if all the informal businesses were transitioned to the mainstream economy. The main driving factors of the shadow economy in Eswatini are the tax burden in the form of direct tax and indirect tax, the contribution of the agricultural sector, institutional, and self-employment. The inertia of shadow economy at a high proportion of GDP depicts the lack of incentive to informal business operator to transition into the formal economy. Such incentives are necessary to create an enabling environment that will incentivise informal businesses to transition out from the shadow economy into the mainstream economy.

6. Policy Implications and Recommendations

From the study results, policy makers can identify the major factors that influence peoples' incentives to participate in the shadow economy. Policy reforms by formalizing of the shadow economy are necessary to be able to reduce the size and the trends of the shadow economy. Most essentially, policy makers need to develop policies that focus on the quality of institutions (regulations) by creating democratic and transparent institutions with lesser regulatory burden, corruption and bureaucracy. This will be able to restore the confidence and trust of the economic agents in the overall system of the country and to be able to have effective strategies to reduce the shadow economy in Eswatini. In order to reduce the impact of self-employment on shadow economy the government can create an enabling environment, which would ultimately make self-employment easier and positively reduce unemployment while directly contributing to reducing the size of the shadow economy. To reduce the tax burden and incentivise businesses to transition from the shadow economy into the formal economy, policy makers should focus on reducing the overall taxation, especially the indirect taxation. To reduce the incidence of agricultural producers to operate in the shadow economy. It is recommend that agricultural marketing boards should improve their incentive mechanisms such as the pricing system, transparency, amongst other things, in order to incentives producers to sell their products to the marketing boards. This can ultimately encourage agricultural producers to commercialise their agricultural production because they have viable market through which they can sell their products.

Biographical Notes

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