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# EFFECT OF GOVERNMENT AGRICULTURAL EXPENDITURE ON ECONOMIC GROWTH: EVIDENCE FROM A DEVELOPING COUNTRY

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**Abstract:** Fiscal policy has been used by various governments to promote economic growth. The effectiveness of government expenditure on economic growth depends on recipient sector of government expenditure. This study contributes to this research area by investigating the effect of government agricultural expenditure on economic growth in the Kingdom of Lesotho. The government of Lesotho identified the agricultural sector as a productive sector that is central to the achievement the economic growth goal and development plan. Descriptive statistics and inferential econometric techniques (ARDL, DOLS and VEC Granger causality) over time-series data for the period 1982-2019 were utilized in this study. The results suggest that while current level and pattern of government agriculture expenditure cannot stimulate the desired economic growth and prosperity in the country, domestic investment appear to be a stimulant of the desired economic prosperity. Consequently, any economic growth policy or strategy that is premised on government agricultural sector expenditure would fail. Thus study recommends that countries including Lesotho should prioritize sustained increase in domestic investment.

**JEL Classification**: H50, Q14, O10
**Keywords**: Government Expenditure, Agriculture Sector, Economic Growth, Keynesian Hypothesis

## 1. Introduction

Economic growth is generally agreed as a necessity or a prerequisite for the achievement of economic development, it is a macroeconomic goal that every government strives to achieve and sustain. According to Haseeb et al., (2019),

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economic growth is the rise in the value and quantity of goods and services produced within a geographical territory over time. Economic growth reflects how healthy or vulnerable to shocks an economy is, as well as the size and productive capacity of a country. Economic expansion in the form of economic growth is important because it improves living standard and reduces poverty level through higher per capita income. Likewise, sustained economic growth improves government finances through lowering of government borrowing, higher tax revenue, increased government investment and expenditure in productive and social sectors (e.g. health and education), and lowers unemployment amongst others. The capability of an economy to attain and sustain its' growth depends on the viability and productivity of individual sectors in the economy and type of economic policies that is being implemented. One of the economic policies used by various government of the world for the realization of several macroeconomic targets (including economic growth) and economic stabilization is fiscal policy (Onifade et al., 2020).

Public expenditure, as one of the fiscal policy tools has been used by governments of the world to regulate the economy which comes through budgetary expansion or contraction that moderate private sector demand and expenditure (Ahuja and Pandit 2020), maximize economic wellbeing (Tanzi and Zee, 1997; Pula and Elshani, 2018), and ensures redistribution (Atkinson and Stiglitz, 2015), a perspective that is in line with the Keynes postulation on government expenditure and economic growth relationship. Pula and Elshani (2018) further emphasize that government expenditures are imperative because they aid the provision of public goods and correction of imperfections and failures of the market economic system. However, while some empirical literatures have validated the Keynes theory by demonstrating a positive effect of government expenditure on growth, unidirectional causal relationship from government expenditure to economic growth and bidirectional causal relationship between both economic variables (Diyoke et al. 2017; Sedrakyan and Varela-Candamio, 2019; Campo and Mendoza 2018; Ho and Iyke 2020; Ahuja and Pandit 2020; Natarajan et al., 2022; Le 2020; Gurdal et al., 2021), others (Sáez et al. 2017; Thabane and Lebina, 2016;Olaoye et al., 2020; Sedrakyan and Varela-Candamio, 2019) negated the Keynes theory in their study by upholding Wagner's rule only or finding no significant relationship between government expenditure and economic growth. Apparently there is an inconclusiveness regarding government expenditure and growth relationship, which could be as a result of dissimilarity in aim, source of financing, size, income level of country and recipient sector of government expenditure (Amusa and Oyinola, 2019; Arestis et al., 2021; Lupu et al., 2018; Selvanathan et al., 2021; Sedrakyan and Varela-Candamio, 2019).

In term of sectoral contribution to economic growth and effect of sector level expenditure, the agricultural sector is a sector that is unarguably important for economic growth and development, especially among developing economies. This is based on the Rostow stages or sequences of growth which identified the traditional, extractive, and primary sector specifically agricultural sector as a necessary and precondition sector for take-off and economic growth. Ruttan (1965) did buttress that the agriculture sector is expected to provide food for a rapidly increasing population, promote demand for products targeted towards the agricultural sector needs from emerging manufacturing and ICT sectors, and through agricultural export foreign earnings provide necessary capital investment for the economy. Hence, over the years, the sector has been identified to be a contributor to

employment of large labour force, food security, foreign exchange earnings, rural development, and economic transformations (Maïga et al, 2021; Ebenezer et al., 2019). Likewise, according to Anríquez and Stamoulis (2007), the agricultural sector has both forward linkage (e.g. agricultural and food processing industries servicing the hospitality sub-industry like restaurant and hotel industries) and backward linkage (e.g. sub-industry that produce animal feed and fertilizer with the chemical and mineral industry for agricultural sector use), as well as rural-urban linkages, agricultural and non-agricultural activities (FAO, 2020) that make the agriculture sector essential for economic growth and development. The sector is still recognized as key to the realisation of the Sustainable Development Goals (SDGs), and most especially for post-Covid-19 economic recovery and livelihood.

With respect to the agricultural sector, Mogues et al., (2015) and Armas et al., (2012) argued that the need to correct externalities, address market and information asymmetries (with regard to agricultural research and development, technology generation and adoption, and regulations), distribute goods and services that are biased against the majority of rural-based agriculture-dependent people provide a rationale for involvement of government in the agricultural sector. Also, in reaffirming the significance of the agricultural sector in attaining the continental vision of shared prosperity and better-quality livelihoods through accelerated agricultural growth and transformation and emphasizing the need for government expenditure in the agricultural sector, head of governments in Africa adopted the 2003 Malabo Declaration on Accelerated Agricultural Growth and Improved Livelihoods and Transformation for Shared Prosperity. A commitment to spending a minimum of 10 percent of total government expenditure to the agricultural sector is one of the highlights of the 2003 Malabo agreements. According to Pernechele et al., (2021), investment in agriculture is a driver of both economic and social development, respectively. The extent to which the agricultural sector can perform optimally and contribute to economic growth varies and depend on issue like government expenditure in the sector. Considering the multiple challenges facing the agricultural sectors in Africa including Lesotho in form of climate change, land fragmentation, global pandemic (Covid-19), obsolete farm technologies and farm management practices, inadequate access to irrigation, limited technical know-how, and farming infrastructure, and restricted access to financial credit facilities, this study aim to answer the research question that is current level of government involvement in the sector sufficient in achieving targeted macroeconomic goals? This study analyses the impact of government agricultural sector expenditure on economic growth in Lesotho. The rest of the article is arranged as follows, section 2 presents stylized fact about Kingdom of Lesotho, section 3 provides a review of related empirical literature while section 4 presents the methodology which entail data source and analytical techniques adopted in the study. Results and discussion are presented in section 5, while conclusions and recommendations follow in section 6.

## 2. Stylized Fact about Kingdom of Lesotho

Lesotho is a small and developing landlocked country that is bordered by South Africa. The economic growth rate of Lesotho has been fluctuating and undesirable in recent times, such that the growth rate has been less than 5

percent. Specifically, the annual GDP growth rate of the country stands at 2.34 percent on average during the period 2012-2019.

**Figure 1: Trend in Kingdom of Lesotho GDP and GDP Growth**
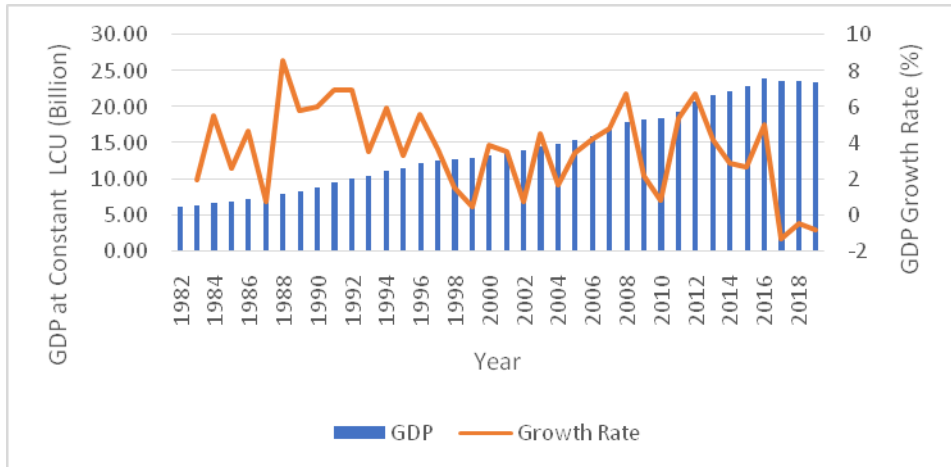


The Kingdom of Lesotho's agricultural sector is observed to be indispensable for the country's economy. Especially in a situation where about 60 percent of the general population reside in countryside, and whose welfare is dependent on their engagement in agriculture either directly or indirectly, and thereby making improvement and growth critical for reduction in poverty situation (World Bank, 2019). Besides, the 1980s performance of sector (the most important sector accounting for 15.2% of GDP) before its' recent low performance indicate that the sector can still salvage the country's economy. Considering the potential of the sector in promoting food security, reducing poverty and aiding economic development in general, the Government of Kingdom of Lesotho positioned the agricultural sector alongside other three productive sectors that is essential to the achievement of laid out goals in the recent National Strategic Development Plan (NSDP) II 2018/19–2022/23, hence making efforts to develop the sector. The capacity of a sector to function as expected however depends on the extent of involvement of either the public or private sector with respect to financing and investment.

Regarding public sector involvement in the agricultural sector, Lesotho is one of the Africa countries that subscribed to the Comprehensive Africa Agriculture Development Programme (CAADP) agreement of government devotion of 10% of total national expenditure to the agricultural. The level of commitment of the country to the 2003 CAADP Malabo agreement is graphically presented Figure 2. Between the year 2004 and 2019, the share of government agriculture expenditure in total government expenditure ranges between 1.72 percent in 2013 and 14.781 percent in 2019. There was a consistent decrease in the share of government expenditure from 3.99 percent in 2004 to 1.72 percent in 2013, it however rose to

14.780 percent in 2015 A reduction in the share of government agricultural expenditure is further observed in the year 2016 to 3.75. Nonetheless, a sustained increased his seen in the years 2017, 2018 and 2019 respectively.

**Figure 2: Graphical Representation of Level of Commitment to 2003 CAADP Malabo Agreement**
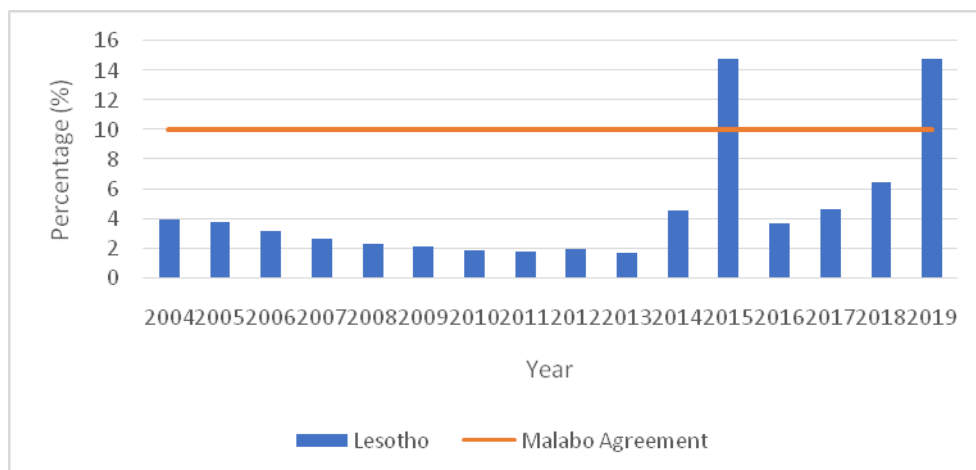


The Figure 2 presenting a graphical representation of alignment or commitment of Government of Lesotho to CAADP Malabo agreement, clearly show that out of the sixteen years of the commitment to the agreement Lesotho was able to meet the target in the years 2015 and 2019 only, respectively. Hence, it can be said that Lesotho has not been able to adequately meet with the Comprehensive Africa Agriculture Development Programme (CAADP) requirements or priority performance metrics of devoting 10% of total national expenditure to agriculture. This trend is however not only familiar to Lesotho, Pernechele et al., (2021) noted that several other Sub-Saharan African countries have not reached the target of allocating 10 percent of national budgets to agriculture. According to Pernechele et al., (2021) this is a result of financial constraints such as burden of debt repayment and weak revenue growth and unmonitored expenditure in the sector.

## 3.Literature Review

Economic Growth and Government Expenditure: Theory

Theoretically, the link between government expenditure and growth can be deduced from, views, theories, and models of various economic schools of thought that have been put forward in the economic field. These the Neoclassical Growth Theories, Endogenous Growth Theories, Wagner's law along with the Keynes postulation. The neoclassical growth model posits that upsurges in labour quality and quantity (through education and population growth), improved technology and

increases in capital (through investment and saving), are factors that stimulate economic growth. Barro (1996) further argued that, eventually economic growth would be exogenously determined by human capital and technology (in the form health, experience and education). The neoclassical position is however deficient in that it did not make provision for institutional factors and public policy including government expenditure in prompting economic growth (Petchko, 2018; Bassanini and Scarpetta, 2001). This short-coming motivated the development of Endogenous growth theories also known as the new growth theories (Petchko, 2018; Mankiw, 2013) which posited that economic growth is generated by factors within the production process, such as increasing returns or induced technological change (Todaro and Smith, 2015). Here, technology is considered to be endogenous due to its reliance on research and development investment decision and extent of diffusion (Petchko, 2018; Bassanini and Scarpetta, 2001). Cortright (2001) noted that Endogenous growth theories posits that long period knowledge-based economic growth is a result of increasing return to scale in technological development. The theory relaxes the proposition of exogenous savings and capital formation of Solow (1956) and institutional dynamics that could shape economic growth related policies (Bassanini and Scarpetta, 2001). Petchko (2018) citing Barro (1996) maintained that growth rates differences among countries arise from variances in saving propensity, technology access, and government policy. Such that any government that increases its' expenditure to alleviate distortions in market, ensures secured right to own property, provides infrastructural facilities, and ensure financial markets improvement would generate efficiencies that translate into desirable growth than government that does otherwise (Petchko, 2018).

Wagner's law posits that as the economy expands through time, government's operations and functions expand. An increase in government expenditure is here seen as indispensable for a developing and progressive economy (Ansari et al., 1997). As it is observed, that social, security and administrative functions of government and expenditure to meet these functions increases as an economy expands. The financing of these expanding functions is however premised on the growth of the economy (Peacock and Wiseman, 1961), because economic growth is an indication of more revenue for the government. Hence, government expenditure is rather considered as an outcome or endogenous variable, caused by growth in national income in Wagner's law. Keynes on the contrary argued that total income of an economy, depends on the spending patterns of economic agent (that is government), in the short run. Keynes postulated that the increase in government expenditure will increase output, a unidirectional causation from government expenditure to economic growth. Thus, government expenditure is considered as an independent and exogenous factor, and a fiscal policy tool to stimulate growth (Peacock and Wiseman, 1961; Gatsi et al., 2019). Here, government spending is seen as one of the components of aggregate demand, any rise in it will raise aggregate demand, and because of the multiplier effect potential could lead to increased employment and output, respectively.

Government Expenditure and Economic Growth: Empirics

Literature that has empirically studied economic growth and government expenditure interaction are abundant. These literatures have been examined from different perspectives including aggregate expenditure vs. growth perspective,

disaggregated expenditure vs. growth perspective, and specific sector expenditure vs growth perspective. This section presents review of relevant literature from aggregate expenditure vs growth perspective, disaggregated expenditure vs. growth perspective, and agricultural sector expenditure vs. growth perspective. From and aggregate expenditure perspective, Odhiambo (2015) established a bidirectional short-run causality between government expenditure and economic growth and a long-run period unidirectional causality from economic growth to government expenditure in South Africa through Granger Non-Causality Test. Ho and Iyke (2020) applied the ARDL testing procedure to investigate the determinants of economic growth in Ghana. It was found that government expenditure only influences economic growth in the short-run. Similarly, Diyoke et al. (2017) investigated the impact of government spending on economic growth in among Sub-Saharan African countries (SSA) for the period 1980 to 2015 and applying both static panels and Arellano and Bond (1991) GMM estimators. The findings revealed that the government spending have a significant positive impact on the region's growth. Campo and Mendoza (2018) studied the impact of public spending on regional GDP in 24 Colombian departments to see whether Keynesian or Wagnerian approaches are valid in the country. The findings reveal that public spending has a large and positive effect on GDP, which is consistent with the Keynesian approach and supports the concept that more public spending contributes to economic growth. Related conclusion was found in the studies of Ahuja and Pandit (2020), Gurdal et al., (2021) and Le (2020). However, Sáez et al. (2017), Thabane and Lebina (2016) and Olaoye et al. (2020) reported contrary evidence in this regard.

Similarly, Chu et al., (2020), Amusa and Oyinola (2019), Ndubuisi (2018), Garoma and Bersisa (2018), Selvanathan et al., (2021), Arestis et al., (2021), Lupu et al., (2018), Mazorodze (2018) demonstrated using various analytical techniques that effect of government expenditure on growth depends on the sector recipient or functional component of government expenditure. In relation to government agricultural expenditure and economic growth Shuaib et al. (2015), Ebenezer et al., (2019), and Dkhar and De (2018) showed that government expenditure on agriculture does influence agricultural productivity and economic growth positively in Nigeria, South Africa and Russia, respectively. Furthermore, evidence from empirical literature further show that several macroeconomic factors besides government expenditure influence the level of growth in an economy, the extent of their influences however differs across countries, regions, and income groups. Some of these factors include but not limited to; foreign direct investment (Wang et al., 2021), international trade (Nguyen, 2020), human capital development (Ogundari and Awokuse, 2018), financial development (Ruiz-Vergara, 2018), energy consumption (Salari et al., 2021), tax (Stoilova, 2017), inflation (Nyambe and Kanyeumbo, 2015) and domestic investment (Meyer and Sanusi, 2019; Aslan and Altinoz, 2021; Gyimah et al., 2022; Wani, 2022) among others.

## 4. Methodology

### Model Specification

The empirical model specified in investigating the effect of government agriculture sector spending on economic growth which is the second objective of this study, is premised on the Keynesian hypothesis that government spending is a

fiscal policy tool often utilized to induce consumption and production of goods and services, and on the study of Selvanathan et al., (2021) which re-examined Wagner and Keynesian hypothesis relating to sector level spending of government and economic growth in Sri Lanka. The mathematical representation of relationship between government agricultural expenditure and economic growth in the Kingdom of Lesotho is presented in equation (1).

$$lnGDP = \delta_0 + \delta_1 lnGEA + \mu \dots\dots\dots\dots\dots\dots\dots\dots..(1)$$

However, to avoid limitations related to bivariate models, a moderating variable was introduced, which is reflected in equation (2).

$$lnGDP = \delta_0 + \delta_1 lnGEA + \delta_2 lnDI + \mu \dots\dots\dots\dots\dots\dots\dots..(2)$$

*Description of Variable*

**Economic Growth** can be defined as a long-term increase in a country's capacity to deliver increasingly diverse economic commodities to its population, which it is made possible by an increase in gross domestic product (GDP). GDP measures the total value of the final use of output produced by an economy, by both residents and non-residents (Nnadozie and Jerome, 2019). In this study, the variable economic growth is the dependent variable, and it is proxied by real gross domestic product (GDP). **Government Agricultural Expenditure (GEA)** are transfer made from the government to economic agents (producers and input suppliers), for general support for agricultural infrastructure, R&D and extension services, marketing, storage, or inspection facilities, among others, and administrative costs (that cost linked to policy formulation and coordination and running costs of ministries and other public entities (Pernechele et al., 2021). Based on the Keynes postulation and previous studies (Dkhar and De, 2018; Tijani et al., 2015; Shuaib et al., 2015), this study posits that government agricultural expenditure would have a positive effect of economic growth. **Domestic Investment (DI)** is an essential component that can enable economic growth (Overseas Development Institute, ODI, 2016). It is defined as the sum of investment that support and promote industrial growth in an economy and by extension promote industrialization by stimulating aggregate demand and boosting productive capacities (Haraguchi et al., 2019; Weiss and Clara, 2016). Higher domestic investments play a key role in sustaining the development of the local industry, fostering structural transformation and therefore become a pre-requisite for long-term growth (Cornia and Martorano, 2012; Haraguchi et al., 2019). The variable is included in this study in line with past studies (Meyer and Sanusi, 2019; Aslan and Altinoz, 2021; Gyimah et al., 2022; Wani, 2022). The variable is proxied by gross fixed capital formation and it is expected that the variable will have a positive relationship with economic growth.

*Data Source and Sample*

In line with the objectives of this study and variables presented in the mathematical representations in equations (2), secondary data on gross domestic

product (GDP) at constant prices, government agricultural expenditure, and gross fixed capital formation were sourced from the World Bank Group website and Regional Strategic Analysts and Knowledge Support System (ReSAKSS) website-www.resakss.org, respectively. The time series data used for this study is from the period 1982-2019.

*Analytical Techniques*

Both descriptive and inferential analytical technique was employed in this study. Descriptive statistics such as mean, median, standard deviation, and tables were used in describing the variables used in this study. A graph was also used in addressing the first objective of the study. Also, in econometric analysis, it is necessary to know the stationarity properties of variables being used. Stationarity test is used to detect variations that may arise to avoid the problem of spurious regression. Any variable that is not stationary at its levels form is expected to be stationary at its' first differenced form. In this study the stationarity properties of variables were examined using the Philip-Peron test. The decision rule is that we reject the null hypothesis of non-stationary if $T_t < T_{critical}$ and accept null hypothesis of non-stationarity if $T_t \geq T_{critical}$. If the variables are integrated in same order or in a mixed order not beyond I(1), a long run relationship among the variable could be considered using VECM or ARDL respectively. This study however chose to utilize ARDL cointegration technique.

The ARDL-Bound estimation technique is utilized in this study to analyze the long-term relationship between variables through ARDL model, in terms of establishing the existence of a cointegration relationship among economic model variables in a model or not. Cointegration often refers to the fact that two or more series share a stochastic trend (Stock and Watson), it focuses on whether there is a long-term linear relationship between two or more-time series. An ARDL Bounds test for cointegration proposed by Pesaran and Shin (1999) is applied in this study in order to ascertain the existence of a long-run relationship among the variables under consideration in model in equation (3) or not.

$$\Delta lnGDP_{nt} = \delta_0 + \sum_{i=1}^{n} \delta_{1i}\Delta lnGDP_{t-i} + \sum_{i=0}^{n} \delta_{2i}\Delta lnGEA_{t-1} + \sum_{i=0}^{n} \delta_{3i}\Delta lnDI_{t-i} + \delta_4 lnGDP_{t-1} + \delta_5 lnGEA_{t-1} + \delta_6 lnDI_{t-1} + \varepsilon_{1t} \dots \dots \dots \dots \dots (3)$$

The bounds test decision rule is that the value of the F-statistics should be higher than the lower I(0) and upper I(1) bounds, respectively to establish a cointegrating relationship or otherwise. If an existence of cointegrating relationship is confirmed between dependent and independent variables, then the estimation and determination of the size of effect of the independent variables on the dependent in both the long-term and short-run is conducted through ARDL model.

$$\Delta lnGDP_{nt} = \delta_0 + \sum_{i=1}^{n} \delta_{1i}\Delta lnGDP_{t-1} + \sum_{i=0}^{n} \delta_{2i}\Delta lnGEA_{t-1} + \sum_{i=0}^{n} \delta_{3i}\Delta lnDI_{t-1} + \gamma_{1i}ECM_{t-1} + \varepsilon_{1t} \dots \dots \dots \dots (4)$$

where $\delta_1 - \delta_3$ are long-run coefficients; and $\varepsilon$ is the white noise error term.

The advantages of the ARDL estimation technique over other long-run cointegration test techniques motivated for its' adaption in this study. ARDL technique is programmed to allow estimations regardless of the combination of order of integration of series in the model which should not be above an order of one. ARDL can estimate both short-run and long-run dynamics simultaneously, and it is useable when sample appear to be small (Pesaran et al., 2001; Ewetan et al., 2020, Ho and Iyke, 2020).

## 5. Results and Discussion

The findings are presented in this section.

**Table 1: Summary of Descriptive Statistics of Variables**

|  | GDP | GEA | DI |
|---|---|---|---|
| Mean | 143000000 | 49451 000 | 3390000000 |
| Median | 13600000000 | 37856 000 | 3020000000 |
| Maximum | 24000000000 | 212934 000 | 8530000000 |
| Minimum | 6270000000 | 18721 000 | 1730000000 |
| Std. Dev. | 5670000000 | 0.033803 | 2380000000 |
| Observations | 38 | 38 | 38 |

*Source: Authors' Computation*

The statistics show that the gross domestic product of Lesotho has averaged $143 million over the sampled period. The minimum amount of the gross domestic product was $6.27 billion, and the maximum amount was $24 billion. The statistics also shows that government agricultural expenditure of Lesotho has an average of $49 million over the sampled period, while the minimum agriculture sector expenditure recorded is $19 million the maximum was $213 million recorded in the years 2011 and 2019, respectively. The statistics also show that domestic investment of Lesotho has a mean of $3.39 billion, the minimum amount of domestic investment was $1.73 billion, and the maximum amount was $8.53 billion.

*Unit Root*

The result of the unit root test for stationarity conducted using the Phillips-Perron test is presented in Table 2. The result showed that some variables were non-stationary and other stationary in levels. Those that were not stationary become stationary after first difference. For example, Log of GDP, GEA and DI are integrated of order one I (1), The mixture of I(0) and I(1) variables validates the use of ARDL estimation techniques in this study.

**Table 2:Phillip-Perron Unit Root Test Result**

| *Variable* | Level | First Difference | Decision |
|---|---|---|---|
| lnGDP | -2.0808 | -4.2659* | I(1) |
| lnGEA | -0.5116 | 5.5907* | I(1) |
| lnDI | -2.2211 | -4.9025* | I(1) |

*Source: Authors' Computation; Note: * indicate the level of significance at 1%.*

Determining the order of lag structure is first conducted before the establishment of long-run relationship or not, and before the short and long-run ARDL model estimation. This is imperative to avoid estimation error arising from lag length under or over in over estimation. Schwarz information criteria (SIC) and Akaike information criteria (AIC) and are the most often used lag selection approach. The best model is provided from a lower SIC or AIC values. Hence, the optimal lag structure in this study was found by using the Akaike Information Criterion. The Akaike Information Criterion graph reflecting the optimum lag structure is presented in figure 2. From the figure, the selected optimal lag structure for the ARDL estimation is ARDL (1, 3, 4) for the equation 1.

**Figure 3: Akaike information Criteria (AIC)**



Akaike Information Criteria (top 20 models)
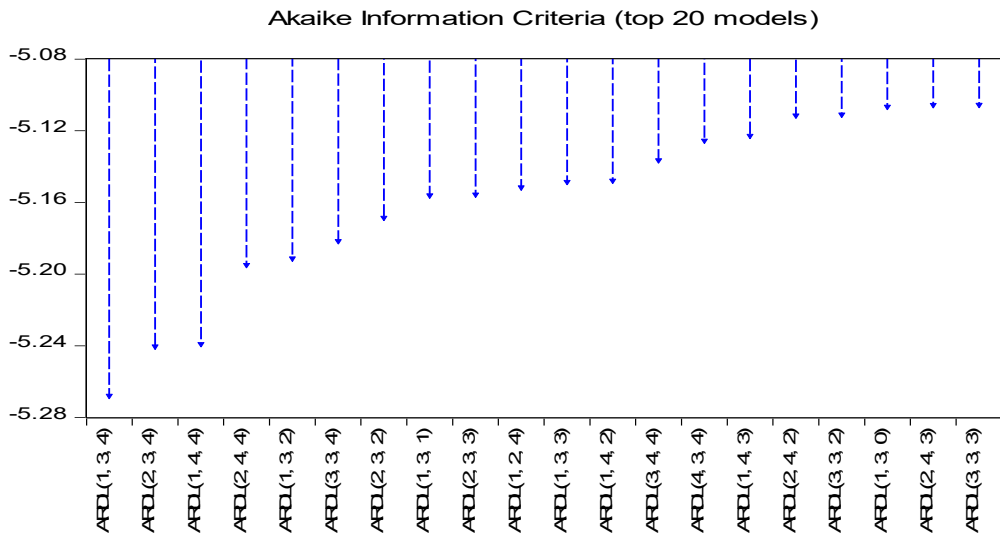
*Cointegration Test Result- Bound Test*

From Table 3, It can be seen that the F-statistic computed is greater than the upper bound value at 10 percent, 5 percent and 2.5 percent levels of significance for this model. It is therefore concluded that there is a long run relationship among the variables in this model.

**Table 3: ARDL Bound Test**

| F-Bounds Test | | Null Hypothesis: No levels relationship | | |
|---|---|---|---|---|
| Test Statistic | Value | Signif. | I(0) | I(1) |
| | | | Asymptotic: n=1000 | |
| F-statistic | 17.435 | 10% | 2.63 | 3.35 |
| k | 2 | 5% | 3.1 | 3.87 |
| | | 2.5% | 3.55 | 4.38 |
| | | 1% | 4.13 | 5 |

*Long-run and Short-run Estimate of Effect of Government Agricultural Expenditure on Economic Growth*

In the long run, the coefficient of government agricultural expenditure is negative and significant, this implies that 1 percent increase in government agricultural expenditure will lead to a reduction in gross domestic product by 0.296 percent. This contradicts the 2003 Malabo position that agricultural expenditure is expected to influence growth positively. This is consistent with Thabane and Lebina (2016) who established that government expenditure cannot drive growth in Lesotho. This can however be justified by the fact that in most cases, fund allocated to the agricultural sector in Lesotho are either misappropriated or embezzled. Equally, Mudaki and Masaviru (2012) established a negative relationship between agricultural expenditure and growth for Kenya, which is argued to be fallout of no mechanized farming system. This situation arises when expenditure is not in a subsector that has multiplier effect for economic growth, as a result the spending is essentially ineffective for the pursuance of economic growth. However, this result is inconsistent with Shuaib et al., (2015) and Selvanathan et al., (2021) who both found a positive relationship between agricultural expenditure and growth in Nigeria and Sri Lanka, respectively. This finding invalidates the Keynesian proposition that government expenditure in the agricultural sector can stimulate economic growth in Lesotho. Furthermore, the coefficient of domestic investment is positive and significant in the long-run at 1 percent significance level and it is consistent with the *a priori* expectation and previous studies of Meyer and Sanusi (2019), Aslan and Altinoz (2021) Gyimah et al., (2022) and Wani (2022) who all established a positive and significant effect of domestic investment on economic growth. This implies that a 1 percent increase in domestic investment would lead to about 0.38 percent in economic growth. This finding supports the fact that higher domestic investment is imperative for the development of the local industry, structural transformation and long-term growth (Cornia and Martorano, 2012; Haraguchi et al., 2019).

**Table 4: Long-run and Short-run Estimate of Effect of Government Agricultural Expenditure on Economic Growth- ARDL(1, 3, 4)**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| *Long-run Estimate* | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| LNGEA | -0.295 | 0.073 | -4.030 | 0.001 |
| LNDI | 0.378 | 0.035 | 10.889 | 0.000 |
| C | 14.428 | 0.789 | 18.293 | 0.000 |
| *Short-run estimate* | | | | |
| D(LNGEA) | -0.028 | 0.010 | -2.951 | 0.007 |
| D(LNGEA(-1)) | 0.046 | 0.011 | 4.114 | 0.000 |
| D(LNGEA(-2)) | 0.026 | 0.010 | 2.484 | 0.020 |
| D(LNDI) | 0.095 | 0.020 | 4.878 | 0.000 |
| D(LNDI(-1)) | 0.017 | 0.021 | 0.844 | 0.407 |
| D(LNDI(-2)) | 0.032 | 0.020 | 1.577 | 0.129 |
| D(LNDI(-3)) | -0.045 | 0.019 | -2.433 | 0.023 |
| CointEq(-1)* | -0.114 | 0.013 | -8.879 | 0.000 |
| R-squared | 0.717 | | | |
| Adjusted R-squared | 0.641 | | | |
| Durbin-Watson stat | 1.965 | | | |

*Source: Authors' Computation*

*Postestimation Test*

Necessary post-estimation tests were conducted to check the validity of the estimated model; the results of the test are presented in Table 5. The normality test which was checked using Jarque-Bera indicates the series are normally distributed at 5 percent level of significance. Evidence from the Table 5 further show that there is no serial correlation in this model as probability value of the F-statistics is greater than 5% significance level. The Breusch-Pagan-Godfrey test for heteroscedasticity also suggest that the series does not series suffers from heteroscedasticity.

**Table 5:Diagnostics Test Results**

| Normality Test | |
|---|---|
| Jarque-Bera | 1.883 |
| Probability | 0.389 |
| Serial correlation: Breusch-Godfrey Serial Correlation LM Test: | |
| F-Statistic | 0.094 |
| Prob. | F (2,21) = 0.910 |
| Heteroskedasticity Test: Breusch-Pagan-Godfrey | |
| F-Statistic | 0.609 |
| Prob. | F(10,23): 0.790 |

*Source: Authors' Computation*

Finally, the stability of the model was tested using the CUSUM (Cumulative Sum) and the CUSUMSQ (Cumulative Sum of Squares). The stability test, according to Pesaran et al., (2001) determines if parameter estimations are stable over time. The CUSUM and CUSUMSQ null assumptions imply that the coefficient vector remains constant throughout time. At the 5% confidence level, the t statistics are shown against the critical bound. If the plots stay within the crucial boundaries at the 5% confidence level, the null hypothesis is not rejected, and we can conclude that all of the coefficients are stable.

**Figure 1. CUSUM and CUSUM of Squares Test for Stability**
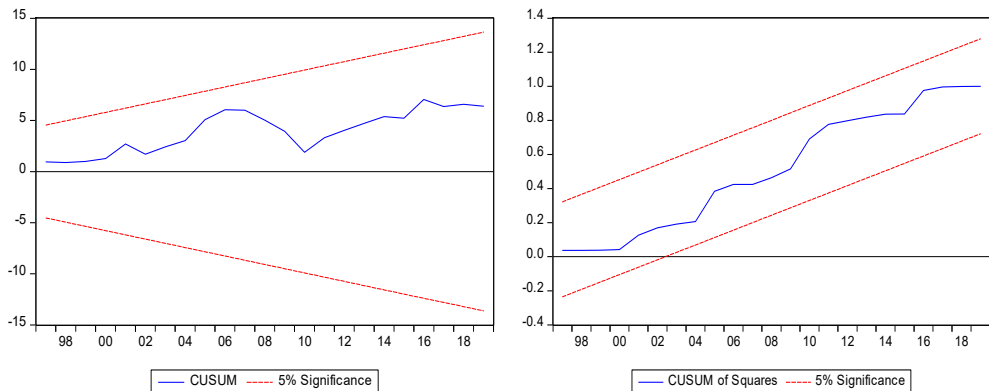


*Robustness analysis*

This study further employed the Dynamic Ordinary Least Square (DOLS) to check the robustness effects of government agricultural sector expenditure on economic growth. DOLS method assesses the actual co-integrating and is consistent for long-run estimation of the ARDL method. The robust analysis results are presented in Table 6. The evaluation is significant, and coefficients are the same as ARDL long-run estimates.

**Table 6: Results of DOLS Estimation**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LNGEA | -0.183 | 0.063 | -2.888 | 0.008 |
| LNDI | 0.364 | 0.032 | 11.314 | 0.000 |
| C | 14.879 | 0.746 | 19.952 | 0.000 |
| R-squared | | 0.953 | | |
| Adjusted R-squared | | 0.938 | | |

*Source: Authors' Computation*

Furthermore, following the existence of cointegration relationship between economic growth, government agricultural expenditure and domestic investment that was earlier established, a further examination of causal relationship between the variables is conducted using the Granger causality/Block exogeneity Wald test, which is reported in Table 7. Result show unidirectional (one-way) causality relationship from domestic investment to GDP, and from domestic investment to government agricultural expenditure. No causal relationship was found between

**Table 7: VEC Granger Causality/Block Exogeneity Wald Tests**

| Dependent variable: D(LNGDP) | | | |
|---|---|---|---|
| Excluded | Chi-sq | df | Prob. |
| D(LNGEA) | 3.709 | 2 | 0.157 |
| D(LNDI) | 9.536 | 2 | 0.009 |
| All | 14.549 | 4 | 0.006 |
| Dependent variable: D(LNGEA) | | | |
| Excluded | Chi-sq | df | Prob. |
| D(LNGDP) | 1.194 | 2 | 0.551 |
| D(LNDI) | 5.128 | 2 | 0.077 |
| All | 5.489 | 4 | 0.2401 |
| Dependent variable: D(LNDI) | | | |
| Excluded | Chi-sq. | df | Prob. |
| D(LNGDP) | 0.486 | 2 | 0.784 |
| D(LNGEA) | 0.934 | 2 | 0.627 |
| All | 1.522 | 4 | 0.823 |

*Source: Authors' Computation the variables of interest (i.e. government expenditure and economic growth), meaning that government expenditure on agricultural sector cannot drive growth.*

The non-causal relationship between government agricultural expenditure and economic growth further confirms the earlier finding of negative impact of government agricultural expenditure on growth. This shows that neither Keynes nor Wagner's postulations hold in the case of Kingdom of Lesotho. In this situation, policymakers should be careful in channel public finance toward the current expenditure pattern in the agricultural sector in the pursuit of achieving desire growth in the economy.

## 6. Conclusion and Policy Recommendation

Achieving and sustaining economic growth is the goal of every government of countries, and government expenditure is a fiscal tool that has been used by government to achieve this goal. Government expenditure has been used to regulate an economy during the period of economic expansion or recession, respectively. However, there has is a long-lasting debate on the relationship

between government expenditure and economic growth such that while some studies show that government expenditure influences economic growth, other found that it is economic growth that influences government expenditure. This contradictory evidence could be due to differences size, income level of country and recipient sector of government expenditure. It is against this backdrop that this study examines the effect of government agricultural expenditure on economic growth in Lesotho. ARDL, DOLS and VEC Granger causality estimation techniques were utilized over time-series data on economic growth, government expenditure and domestic investment for the period 1982-2019 to achieve the objective of the study. This study demonstrates that Lesotho government failed to meet CAADP agreement that a minimum of ten percent of government expenditure should be directed to agriculture. The empirical analytical techniques result suggests that expenditure of the government on agricultural sector cannot drive the desired economic growth of Lesotho, this an invalidation of the Keynesian model relating to government expenditure-growth relationship. The implication of this is that the agricultural sector of Lesotho and other African countries will not be able to attract the required private investment that could drive the agricultural sector performance and economic growth. Any growth policy and strategy that is premised on government agricultural sector expenditure would fail. Rather as revealed from this study, the government of countries should ensure an increase in domestic investment in order to achieve the needed economic growth.

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# OVERVIEW ON SOCIAL MEDIA USER BEHAVIOR DURING THE COVID-19 PANDEMIC: FROM FEAR OF MISSING OUT AND SOCIAL NETWORKING FATIGUE TO PRIVACY CONCERNS

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**Abstract:** Social networking sites and social media serve as vital avenues of interaction among people all over the world as well as essential platforms for the distribution of information. Companies, like individuals, embrace social networks as a non-formal way to engage with their customers and suppliers, gather information about their online behavior, and offer personalized content. Both scholars and managers from various organizations looking to increase their competitive edge or market shares have an interest in the impact that social networks have on human behavior. Because of this, the current research seeks to investigate how users perceive a wide range of concepts related to using social networking sites, including fear of missing out (FoMO), social networking fatigue, information and communication overload, ubiquitous connectivity and peer communication, and privacy concerns. The authors also examined users' intentions to continue using social networking sites despite the COVID-19 outbreak in order to ensure a more thorough understanding of the research topic. The findings aim to provide a better knowledge of how users see interaction on social networks in their daily lives as well as an overview of user perspectives on the terms mentioned above.

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# 1. Introduction

Social media has become part of our everyday activities, being present in every moment of people's lives, with a strong impact on their well-being and support for peers (Sitar-Taut et al., 2021). Thus, it reshapes the way we perceive the world and creates an environment where connections and relationships are one click away, at any time, with anyone. As the results show (Musetti et al., 2022), 49% of the world's population used SNS in 2020, a percentage that nearly tripled in the last decade, registering an increase from 970 million users back in 2010 to more than three billion users according to the data available for the year 2020. During the COVID-19 pandemic, social network users felt a much more acute sense of belonging, socializing, and keeping abreast of news, information, or posts created or shared by virtual friends (Islam et al., 2020). At the same time, SNS facilitates quick access to shared information and communication with other users, and communication with friends, colleagues, family, or others has become much simpler and more accessible during lockdown periods when a face-to-face meeting would have been difficult to establish.

SNS is a substrate for social media that enables the exchange of content generated by users on the Internet so that they can connect to a public social networking network (Pilatti et al., 2021). Among the most well-known and used types of SNS are Facebook, Youtube, Instagram, and Twitter. People can connect to social networks for fun, to create new connections with other users with whom they share the same ideas, hobbies, or beliefs, respectively, to restore or maintain relationships with friends, family, or colleagues, to fill free time, or wanting to find news and information (Musetti et al., 2022). Fear of missing out (FoMO) is a concept that has captured the attention of researchers in recent years, due to the ambiguity associated with it, especially in terms of the generated negative effects (Li et al., 2022). Thus, FoMO is associated with the black side of social networks and the online environment (Sun et al., 2021) due to the negative implications it has on the user's well-being. Therefore, researchers in the field (Fioravanti et al., 2021) have shown great interest in evaluating whether FoMO levels of individuals lead not only to the level of involvement in SNS, but also to develop a compulsive use of them. However, there is little evidence on how FoMO affects the psychological response of each individual who uses social media online, which is an important gap in the field, especially in light of the fact that social media dominates the online environment and is constantly developing, and the number of users has increased exponentially (Tandon et al., 2021). Furthermore, some studies agree that FoMO is correlated with excessive use of SNS and, with the current advancement in the industry of smart mobile devices, online social activities transform into accessible and convenient tools used by individuals to connect each other (Li et al., 2022). At the same time, users' concerns increase knowing that SNS providers can monitor their actions, especially with the help of location-based services, allowing SNS providers to identify their position in real-time and share this information with other users. (Gao et al., 2018).

Recognizing the existing literature gap in the field, the design of the current research focuses on the analysis of how social networks influence user behavior in real life, emphasising also the effects they have on individuals in terms of the time spent by users in the online social environment. Concepts such as fear of missing

out (FoMO), SNS fatigue, information overload, communication overload, ubiquitous connectivity, and peer communication also constituted topics of research. Furthermore, we investigated issues such as personal data confidentiality, and the collection of personal data for inappropriate purposes, consciously or unconsciously provided by the user. Nevertheless, we also focused on the desire of users to find alternatives to SNS or to continue using them. Taking all these points into consideration, the obtained results reflect an overview of how social networks affect lifestyle, the need for communication or different attitudes, and provide a more in-depth understanding of how users perceive them.

## 2. Literature review

Social networking sites (SNS) constitute a vital component of our daily activity (Mican et al., 2020), as they allow users to communicate and socialize with friends, family, or colleagues much faster and more easily compared to a face-to-face connection. Unlike the real world, in the online environment, the user can create connections at any time, with individuals from anywhere while using a social network such as Facebook (Zafar et al., 2021). Simultaneously, social media platforms have begun to provide consumers with many opportunities to compare products, features, and suppliers (Mican and Sitar-Taut, 2020). In addition, allows consumer-to-consumer interaction by sharing consumer experiences through digital formats such as videos, photos, comments, text posts, etc. (Onofrei et al., 2022). Therefore, when individual experiences, ideas, and attitudes are shared, consumers transform themselves into co-creators of content/value in terms of learning, collecting, and distributing information, and these activities determine a certain amount of time spent online.

SNSs are web-based services built around three key features (Musetti et al., 2022). The first one refers to the creation of a personal account in a social network, public or semi-public, by providing self-descriptive information of the user, followed by his list of connections, respectively, his interactions with other users. A good example in this sense is the list of personal virtual friends displayed to each user on the Facebook platform, later called Meta. In the latter phase, most SNSs are organized to provide frequent content to users, which makes it easier to use social media as often as possible to check for new content, such as friend posts, incoming messages, or shared photos (Cheung et al., 2022). The use of social networks has indirect positive effects on the user's well-being by increasing self-esteem and perceived social support, as well as by providing opportunities for self-disclosure with positive social repercussions, such as greater social support (Pilatti et al., 2021).

Fear of missing out (FoMO) refers to an individual's fear and concern about the lack of certain information or experiences from a social point of view that he or she wishes to receive and that brings him or her satisfaction (Tandon et al., 2021). The concept of FoMO is also described as a form of anxiety-related psychopathology whose cause is perceived deficits in psychosocial needs, for example, the stringent need to belong or social relationships (Berezan et al., 2020). FoMO triggers the fear of not being left out, respectively, of not losing satisfying experiences that other users may live during an absence from their social environment (Li et al., 2022). Thus, FoMO can create a distinct tension that affects an individual's internal state, respectively, induces a desire that causes him to stay in touch and interact more and more with social networks, so that he/she is aware

of the information shared continuously by the contacts he or she has in social networks (Fioravanti et al., 2021).

From the analysis of the structure and environmental characteristics of SNS, we may conclude that communication through SNS develops online, being an excellent alternative for those who are confronted with anxiety. As research in the field (Hussain and Wegmann, 2021) emphasized, people experiencing high levels associated with anxiety appreciate that communicating in an online environment is much less intimidating than communicating face-to-face. In the current study, the user's perception was analyzed on the aspects related to the fatigue felt after using SNS, as well as on information overload by asking specific questions to which they answered through a notation to highlight how often they use social networks.

Ubiquitous connectivity is a significant modern innovation that transforms the way companies connect and interact with consumers, respectively, the way they collect data about their purchases and preferences (Margulis et al., 2020). Ubiquitous connectivity implies that users can access the SNS regardless of time or location, by constantly connecting with others (Choi, 2016; Gao et al., 2018), and users' personal information, such as photos, interests, group of friends, and family, is exposed to others. They are frequently asked to disclose certain personal information when creating an account on the SNS. This raises concerns about leaking private information, as people become increasingly skeptical about disclosing personal information to strangers because of their consistent fear that private information will be misused (Zhou, 2020). Privacy is associated with access to personal information in the online environment, which encourages the user to protect their personal information from being misused. Analyzing the downside of ubiquitous connectivity and its effects on individuals using SNS, our study also focuses on individuals' concerns about online privacy because ubiquitous connectivity contributes to the development of social presence (Choi, 2016). Moreover, it also brings to our attention the issue of user privacy, especially because by using the SNS, individuals are prone to disclosing private information to establish connections and build relationships (Jung, 2017). In addition to users' preoccupation with the possibility of leaking personal information online, ubiquitous connectivity also highlights the issue of overloading information from the online social environment (Gao et al., 2018). In line with these aspects, this study assumes that ubiquitous connectivity due to SNS inevitably leads to concerns about privacy and therefore may have negative outcomes for individuals (Choi, 2016).

Since SNS allows users a constant exchange of content and access to information disclosed by other users such as posts, messages, comments, or photos, a possible consequence of using SNS is the constant threat of information leakage. As a result, ubiquitous connectivity could lead to concerns about privacy and personal data collection considering the SNS. Therefore, during the use of the SNS, users usually reveal vulnerable personal information, such as personal or unconsciously shared profile information, information about their current location, or private conversations with friends, family, colleagues, or other users with whom they have connections. Because of that, the service provider can follow the activities and evidence of users with the help of advanced technological instruments. These mentioned aspects may raise users' concerns about their privacy (Gao et al., 2018).

Trust is associated with people's faith in each other and consists of the sincerity shown towards the one next to them, consistency in the good behavior

towards them, and the observance of the promises made. SNSs are strongly grounded in interpersonal relationships, as people who tend to trust these platforms continue to use them frequently, influencing their interactive behavior (Zafar et al., 2021). The primary role of trust in social networks is described by different levels of perception among users, suggesting that trust in the SNS may cause the response of social network users to the information they find during use and navigation (Hussain and Wegmann, 2021; Zafar et al., 2021). Individuals' perceptions of trust in social networks can attract and keep users' attention to posts, comments, or videos shared through certain social channels or existing profiles/accounts on the network used (Li et al., 2011). Therefore, browsing social networks and the influence they have on their use on individuals depends on their trust in the SNS and will be more substantial for those who have a stronger trust in social networks than for those who show a certain degree of skepticism or distrust of them (Cao et al., 2021).

## 3. Data analysis and results

The authors used descriptive statistics for data analysis, as well as for describing the basic characteristics of the sample. Data were collected through Google Forms from 544 students, using five-point Likert scales to measure respondents' agreement with various statements. The sample consisted of women (57.90%) and men (42.10%) aged 19-24 years (82.17%) and aged over 25 years (17.83%). In the followings, there are summaries of the sample and measurements, and quantitative analysis of the data was performed together with the graphical analysis.

**Figure 1: The main social networks used**
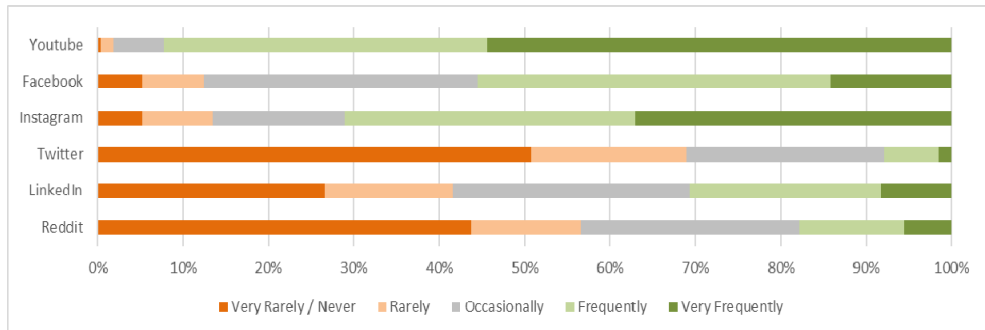


In Figure 1 we can see the distribution of the frequency with which the main social networks are used by the respondents to the questionnaire. Of these, 54.41% use Youtube very frequently as a social media network, 37.13% use Instagram very frequently, and 41.36% frequently use Facebook to socialize. Only 5.15% rarely use Facebook and Instagram, and some of the answers highlighted the fact that 50.74% rarely use Twitter to socialize, 43.75% rarely use Reddit as an online social platform, and 26.65% use it very rarely LinkedIn. Thus, we can conclude that the most frequently and very frequently used social networks are

Youtube (92.3%), Instagram (71.1%), and Facebook (55.5%), and the least used, rarely and very rarely, are Twitter (68.9%), Reddit (56.6%) and LinkedIn (41.5%).

In our study, as highlighted in Figure 2, the analysis of the responses shows that regarding the measurement of fear of missing out, a percentage (32.4%) of respondents are worried to know that their friends are having fun without them, and instead (42.8%) do not have a problem with this aspect. A percentage of (23.5%) fear that their friends have more satisfying experiences than them, but (52.0%) do not agree with this, and the percentages are similar in terms of the experiences of other people on social networks. Regarding the compulsive use of SNS, a percentage of (32.5%) use social media (SM) to forget about personal problems, and (36.9%) feel the need to use more SM. Only (12.9%) agree that they spend a lot of time thinking about SM, while (56.8%) consider that they do not spend much time thinking about SM.

**Figure 2: Fear of missing out and compulsive use of SNS**
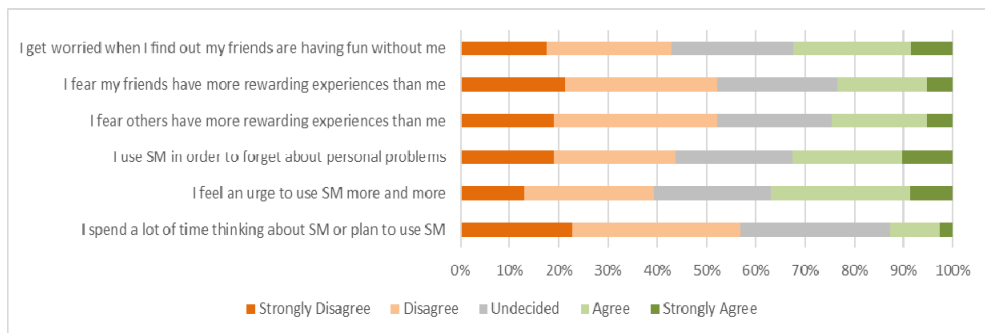


Regarding SNS fatigue, Figure 3 shows that a part of respondents, more precisely a percentage of (22.1%) claim that while using SNS they often feel too fatigued to perform other tasks well, but (56.4%) opine that the use of SNS does not tire them and that they can perform other tasks without problems. A percentage of (17.8%) consider that due to the use of SNS, they feel exhausted, but (58.6%) consider that they still have energy. After a session of using the SNS, a percentage of (19.1%) consider that they feel quite tired, but a significant percentage (54.4%) believe that using the SNS does not tire them. Regarding communication overload, out of the total respondents, (38.8%) consider receiving too many notifications and push messages from SNS, and (32.2%) do not agree with this. A percentage (24.3%) of the respondents consider that they sent more messages than they wanted through SNS, instead (50%) do not agree with this. In the same vein, a percentage of (20.4%) consider receiving too many messages from peers through SNS, and (46.5%) consider that they are not too many.

In the case of information overload, 35.5% of respondents experience some problems with too much information to be synthesized within the SNS, but instead, 36.2% of respondents feel comfortable. Regarding the fact that they feel overwhelmed by the amount of information they must process daily within the SNS, (24.4%) agree with this, and (41.2%) do not have a problem in this direction. A percentage of (42.1%) of respondents say that they are often distracted by the excessive amount of information in the SNS, but (30.9%) do not consider it a problem.

**Figure 3: SNS fatigue, communication, and information overload**
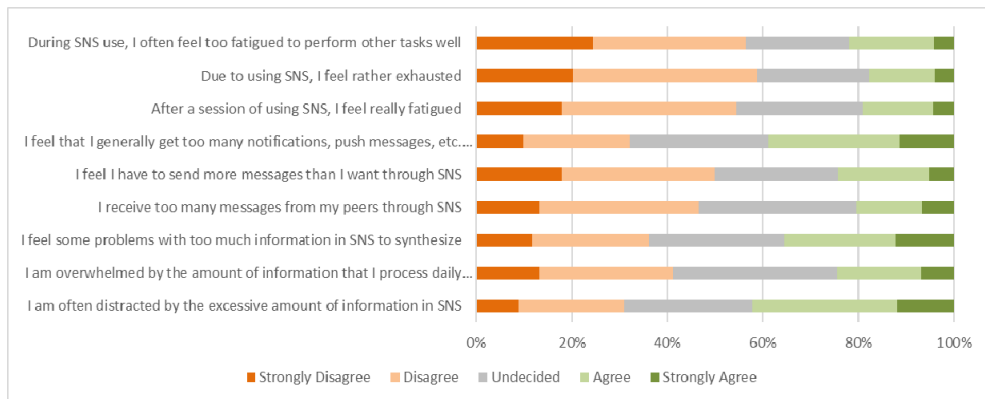


Regarding peer communication, Figure 4 shows that (44.3%) of the respondents consider that their colleagues within the SNS encourage them to do different activities, but instead (23.2%) do not agree with this perspective. However, most of the respondents (69.5%) considered that they had obtained a lot of information from colleagues within the SNS, and only (12.9%) did not agree. A significant percentage (66.0%) stated that they asked their colleagues from SNS for advice on a wide range of issues, and only (14.9%) did not ask for advice. Another high percentage (65.1%) stated that they talked to their colleagues from SNS about buying various products, and (15.4%) did not have such discussions on SNS.

**Figure 4: Peer communication and ubiquitous connectivity through SNS**
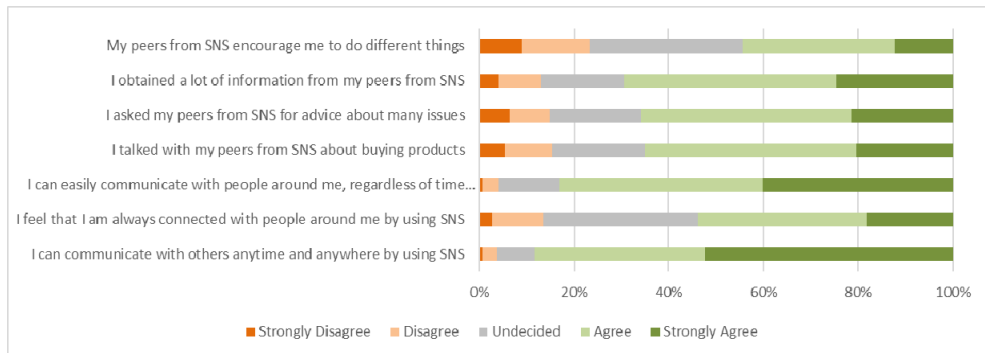


Another important concept in terms of SNS is ubiquitous connectivity. In this sense, the majority of the respondents (83.1%) believe that through the SNS they can easily communicate with the people around them, at any moment and from any location. More than half of the respondents (53.9%) feel that they are always connected with the people around them using SNS. A high percentage of respondents (88.4%) believe that SNSs have a major advantage because through them they can communicate with others anytime and anywhere.

A frequently discussed issue lately is that of data collection and concerns regarding SNS. In this regard, as can be seen from Figure 5, more than half of the respondents (58.3%) are concerned that the SNS collects too much personal information about them, but instead (14.9%) do not have a problem with this. A significant percentage (69.3%) consider that they feel bothered to provide personal information to so many people within the SNS, but (8.8%) feel comfortable with this. Also, (69.1%) consider that they are disturbed that within the SNS they are asked for information about their current location, but (12.3%) do not feel affected. A percentage of (63.8%) are annoyed that too much personal information is requested within the SNS, but (12.9%) are not worried.

**Figure 5: Data collection and privacy invasion/concerns regarding SNS**
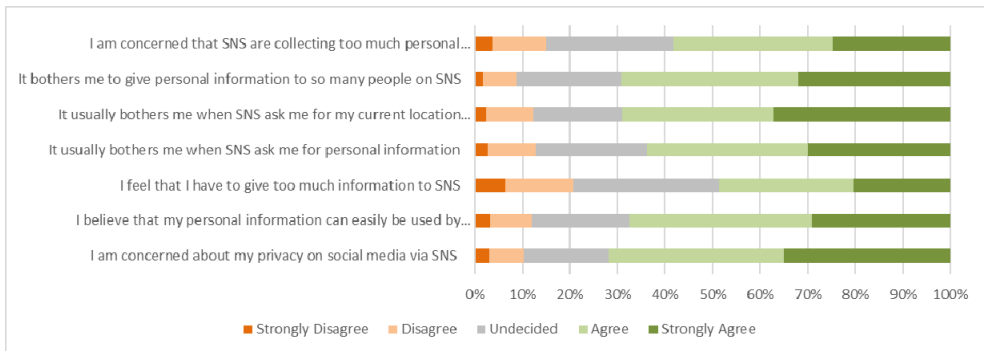


Regarding privacy invasion/concerns regarding SNS, almost half of the respondents (48.7%) feel that they must give too much information within SNS, but (20.6%) consider that it is not so much. Another concern is that (67.5%) believe that personal information can be used too easily by marketers on the SNS, but (11.9%) do not agree with this. A significant percentage of respondents (71.9%) are concerned about their privacy on social networks, but (10.1%) feel comfortable and do not experience feelings of concern.

**Figure 6: New relationship building and intention to continue using the SNS**
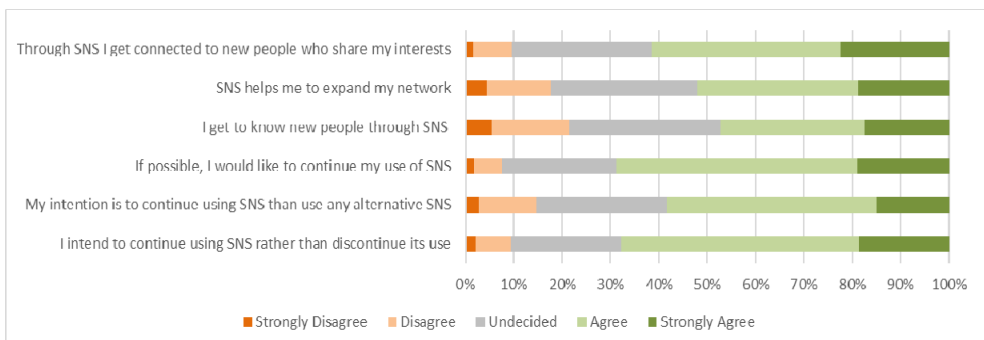
The respondents of the study consider that an important aspect within the SNS is represented by the new relationship building using the SNS. Thus, according to the data in Figure 6, the majority of respondents (61.6%) consider that through the SNS they connect with new people who share their interests, (52.0%) consider that the SNS helps them to expand their network of contacts, and (47.2%) believe that the SNS helps them meet new people.

Regarding the intention to continue using the SNS, more than half (58.5%) stated that they intend to continue using the SNS, rather than using other alternatives to the current SNS. Only (14.7%) would prefer other alternatives to the current SNS. Regarding the continued use of the SNS, (67.8%) wish, if possible, to continue using the SNS rather than discontinue its use. However, a percentage (9.4%) say that they no longer want to continue using the current SNS.


## 4. Conclusions

Social media and SNS have become extremely popular and are part of our everyday life taking into consideration that they facilitate quick access to information and communication with other users. Thus, communicating with friends, colleagues, family, or others has become easier and more accessible. Therefore, our study made an overview of the use of social media and SNS during the COVID-19 pandemic in Romania and addressed several concepts studied intensively in the literature.

The results obtained show that the most popular social networks used daily are Youtube, Instagram, and Facebook, and the top of the least used is led by Twitter, followed by Reddit and LinkedIn. Regarding the concept of fear of missing out (FoMO), only a small part of the respondents is worried about the fact that their friends are having fun without them, or that their friends, respectively, other people, have more satisfying experiences than them. On the contrary, almost half of the respondents do not have a problem with these aspects. Regarding compulsive use of the SNS, approximately one-third of respondents use SM to forget about personal issues and feel the need to use SM and SNS more frequently.

Regarding SNS fatigue, more than half of the respondents believe that using SNS does not tire them and that they can perform other tasks without problems. About the same percentage consider that they do not feel exhausted due to the use of SNS, or after an extended session of using SNS. Regarding the communication overload, out of the total respondents, only around one-third of the respondents consider that they receive too many notifications and push messages from SNS, and about half consider that they did not send more messages than they wanted through SNS, nor that they receive too many messages from peers through SNS. In the case of information overload, most of the respondents say that they do face severe challenges in terms of too much data to be synthesized in the SNS and that they do not feel overwhelmed by the amount of information they have to process daily in the SNS. However, a considerable percentage of the respondents agree that they often feel distracted by the existing information overload of the SNS.

Regarding peer communication, most respondents believe that their colleagues in the SNS encourage them to do different activities, that they have obtained a lot of information from them, that they have asked them for advice on

different problems, or that they have had discussions about buying various products. In the case of ubiquitous connectivity, most of the respondents believe that they can easily communicate through the SNS, that they feel that they are always connected to the people around them and that they have a major advantage because they can communicate with others anytime from anywhere.

Another issue studied was data collection and privacy concerns regarding SNS. Thus, more than half of the respondents are concerned that the SNS collects too much personal information or are disturbed that the SNS asks them for information about their current location. Nearly half of the respondents feel that they must provide too much information in the SNS, and the majority believe that personal information can be used too easily by the sellers of certain goods, which makes them worried about their privacy on social media. A high percentage of respondents believe that the SNS brings a major advantage because by using SNS they connect with new people who share similar interests, therefore expanding their network of contacts and meeting new people. A particularly important aspect of the study is the analysis of the intention to continue using the SNS. Thus, almost two-thirds of the respondents stated that their intention is to continue using the SNS and that they would not prefer other alternatives to the current SNS.

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# CLAIMS SETTLEMENT AND RISK ATTITUDES: EVIDENCE FROMTHE MOTOR INSURANCE POLICYHOLDERS

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**Abstract:** Claims, being the heartbeat of the workability of insurance, are the most critical contact influencer between the insuring public and the insurer. It serves as a critical path to truth that shapes the policyholders' ultimate perceptions of their insurers. Therefore, this study aimed at evaluating the relationships between claims settlement and risk attitudes, with specific reference to motor insurance policyholders in Lagos, Nigeria. The study adopted a cross-sectional survey research design. A survey based questionnaire was applied to 287 motor insurance policyholders. The findingsshow that claims settlements are significant in attracting reasonable risk attitudes. The study recommends that motor insurance providers should put in place fascinating claims packages in order to boost the confidence level of the motoring communities. Government should rejuvenate and empower the motor insurance public complaint commission to address issues relating to motor insurance claims of either party in the motor insurance contract. Future research work could direct attention to insurance fraud issues emanating from the insurance claims settlement manual.

## 1. Introduction

Motor insurance, being one of the transportation insurance modes, is designed as a risk management instrument to guarantee policyholders' peace of mind. It plays a crucial role in safeguarding policyholders from financial losses that motor vehicles can cause ranging from loss of property, medical bills, legal fees, to

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loss of income (Abdalla &Enaji, 2014; Gage, Bishop, & Morris, 2015). Historically, the appearance of motor vehicles on the road can be dated back to the year 1880s. The initial motor insurance policy emerged during the year 1890s (Ellis, 1983). Its emergence was after the failure of enacted regulation to control accidents of motor vehicles on the road. Motor insurance compensates victims who sustained bodily injuries and/or are obliged to repair motor vehicles damaged by the risk of collision and other third-party liability motor-related risks (Ibiwoye, Adeleke, & Aduloju, 2011). The compensation provided, in this regard,is encapsulated in the claims settlement mode and time.

Claims, being the heartbeat of the workability of insurance, is the most critical contact influencer between the insuring public and the insurer (Ayuba, Isyaka, & Azuoonwu, 2020; Hartwig, Lynch, & Weisbert, 2016). It serves as a critical path to truth that shapes the policyholders' ultimate perceptions of their insurers (Yusuf & Ajemunigbohun, 2015). Indeed, policyholders' perceptions around claims are usually informed by the defining relationships between the insurers and the insuring public (Raghuram, 2019). Thus, the defining relationships are most widely present in motor insurance policies (Ajemunigbohun, 2018; Bulbul & Baykal, 2016; Jayasudha, 2015; Namukaso, Ssekaukba, & Bagenda, 2017; Onafalujo, Abass, &Dansu, 2011). Although it is believed that roads can be better built and motor vehicles improved to tolerate mistakes, road risks can never be eliminated. Therefore, understanding motor users' attitudes is essential and significant in reducing the influence of human factors in road accidents and directing their attention to the importance of motor insurance.

However, the attitude of many motorists is disturbing as there seems to be an increase in the number of risk exposures motorists are faced with, which include loss of life and vehicle, risk of collision or damage to the vehicle, and other third-party motor-related risks (Magri, Farrugia, Valletta, & Grima, 2019; Segovia-Vargas, Camacho-Minano, & Pascual-Ezama, 2013). This attitude has created a great deal of apathy and very inauspicious perceptions regardingmotor insurance as a formidable financial technique to safeguard policyholders' interests in the event of a motor-related losses (Kwanga, 2017). The negative perception has resulted in low patonage for a motor insurance policy by Nigerians, created by poor claims settlement (Isimoya, & Ajemunigbohun, 2019; Olowokudejo, Aduloju, & Ajemunigbohun, 2020). With poor claims settlement, policyholders develop low-risk aversion. Therefore, low-risk aversion is a major challenge of any insurance industry, as it remains the heartbeat to the demand for motor insurance (Botha, 2017). It is a major drawback in the quest to attract more policyholders into the portfolio of motor insurance providers, and adversely affected motor insurance providers in terms of perceived policyholder's perception. This makes it difficult for motorists to comply with the compulsory motor insurance law in Nigeria. The study objective is focused at evaluating the nexus between insurance claims settlement and risk attitudes of selected motor insurance policyholders in Nigeria.

## 2. Literature review

### 2.1. Theory of Planned Behaviour

Planned behaviour, as a theory, was propounded to depict social values, attitude and controlled behaviour of mankind in business related activities (Zhang &

Cain, 2017). This theory commenced as the theory of reason action in the 80's to predict individuals' intents to get involved in behavioural events at a specific place and time (Ajzen, 2011). It is a well-designed estimates of risk attitude regarding a behaviour of interest, perceived behavioural intention and control, and subjective values. The outcome of previous studies (such as Brahmana, Brahmana, & Memarista, 2018, Mai, Nguyen, Vu, Bui, Nguyen, & Do, 2020; Kautonen, Van Gelderen, & Tornikoski, 2013) have shown that the theory of planned behaviour (TPB) has contributed extensively to insurance behavioural studies. This theory is thus considered typical for business activities even if the new venture may develop abruptly due to a chance realised. With TPB, two major sources of intent, that is, motivation to act for an intended behaviour and possibility of a given behaviour (Mamum, Rahman, Munikrishnan, & Permarupan, 2021). It is necessary to note that TPB contends that intent is a direct antecedent of behavioural performance. TPB stipulates, in principle, that the more acceptable the attitude and subjective value, the higher the perceived behavioural control, the stronger an individual's intent concerning the performance of insurance behaviour (Harrison, 2019; Sung, Yam, Yung, & Zhou, 2011). This theory explains how the insurers' claimsettlement affects the risk attitudes of motor insurance policyholders.

## 2.2. Conceptual clarifications

### 2.2.1. Claims Settlement

Claim is seen as a request for paying the delivery of either goods purchased or services provided (DiNapoli, 2013). It is referred to as a demand made by a policyholder on an insurer concerning his/her entitlement under an insurance contract (Ajemunigbohun, Isimoya, & Ipigansi, 2019). Singh (2012) maintains that claims can be properly settled when an insurer provides state-of-the-art claims mechanisms that are in alignment with robust business dynamics, and detailed managerial systems that will enhance the efficiency and efficaciousness of claims settlement processes. Claims settlement has been the pathway to driving an insurer's development in customers' acquisition, retention, product development, and profitability for survival (Capgemini, 2011). It either makes or breaks the policyholders in terms of their experience (Raghuram, 2019). However, insurer who fails to settle claims to the satisfaction of the policyholders would attract less business as it is likely to dissuade continued patronage from such customers (Onesede, 2013). For this reason, it is expected for insurer to create necessary collaboration between its claims department and other operational departments comprising underwriting, marketing, and information technology (Bruggmann, Catlin, Chinczewski, Lorenz, & Prymaka, 2018).

Claims settlement is a functional aspect of the insurance business and is thus noted as the end product of insurance transactions. It is an ideal instrument for measuring the perceived image of an insurance company. Therefore, adequate claims settlement awakes and attracts policyholders to demanding insurance policies of any kind (Afolabi, 2018; Kwanga, 2017; Lawrence, Evans & Richard, 2017; Yadav & Mohania, 2015). Nyce (2007) sees it as one of the functional areas of the insurance business, aside from marketing and underwriting. In furtherance of his submission, the claims settlement process is designed to achieve a fair settlement under the

applicable insurance policy provisions. Accordingly, claims settlement that exceeds the promised amount payable under the policy increases insurance costs for all policyholders. Rejda and McNamara (2014) came up with a submission that claims settlement, as a function of insurance, makes provision for several primary objectives. These objectives include verification of loss events, fairness and promptness of claims payment, and self-service assistance to the policyholders.

Market failures or inefficiencies in references to claim practices are in three phases. First is the inadequacy of customers' information with respect to relative quality assessment of claims handling practices of insurance companies. Second is the existence of agency relationship that gives the insurer liberty to control policyholders' affairs but restricted capacity to the policyholder to monitor the insurer's behaviour. Third is the insurer's capacity to act in an opportunistic manner at the time of claim (Feinman, 2014). Feinman (2014) stressed that inefficiency or failure in the insurance market milieu becomes endemic for claims settlement due to factors such as asymmetric information, agency problem, and insurers' risks of opportunism. According to Porrini (2017), insurers oftentimes suffer from information lack regarding the risk characteristics of individual persons in the contract of insurance. This asymmetry encompasses insurance contract in two ways: *moral hazard* and *adverse selection*. In the agency relationship, individual performance differences are often ignited by their expectant incentives and access to numerous information (Feinman,2016). Feinman (2018) states that opportunism can besystematic, intentional or negligent. While the insured opportunism includes misrepresentation of application at the time of loss situation or claims settlement, which further creates a fraudulent act; the insurer's opportunism takes the form of appreciable gains from pre loss attitude which include denial or procrastination of claims settlement, either in whole or part, misrepresentation of drafted policy language, etc

### 2.2.2. Risk Attitudes

Risk is defined as a situation where the outcome is uncertain and there exists a possibility of loss. (Arunajatesan&Viswanathan, 2017). According to Egerue (2017), risk is described as the deviation of future outcomes from the expected or predicted values. Risk is an unlikely event with either a positive or negative impact on specific objectives (Rejda& McNamara, 2014). However, attitude is defined as an individual disposition to react with a specific degree of favour or disfavour (Taofeeq & Adeleke, 2019). Therefore, Risk attitude is described as an individual enlightenment towards either avoiding or preferring risk when deciding on how to proceed in the circumstances embedded with the uncertain outcome. (Glanz, Greeke, LaRussa, Stuart, Rintell, Chitmis, & Healy, 2016). Risk attitude functions as an individual perception of risk with the tendency of experiencing an adverse event (Lippi, Barbieri, Piva, & De Bondt, 2018).

### 2.2.3. Motor Insurance

Motor insurance is a pecuniary tool to safeguarding insurers' risks against motormishaps (Olowokudejo, Aduloju, & Ajemunigbohun, 2020). According to Zerou (2016), it is a contract between the insured and the insurer, in which the insured agrees to pay premium and the insurer, agrees to pay losses as per the policy. It

was further simply put as the protection to risk of accident on property (covering accident damage on the motor and theft), liability (covering third-party legal responsibility to others' property damage or bodily injury) and medical coverage and death (takes care of emergency medical expense, cost of funeral or the agreed sum insured life in case of death). According to Falegan (1991) as cited in Onafalujo et al. (2011), motor insurance provides for bodily injury or property destruction to the third-party emerging from the use of vehicles. It is most times categorised in line with vehicle usage embodying private cars, goods carrying vehicles, commercial vehicles, public authorities' vehicles, passengers carrying vehicles, mechanical plants of specific structure, and agricultural and forestry vehicles (Bassey, 2018; Ngwuta, 2007). More so, earlier submission by Akintayo (2004) stated some characterising procedures connected to motor insurance to include period of insurance, vehicle value, hired vehicles of not less than twelve months, no claim discount, betterment, waivers, policies cancellation, etc.

## 2.3. Review of Previous Studies

Several surveys have been devoted both in Nigeria and other countries of the world to identify claims handling processes in insurance and how they are in relations to policyholders' perception in motor insurance (e.g. Bortoluzzo, Claro, Caeteno, & Artes, 2011; Gangil & Vishnoi, 2020; Gurung, 2016; Islam & Hossain, 2018; Yusuf & Ajemunigbohun, 2015).

In reference to a study carried out by Jiandong (2016), model for created to explain claim happenings, reporting, and controlling of insurance companies' mechanisms. The study derived a formula that includes the joint distribution and the joint moments for the combination of claims reporting and control procedures such as loss Incurred But Not Reported (IBNR), loss Reported But Not Settled (RBHS), loss Settled (S). A generalised model known as Poisson claim arrival was employed. The study concluded that a relationship between the claim happenings, reporting, and controlling metrics probably affects IBNR, RBNS, and Settled claims' volatilities.

Angima & Mwangi (2017) examined the relationships between underwriting and claims management and the financial performance of property and casualty insurance companies in East Africa.The study adopted descriptive research design. The study employed both primary and secondary data. While questionnaire survey was as a primary source for collection of data from 82 property and casualty firms' members of staff, the secondary data was procured from yearly financial report for the period 2010 to 2014. To analyse the data, a linear regression model was exerted in the research outcome. The study confirmed and established significant relationships between the variables.

Salleh, Kassim, Yazid, & Rashid (2018) embarked on a study aimed at determining the factors influencing consumers' attitudes towards insurance claims fraud. The study was descriptive in its design and employed a questionnaire survey for obtaining data from 210 respondents. In an attempt to decisively analyse the collected data, a multiple regression technique was adopted. The study established the influential effects of moral hazard, economic issues, and perceived fairness on insurance claims fraud. With this result, the study confirmed a positive nexus between consumers' attitude and insurance claim fraud.

Ajemunigbohun, Sogunro, & Oluwaleye (2020) conducted their study on the claims handling process attributes, with respect to the perceptions of motor insurance policyholders in Lagos, Nigeria. The study employed cross-sectional survey design with the sample size of 287 participants among selected motor insurance policyholders in Lagos, Nigeria. Both descriptive statistics and Friedman's rank test were adopted for data analysis. This study established a mean rank test among speedy settlement of claims, transparency of the claims process, easy contact with providers anytime, prompt communication network with providers, staff care for the policyholders in claims handling, and multiple channels to connect with the providers.

Oyetunji, Adepoju, & Oladokun (2021) research was based on the relationship between poor claims settlement and demand for insurance policies in Nigeria. While a structured questionnaire was used to gather information from 115 participants, Pearson's correlation coefficient technique was adopted in the data analysis. The study stressed the importance of prompt and adequate claims settlement in order to attract patronage for insurance policies. In conclusion, the study revealed vital interrelationship between claims settlement and demand for insurance. The study established further that the different cycles of claims procedures are important in attracting more premium income, customers' patronage, market efficiencies, and the like.

## 2.4. Gap identified

Jiandong (2016) observes that there seem to be a functional framework for claims processing, reporting and handling of insurance companies' mechanisms; with the tendency to enhance quality service provisions and satisfy customers' expectations profitably. For risk attitude, decision makers' analyses have always been affected either as a risk averse, risk neutral, or risk seeking individual (Obayelu, Olowe, & Falaye, 2017; Oladeinde & Oladeinde, 2014). Considering the numbers of existing literature investigated on claims settlement and risk attitude, there seems to be limited numbers of research conducted in relation to insurance studies. With the core importance of these adopted variables, empirical studies among Nigeria's motorists are rare, and then, appear not to have been extensively explored. This is a major gap in Nigeria which calls for intervention and part of which initiate this study. More so, theoretical choice of rational choice was a gap as there seems not to be no existing studies where these selected variables were related (i.e. claims and risk attitude). Furthermore, this study differs from existing studies in Nigeria, by examining claims settlement in relation to risk attitudes among Nigeria's motorists. There is therefore the gap in the relationships that this study seeks to fill by using multinomial logistics regression technique.

## 3. Methodology

To attain the study objective, a cross-sectional survey research design was adopted. The reason for the adoption of this research design was because it provided the researcher with chances of collecting data from a number of cases within identical time space; and at a single point in time. It further assists for large and representative sample from the population of interest (Kothari & Garg, 2016; Oyeniyi, Abiodun, Obamiro, Moses, & Osibanjo, 2016). Data collection was conducted through survey strategy around selected motorists within the 52 licensing stations of Motor Vehicle Administration Agency in Lagos State, Nigeria. The research instrument

employed was structured questionnaire. The instrument was designed to consist of two parts, A and B. While part A comprised of personal profile of participants, part B was designed to contain survey items relating to construct understudied. More so, the participants'' views in relation to the research instrument were designed to reflect five Likert-type scale measurements from strongly agree to strongly disagree (Cooper & Shindler, 2014).

The study population consists of the aggregate of registered motorists in Lagos State recorded at 704,828 (Motor Vehicle Administration Agency, 2019). The choice of Lagos State, as a study area, was supported by the fact that the state had the highest volume of motor insurance premium generation and claims settlement in Nigeria (Nigerian Insurers Association, 2019). Quota and convenience sampling method were adopted in the data distribution and collection processes. The research instrument was distributed to all licensing stations in a stratified manner, and collected on the availability and readiness of the selected motorists in all the 52 licensing stations. Since the target population comprised of all registered motorists in Lagos metropolis, sample size was calculated in reference to Taro Yamane's (1967) formula as cited in Ajay and Masuku (2014) to be 399. Out of this, 287 participants' responses were selected to have useful for data analysis (72% response rate).

On the validity of the research instrument, congruent and logical validity were employed. While the former was carried out through measures of construct understudied from well-grounded literature, the latter was structured via the allocation of a set of drafted questionnaire to few selected motorists and some members of academics in the field of insurance and transportation. These experts scrutinized the instrument and came up with reasonable suggestions which assisted the researchers in the survey items on the questionnaire. The Cronbach alpha value of the reliability test of the research instrument for items was 0.832, above the standard required value of 0.7.

The study variables were operationalised and modeled in specific terms towards the study objective as clearly stipulated below:

**Model specification**

**Model 1**

**1a.**   $\ln\left(\frac{P(Y=RS)}{P(Y=RN)}\right) = a_o + a_1 ICS$   (1)

**1b.**   $\ln\left(\frac{p(Y=RA)}{p(Y=RN)}\right) = b_o + b_1 ICS$   (2)

Likewise, $c_0, c, d_0, d_1$ are the regression constants

However, the data analytical technique employed for the study was multinomial logistics regression. The technique was employed because it connects with results of polytomous discretevariables whose categorical values were more than two categories. The statistical tool allowed for the identification and comparison of parameter calculations to the response variable's reference category (Asampana, Nantomah, & Tungosiamu, 2017). It is thus seen as an extension of the binomial (dichotomous) model (Senyefia, Adams, & Prah, 2019).

# 4. Results, Analysis, and Discussion

## 4.1. Descriptive Analysis of Participants Responses

**Table 4.1: Participants' Perceptions of Motor Insurance Policies**

| Variables | Response Label | Frequency | Percentage |
|---|---|---|---|
| Do you have motor insurance policy | | | |
| | Yes | 252 | 87.8 |
| | No | 35 | 12.2 |
| Need for claims in the last 12 months | | | |
| | Yes | 63 | 22.0 |
| | No | 224 | 78.0 |
| Access to claims in the last 12 months | | | |
| | Not at all | 130 | 45.3 |
| | Once | 109 | 38.0 |
| | Twice | 26 | 9.1 |
| | Thrice | 16 | 5.6 |
| | Four times and above | 6 | 2.1 |
| Level of satisfaction towards motor insurance policy | | | |
| | Very dissatisfied | 22 | 7.7 |
| | Dissatisfied | 55 | 19.2 |
| | Satisfied | 193 | 67.2 |
| | Very satisfied | 17 | 5.9 |
| Possibility to stop business with a motor insurance provider | | | |
| | Very unlikely | 92 | 32.1 |
| | Unlikely | 125 | 43.6 |
| | Quite likely | 48 | 16.7 |
| | Very likely | 22 | 7.7 |
| Handling and settlement of claims | | | |
| | Very dissatisfied | 27 | 9.4 |
| | Dissatisfied | 65 | 22.6 |
| | Satisfied | 170 | 59.2 |
| | Very satisfied | 25 | 8.7 |

*Source: Field Survey, 2020*

Table 4.1 reveals that large number of the participants representing 87.8 percent confirmed their possession of motor insurance policies. The participants with just 12.2 percent expressed their lack of motor insurance cover. While 78 percent of the respondents expressed their non-request for motor insurance claims in the last 12 months, 22 percent noted their claims notification for motor insurance. More so, 45.3 percent of the respondents admitted not to have access to motor insurance

claims in the last 12 months. Among the other participants, 38 percent claimed to have access once, 9.1 percent claimed twice, 5.6 percent claimed thrice, and 2.1 percent only claimed to have access four times and above. This is an indication that among all the participants surveyed, only 45.3 percent indicated not to enjoy access to motor insurance claims in the last 12 months. Participants' level of satisfaction with respect to motor insurance revealed that while 7.7 percent were very satisfied, 19.2 percent dissatisfied, 67.2 percent satisfied, and 5.9 percent very satisfied. This proves that majority of the participants exhibited high level of satisfaction in motor insurance policies with a total of 73.1 percent responses. Accordingly, the participants expressed the possibility to stop patronising a motor insurance provider with very unlikely recorded at 32.1 percent, unlikely 43.6 percent, quite likely 16.7 percent, and very likely 7.7 percent. Ultimately, the majority of the participants had shown that they are unlikely to stop patronising their current motor insurance provider with an indication of 75.7 percent overall. Conclusively, participants' responses to handling and settlement of claims by their motor insurance providers revealed that while 9.4 percent were very satisfied, 22.6 percent dissatisfied, 59.2 percent satisfied, and 8.7 percent very satisfied. This proves that majority of the participants expressed high level of satisfaction in the handling and settlement of their claims by motor insurance providers with a total of 67.9 percent responses.

**Table 4.2: Claims settlement**

| Variables | Scale Level | | | | | Mean | Std Dev. |
|---|---|---|---|---|---|---|---|
| | SD | D | U | A | SA | | |
| | 1 | 2 | 3 | 4 | 5 | | |
| I buy motor insurance policy due to prompt claims settlement. | 12.2 | 28.6 | 15.7 | 30.0 | 13.6 | 3.04 | 1.273 |
| I buy motor insurance policy because I have high level trust in claims settlement process. | 11.1 | 27.5 | 19.9 | 34.1 | 7.3 | 2.99 | 1.166 |
| I buy motor insurance policy due to efficiency in the claims settlement process. | 6.6 | 27.9 | 27.2 | 30.3 | 8.0 | 3.05 | 1.081 |
| I buy motor insurance because adequate claims settlement is guaranteed. | 9.4 | 28.6 | 21.6 | 33.8 | 6.6 | 3.00 | 1.127 |
| I buy motor insurance policy because appropriate claims settlement method is always provided (such as repairs, cash, replacement) | 11.5 | 21.3 | 18.8 | 38.7 | 9.8 | 3.14 | 1.198 |

*Source: Field Survey, 2020*

In Table 4.2 (and Fig 4.1), the claims settlement items for which data were sought from the entire respondents were *promptness, high level of trust, efficiency, adequacy, and method appropriateness in claims settlement.* The respondents responded to the various items, wherein 43% expressed their agreement in terms of *prompt claims settlement*, 16% indifferent, and 41% flaunted their disagreement. For *high-level trust in claims settlement*, while respondents expressed 41% in support, 39% were in disagreement with it. Then, 20% were indecisive. As for the *efficiency of claims settlement*, 38% of the entire respondents displayed their agreement, 27% were indecisive, and 35% disagreed. For *adequacy of claims settlement,* 40% agreed, 22% undecided, and 38% expressed their displeasure. For the *appropriate claims settlement method*, 48% agreed, 33% disagreed, and 19% indifferent. In all, there seems to be an indication that while claims settlement is slightly prompt, respondents' trust in claims settlement is on the rise. Thus, the results further proved that efficiency in claims settlement rises by 3%. The adequacy of claims settlement also indicated a 2% increase, while the appropriateness of the claims settlement method indicated 15%.

**Figure 4.1. Respondents' opinions regarding Insurance claims settlement**
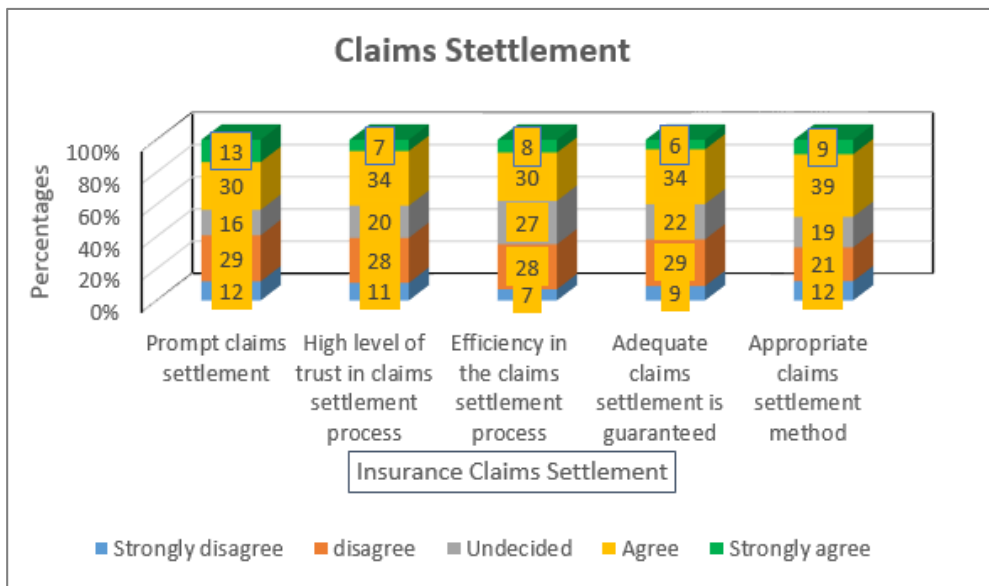


## 4.2. Test of Hypothesis

$H_o$:Claims settlements have no significant effect on the risk attitudes of motor insurance policyholders

**Table 4.3. Multinomial Regression Result for Claims Settlement vs. Risk Attitude**

| Pseudo R-Square | |
| --- | --- |
| Cox and Snell | .027 |
| Nagelkerke | .035 |
| McFadden | .018 |

| Likelihood Ratio Tests | | | | |
| --- | --- | --- | --- | --- |
| | Model Fitting Criteria | Likelihood Ratio Tests | | |
| Effect | -2 Log Likelihood of Reduced Model | Chi-Square | Df | Sig. |
| Intercept | 121.892 | .700 | 2 | .705 |
| Claims Settlement | 129.058 | 7.867 | 2 | .020 |

| Parameter Estimates | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | | | 95% Confidence Interval for Exp(B) | |
| Risk Attitude Constructs[a] | B | Std. Error | Wald | Df | Sig. | Exp(B) | Lower Bound | Upper Bound |
| Risk Averse — Intercept | -.088 | .861 | .011 | 1 | .918 | | | |
| Risk Averse — ClaimsSettlement | -.469 | .311 | 2.276 | 1 | .311 | .626 | .340 | 1.150 |
| Risk Seeking — Intercept | .355 | .492 | .516 | 1 | .471 | | | |
| Risk Seeking — Claims Settlement | .249 | .158 | 2.479 | 1 | .115 | 1.283 | .941 | 1.750 |
| a. The reference category is: Risk Neutral. | | | | | | | | |

*Source: Researcher's Computation, 2020*

The R-squared statistic (Cox & Snell and Nagelkerke and McFadden R-Square), as explained by the fitted model, implies that the claims settlement variations explain about 1.8% to 3.5% of the total variation in the measure of risk attitude. As regards the variables in the parameter estimate, a significant value improves the model and indicates a positive effect. The findings show that claims settlement insignificantly predicted (= -0.469, *SE* = 0.311, *p* > 0.05) risk-averse and also insignificantly predicted (= 0.249, *SE* = 0.158, *p* > 0.05) risk-seeking. The likelihood ratio tests of the multinomial regression indicate that there is a significant association between the predictor variable and the response variable. As a result, it can be concluded that claims settlements have a significant effect on motorists' risk attitudes in Lagos, Nigeria.

### 4.3. Discussion of Findings

From the empirical analysis conducted and the test of hypotheses carried out, this study has been able to addressthe research objectiveraised. The result

shows that claims settlements have significant and positive relationships with the risk attitudes of motor insurance policyholders in Nigeria, thereby invalidate the null hypothesis and validate the alternate hypothesis. The result further justifies that claims settlements of motorists in Nigeria bring to bear their risk-seeking nature. This result, thus, proves that motorists in Nigeria are not behaviourally conscious of their insurance demand hence they are inversely and unevenly risk-averse. This study further confirms that they do not take necessary scientific steps to procure motor insurance policies that can serve as shock absorbers in the event of motor accident loss. This finding affirmed Sumaila's (2013) claim that drivers' behavioural understanding is essential and significant in reducing the influence of human factors in road traffic crashes through appropriate risk control strategies. This result corroborates the findings of Brown, Montalva, Thomas, & Velasquez (2017) but of divergent view to that of Kavitha, Latha, &Jamuna (2012). Brown et al. (2017) stated that policyholders' risk attitudes have significant effects over major choices of their life and thus play a substantial influence on their social, economic, health and welfare development. In contrary to the findings of hypothetical statement one, Kavitha et al. (2012) had admitted the significance of consumers' attitude towards general insurance products (motor insurance inclusive) as positive in terms of the increasing risk aversion of the policyholders toward their claims settlement methodology.

## 5. Conclusion and Recommendations

The findings have shown the significance of claims settlements on motorists' risk attitudes. The findings of the study, if adopted will lead to effective claims settlement and reasonable risk attitudes from motor insurance policyholders. The findings further affirmed that claims settlement was significant in attracting reasonable risk attitudes from policyholders. Thus,the study's outcome may be considered useful by policymakers and motor insurance practitioners in designing their strategies for improving claims settlement mechanisms among motorists in Nigeria.Therefore, embracing the claims settlement outcome in relation to motorists' risk attitudes provided for in this study will assist in redeeming policyholders' perceptions for motor insurance policies, as this will imbibe insurer's trust, confidence, honesty, reliability and competence in the heart of the insuring public.

To properly justify the findings of this study, the study recommended that claims settlement mechanisms should be strategically designed to imbibe mutually related ambiance between policyholders and insurers. Motor insurance providers should put in place claim settlement procedure that will boost the confidence level of the motoring communities. Government should rejuvenate and empower motor insurance public complaint commission to address issues relating to motor insurance claims of either party in the motor insurance contract. Motor insurance regulators should take proactive steps in monitoring the contractual agreement towards motor insurance claims settlement by ensuring that motorist's decision towards motor insurance is addressed. Motor insurance providers should corroborate efforts with other stakeholders to see how they can proffer solutions that can properly determine insurance claims function, insurance cost-effectiveness, and enhance market efficiency.

This study contributes to knowledge in that it sensitizes the claims managers to the need to ensure that claims settlement is taken seriously and handled passionately when dealing with motor insurance policyholders. This study benefits the motor

insuring communities in terms of increase in confidence level, effective claims delivery, and the likes. The study suggests that further research works should focus attention on nexus between claims settlements and premium income of the motor insurance in Nigeria. Lastly, future research work could direct attention at insurance fraud issues emanating from insurance claims settlement manual.

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# THE IMPACT OF ACCESS TO CREDIT ON WELFARE INEQUALITY IN MALAWI

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**Abstract** This study evaluates the implications that access to credit has on welfare inequality in Malawi in order to address the gap left in previous studies concerning credit. The study employed data from Malawi's Integrated Household Survey 2017 and used the propensity score analysis to examine what impact access to credit may have on the welfare of Malawian households using consumption per capita as a proxy for household welfare. The study further proceeded to use the generalized Lorenz curve, the Theil indexes as well as the Gini to examine the inequalities present in welfare among the households that access credit and those that do not. The results showed a positive impact of access to credit on welfare as households with access to credit experience lower levels of inequality than those without. However, a closer examination of the Theil's indexes found that factors unrelated to access to credit had a stronger effect on inter-household inequalities than access to credit. The results imply that the impact that access to credit has on welfare inequality is a positive one, but its effect is substantially small. Thus, implying that policies aimed at enhancing distribution of credit should continue. Simultaneously, a more holistic approach on reducing inequality should be included at both household level and national level to achieve a desired result.

**JEL classification:** I390
**Keywords:** access to credit; Households; inequality; Theil index; Lorenzo curve. IHS2017

## 1. Introduction

The rise in welfare inequality over the years has led to many governments incorporating the use of credit to alleviate and if at all eradicate its existence among its citizens. United Nations (2015) defines the welfare inequality as the state of being unequal in rights, status, or opportunities. Mussa and Masanjala (2015) further describe the term as an occurrence when there is an unequal or unjust distribution of resources and opportunities among members of a given population and can exist across a range of dimensions. Ibid further describes these

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dimensions to include health, education, wealth, and welfare. Credit on the other hand, is simply the provision of financial resources by an individual, corporation, or government, with an established claim for repayment often with interest (Barroso, 2022). This credit can either be in terms of formal or informal credit; the latter is credit that is issued without any supervisory body and is usually driven by the profit motive with high interest rates (Notes on Formal and Informal Credit - Cbse Class 10 Economics, n.d.). Formal credit is the credit that is acquired from formal financial institutes, regulated by government.

Over the years, concerns regarding inequality have increased due to research uncovering its associations with unsustainable economic development for many countries (Nguyen et al., 2020). Studies have shown that economic progress can be eroded by the effects of inequality (Nguyen et al., 2020). High levels of inequality have been attributed to reductions in innovation and productivity within countries; lessening efforts made to eliminate poverty making societies more unstable and harder to manage (Corak, 2013). Thus, with these unsustainable effects of inequality several countries, international bodies and research institutions have sought ways in which to reduce inequality in all its forms and dimensions (United Nations, 2021). This can be linked to the Sustainable Development goals where one of the goals outlined is the Reduction of inequalities within and among counties (United Nations, 2018, 2021).

In a report by van de Meerendonk (2016) on the address of micro finance programs in Malawi, ibid, tackled several aspects including the address of the development of the financial sector which is believed to have become an important means in addressing not only issues of inequality but also poverty and economic development in the country. According to Gambetta et al. (2021) well developed financial institutions have played a substantial role in ensuring financial inclusion and sustainable economic development. Through empirical analysis, it has been shown that developed financial markets contribute to an economy's growth through increased efficiency in capital allocation and that poverty and inequality is also lessened through the alleviation of restrictions on credit acquisition that are mostly faced by the poor (Adebowale and Dimova, 2017). The alleviation of restrictions on credit acquisition is achieved through financial inclusion which is an output of a well-developed financial sector, encompassing the ease of access and equal opportunities to accessing financial services (van de Meerendonk, 2016). This entails that individuals have access to suitable and affordable financial products that not only meets their needs in a responsible way but also sustainable (World Bank, 2021b).

In Malawi, however, a study done by Diagne (1998) revealed that the accessibility of credit did not improve but rather worsened the welfare of poor smallholder farmers and in turn widened the welfare gap between the rich and poor. A report made on the study further explained that the reason to this was because the credit provided by microfinance institutions did not accommodate the poor's demands (Diagne and Zeller, 2001). Over the years, significant changes have occurred in the financial sector with the Malawian government taking an interest in its development because of global neoliberalism (van de Meerendonk, 2016; Vellucci, 2021). With the rise in demand for credit, especially in rural areas by those involved in agriculture, the government realized the importance of an inclusive financial system to the development of Malawi and efforts to improve its level were employed by the government itself, Nongovernmental Organizations,

and other international organizations (van de Meerendonk, 2016.). Government through the National Social Support Policy has included microfinance to alleviate poverty and promote welfare in Malawi by ensuring individuals are able to access finance so to increase their income base (Government of Malawi, 2012). Programs such as these have led to the growth of microcredit in Malawi with over 200 million borrowers over the last three decades and with the total number of microloans accessed by ultra-poor households at over 137 million in 2010 (van de Meerendonk, 2016). This growth in financial inclusion has led many to believe that by ensuring poor households have access microfinance, investments in health, education and women empowerment will increase and in turn raise their welfare. However other parties disagree and believe that the growth of the microcredit will only worsen the condition of poor Malawians.

A considerable amount of research has examined credit and its impact on welfare, poverty, and inequality (Adebowale and Dimova, 2017; Chowdhury et al., 2005; Diagne and Zeller, 2001) bringing in mixed results. Whilst some studies have found that access to credit by the poor had a positive effect on their living standards others uncovered that it only makes the poor people poorer and by doing so it worsened the welfare gap that exists among the rich and the poor (Chowdhury et al., 2005). A study conducted by Diagne (1998) on Malawi showed that access to formal loans had a positive effect on household income, one of the measures of welfare but an analysis of the study by Diagne and Zeller (2001) showed that households were made worse off after the loan was repaid thus making the poor worse off at the end of the day. However, this was attributed to the undeveloped financial sector at the time. Overtime, significant improvements in the financial sector have occurred with loan packages that consider individual demands and circumstances and policies directed at ensuring all individuals especially those considered vulnerable have access to credit (van de Meerendonk, 2016). This showed the need for a revaluation of the topic as to whether access to credit has aided in the reduction of welfare inequality which was the purpose of this study.

Nevertheless, since the improvement of the financial sector in Malawi, studies have attempted to address the prevalence of access to credit and welfare inequality. However, it is argued that these studies mainly focused either on the development in the financial and microfinance sectors or the prevalent inequalities in Malawi (Kwengwere, 2011; Mussa and Masanjala, 2015). Thus, though studies exist around the topic none address the direct impact access to credit may have on welfare inequality in Malawi.

## 2.1. Theoretical Literature

There exist some general economic theories that explain the impacts that access to credit has on welfare inequality (Kling et al., 2020). Others propose a positive relationship between the two whilst others suggest a negative relationship. A few theories will be discussed in the subsequent section in economics that explore this relationship.

### 2.1.1. The theory of Utility and Consumer Behavior

This theory proposes a positive relationship between access to credit and welfare but suggests a negative impact on welfare inequality by creating disparities in welfare among those that have access to credit and those that do not (Delis et

al., 2021). The concept of welfare historically has often been associated with an individual's state of happiness and prosperity (Greve, 2008). In economics the concept of welfare is defined under the utility theory as the satisfaction one derives from consuming a product or service (Ragan and Lipsey, 2011). Under this theory and the consumer behavior theory, an individual is said to maximize their utility (or welfare) when their indifference curve is tangent to their budget line (Ragan and Lipsey, 2011).

An indifference curve is simply a curve that depicts the combinations of consumption bundles an individual is indifferent to or rather provides the same utility. A budget line shows all combinations of consumption bundles available to an individual given his level of income (Ragan and Lipsey, 2011). This suggests an individual's utility is constrained by their budget line and a rise in income would be one way in which an individual can shift to another optimal point that is on a much higher indifference curve. Given this theory, access to credit is one of the ways in which individuals can raise their nominal income and enjoy consumptions bundles on a higher utility curve (Delis Et Al., 2021; Ragan and Lipsey, 2011). This in turn creates disparities in welfare between those that have access to credit and those that do not (Delis et al., 2021).

### 2.1.2. Theory of Inequality of Opportunities

Sen (1993) capability framework created a new way in which an individual's well-being could be defined, measured, and compared (United Nations, 2015). According to Sen the freedom to achieve well-being is of primary moral importance in development and is linked to what an individual can do and be with the commodities they have at their disposal (Centeno, 2021). This theoretical approach defined well-being in two broad concepts namely, functioning and capability. Where *functioning* is described as what an individual does with the commodity of characteristics that they come to possess, and *capabilities* is defined as the freedom that individuals have given their command over these commodities (Todaro and Smith, 2009). The theory emphasizes welfare or well-being as a choice between one type of life over another (United Nations, 2015). Under this framework, equalizing the variables of welfare (for example health, education, income, consumption) among individuals should not be the target to reduce inequalities because not all individuals assimilate these variables into well-being and freedom the same way but rather the actual opportunities that give individuals the liberty to pursue a life of their own choosing should be the ones equalized (United Nations, 2015).

Under this study, Amartya Sen's capability approach suggests that, to reduce the inequality in welfare in Malawi, equal opportunities for individuals to obtain credit must be created. That is to say that access to credit acts as the commodity that is useful and gives individuals the freedom to lead a certain life. Another theory in support of this notion is the public good theory of financial inclusion which argues that if financial inclusion is treated as a public good then it will generate benefits for all (Ozili, 2020). Thus, the availability of credit in the economy has the possibility of positively affecting growth and inequality reduction of human welfare.

### 2.1.3. Economic Theory

According to Kling et al. (2020), Economic theory offers contradictory predictions about the implications that credit as a byproduct of financial inclusion

has on welfare inequality. This is shown and explained through a series of theoretical models which restrict the measure of welfare in terms of individuals' income. Rather than credit considered as the main variable in these models, the variable access to finance was preferred instead and encompassed several financial variables including credit. Thus, these models may be a bit restricted in fully understanding the relationship that access to credit and welfare inequality share. Regardless, they provide some understanding on the topic. In the model developed by Galor and Zeira, access to finance and income inequality (used as a proxy to welfare inequality) were shown to have a more negative linear relationship whilst Greenwood and Jovanovic's model predicted to a more non-linear, inverted u-shaped relationship between the two dependents on the level of economic development (Kling et al., 2020). Access to finance either has negative implications on welfare inequality (as access to finance increases the level of welfare inequality decreases) or a non-linear u-shaped relationship with welfare inequality (where increase in financial inclusion reduces welfare inequality to a certain point after which its effects become counterproductive). Kling et al., (2020) argues that not all individuals benefit from financial inclusion and depending on the parameter values financial inclusion can increase or decrease welfare inequality. Other models argue that financial inclusion leads to a reduction in welfare inequality by increasing opportunities to invest in education or entrepreneurship (Kling et al., 2020).

## 2.2. Empirical Literature

There exist numerous literatures on welfare inequality bringing in mixed results, some studies have suggested that welfare inequality exists between those who have access to credit and those who do not. (Delis et al., 2021; Kling et al., 2020). Delis et al., (2021) examined how access to credit for small business owners affected the growth and inequality of their future income. The results showed that those that did get a loan were able to increase their income five years later by more than 10 percent compared to those that did not manage to get a loan. These results suggest that access to credit does in fact grow welfare inequalities between those that access credit and those that do not. Kling et al., (2020) on the other hand, revealed that evidence shows that access to credit can widen or decrease income gaps between the rich and the poor. The study referred to other empirical studies that showed through empirical evidence that income inequality (welfare inequality) worsens if households are dependent of credit and that formal loans do not necessary contribute to the reduction of under-investment of education (Kling et al., 2020).

However, results obtained from a study on China revealed that financial inclusion, measured by credit, savings, account ownership and insurance, has a positive relationship on households' income growth especially those at lower quintiles of income distribution indicating that it does reduce income inequalities (Kling et al., 2020). The study conducted by Kling et al., (2020) examined the impact of financial inclusion on income through its impacts on education and human capital accumulation. By using a continuous variable like investments in education, the study sought to expose the disparities of welfare in terms of income within the country of China.

Nonetheless, a study done by Adebowale and Dimova (2017) suggests otherwise. The study used a treatment effect model, decomposition analysis and

representative household data from Nigeria to examine the implications of formal finance on welfare and the disparities that exist in welfare. The results found a positive effect of credit on household welfare and increasing inter-house inequalities despite enhancing educational investments. Thus, revealing a more negative relationship between access to credit and welfare inequality.

In Malawi studies have revealed that access to credit may have positive or negative implications on welfare inequality depending on surrounding factors such as the financial market. To begin with, the study done by Diagne and Zeller (2001) unveiled the negative effects that credit access had on welfare distribution in Malawi but when analyzed it was seen that the poor households that obtained loans only experience a short-term boom in welfare caused by a rise in their income but later suffered losses in welfare after repaying the loan. However, Diagne and Zeller (2001) explained that the results may have been influenced by undeveloped financial markets at the time that did not cater for the demands of poor household farmers.

A review report on Malawi's financial sector by Meerendonk et al. (n.d.) revealed some major developments in the financial market over the years since the study done by Diagne and Zeller (2001). The report showed that the efforts to enhance economic development and reduce poverty through the promotion of financial inclusion was a success with the poor having accessibility to credit that is designed to suit their demands. However, studies examining inequality still recorded large welfare gaps despite the developments in the financial sector and the availability of loans (Matita and Chirwa, 2009; Mussa and Masanjala, 2015) A study investigating rural-urban welfare inequalities by Matita and Chirwa (2009) revealed that 59% of this welfare gap could be explained by differences in characteristics, specifically physical assets and education showing that expected investments in education due to an increase in financial inclusion did not occur. Unfortunately, this study did not examine if at all the reason to this is due to access to credit, thus may not be proxy to examine access to credit effects on welfare outcomes.

Sebu (2017) on the other hand, examined how credit constraints among farm households in rural areas affect welfare inequality among them. The study indirectly revealed how good credit systems would affect welfare inequality in Malawi. Its sample focused on discouraged borrowers that were often ignored by past studies and a three-step sequential estimation model following a trivariate probit model with double sample selection was employed. The finding revealed that there were more people who were discouraged to borrow than they were those were denied credit and among these many were women, drawing attention to the significance on cross-examining those that are discouraged in accessing credit. Capturing this variable as a credit constraint its impact was assessed against consumption inequality, a measure welfare inequality. The results revealed more prominent inequalities within the groups than between them which were explained to be a result of mainly household size and the value of the assets. According to Demirgüç-Kunt and Levine (2009) there seems to be a shortage of empirical evidence surrounding the issues to do with credit access implications on welfare inequality.

A study done by Sebu (2017) came close to establishing the relationship between access to credit and welfare inequality in Malawi by examining how credit constraints affect consumption inequality (a proxy of welfare inequality) among rural farm households in Malawi. The results of the study showed that consumption

inequalities were more prominent within the two groups credit constrained and unconstrained households than they were between them. This study, however, was focused on credit constraints, and not credit itself, which was the central focus of this study.

The reason as to why this study was important was to not only fill the gap in research but also because of its contribution to information available on issues to do with welfare among Malawian households. Researchers and policy makers generally agree that poor households in rural areas in developing countries such as Malawi are deficient of adequate access to credit (Diagne and Zeller, 2001). This in turn is said to have a negative impact on these households through aggregate and household-level outcomes, including technology adoption, agricultural productivity, food security, nutrition, health, and the overall households' welfare; putting a strain on inter-household welfare inequality at large. Access to credit affects household welfare inequality by easing the restrain on income and consumption within households by providing a source of capital for these activities and therefore increases a households' risk-bearing ability by modifying its risk coping mechanisms. With the many credit schemes put in place by different organization in Malawi, there is a variety and diversity of loan packages extended to all types of people in the country (Diagne and Zeller, 2001). Therefore, there is a need to weigh the role this form of finance has in lessening the ever-growing disparities in Malawian's welfare to bring sustainable development as per objectives outlined in Malawi's Vision 2063.

As seen in this section, there are disparities between what theory may suggest and actual outcomes shown by empirical studies.

## 3. Methodology

This study used cross-sectional data from Malawi's 2017 Integrated Household Survey (IHS4) which was a part of the Living Standard Measurement Surveys (LSMS) project of the World Bank. The survey was conducted by Malawi's National Statistical Office (NSO) with collaboration from the World Bank and was designed to provide information on the various aspects of the socio-economic status of households in Malawi (National Statistical Office, 2005). It contained information on consumption, income, and demographics of about 12000 households (World Bank, 2021a) including information on agriculture and labor, activity of households, as well as details on credit and loans, financial resources, household assets and welfare indicators (National Statistical Office, 2012). The first and second Integrated Household Surveys (IHS1 and IHS2) were implemented to provide information for policy making (World Bank, 2021a). The third Integrated Household Survey expanded on the agriculture content of IHS2 and introduced the Integrated Household Panel Survey, which had a sample size of over 3000 households. The fourth and Fifth Integrated Household Survey's followed the same setup as the previous IHS (World Bank, 2021a).

The sampling frame included households from all regions of Malawi namely, the Northern, Central and Southern; and was arranged into the rural and urban strata. The urban strata include Lilongwe, Blantyre, Mzuzu and Zomba. All the other areas were considered as rural areas (World Bank, 2021a).

## 4. Data Analysis

### 4.1. Econometric Method

The study divided the main objective into two sub objectives which are to examine the relationship between access to credit and household welfare and to evaluate the disparities in welfare among households that have access to credit and those that do not. To satisfy the main objective, data analysis was carried out in two parts as well. Firstly, the first specific objective was satisfied using a well-developed econometric model which is discussed below. Lastly, the second specific objective was fulfilled using appropriate analytic tools.

#### Econometric Model

To address the first specific objective, this study adopted the Treatment effect model which is useful in assessing causal effects of binary variables such as access to credit on outcomes variables of scientific or policy interest (Angrist, 2008). These treatment effects were estimated using propensity score matching analysis. The effect that access to credit has on household welfare was examined using per capita consumption as a measure of welfare and access to credit was treated as a dummy variable, taking the value of 1 if a household accessed credit and 0 otherwise. Consumption per capita (or per capita consumption) was opted for as a measure of welfare since it is a common measure of welfare and preferred by households rather than income according to (Attanasio and Pistaferri, 2016). Hence the following system of equation was developed for estimation:

$$C_i = \beta_0 + \beta_1 Credit_t + \beta_2 Emp_t + \beta_2 Age_t + \beta_3 N_t + \beta_4 Educ_t + \beta_5 S_t + \beta_6 Gender_t + \beta_6 MarrSta_t + \beta_0 R_t \varepsilon_t$$

(1)

Where $C_i$ was denoted as per capita consumption, $\beta_0$ as the intercept, $credit_t$ as access to credit, $Emp_t$ as employment status of the household head, $Age_t$ as the age of the household head that year, $N_t$ as the household size, $Educ_t$ as the education level of the household head, $S_i$ as the region of residence, $Gender_t$ as the gender of the household head, $MarrSta_t$ as the marital status of the household head, $R_t$ as the place of residence and $\varepsilon_i$ as the disturbance errors that follow normal distribution.

To capture the impact that access to credit has on household welfare the households who accessed credit *(F = 1)* were to be compared to those who did not *(F = 0):*

$$Impact = E\left(C|F=1\right) - E\left(C|F=0\right) \ldots\ldots\ldots\ldots (2)$$

However, this could have provided a misleading treatment effect due to selection bias, where other factors aside from the impact of access to credit may influence results (Angrist, 2008). To cater for this, propensity score matching was used to assign a score to the observations in the study based on their likelihood to be treated, after which those who are treated (accessed credit) were matched against those were not based on the score. This was done to enable valid estimation of the counterfactual group based on the assumption that the source of selection bias in this model stemmed from a set of observed characteristics that influence whether an observation acquires treatment or not (covariates) a requirement for matching methods (Angrist, 2008).

To satisfy the second specific objective, the Generalized Lorenz curve along with Theil Indexes and the Gini index were used. The Generalized Lorenz curve much like the Lorenz curve is a curve that is mostly used to show the degree of inequality in each population (Haughton and Khandker, 2009). The closer it is to the equality line the closer the population is to a state of equality. The Theil indexes, on the other hand, are statistics that measure the entropic distance the population is away from the ideal state of equality (Haughton and Khandker, 2009). The closer it is to zero the closer it is to equality. Whilst the Gini index measures the extent to which the distribution within an economy deviates from a perfectly equal distribution of resources and takes the value 0 to represent perfect equality and 1 to represent perfect inequality (Haughton and Khandker, 2009).

To further access, the relationship between access to credit and consumption per capita inequality (welfare inequality) a decomposition of the Theil index was done where the between group and within group inequalities were compared. If the between group inequality index appeared to be greater than the within group inequality then, access to credit would be shown to play role in the disparities in welfare among households in Malawi (Adebowale and Dimova, 2017).

### 4.2. Definition of variables, measurement and apriori expectations

In this study, the variable per capita consumption as a welfare measure was used as the dependent variable. This was because consumption is regarded as a better measure of welfare and welfare inequality compared to others such as income. The reason to this was due to the volatile nature of income, that may give misleading picture on households' welfare as consumption may exceed current income due to acquisition of loans which is the case in the presence of the variable credit (Attanasio and Pistaferri, 2016).

Access to credit was the main explanatory variable in the model and was defined as a dummy variable as discussed earlier. Due to the nature of the study and the methodology employed the other explanatory variables in this study were used as variables that influence whether an individual accesses credit (a covariate). The variables included were education level, marital status, gender, employment status, age, household size, region, and place of residence (urban or rural). All the covariates except household size were computed as categorial variables taking the values 0 and 1.

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In accordance with literature, the apriori expectation of this study was that access to credit has a positive impact on per capita consumption. This is because, access to credit is expected to raise an individual's income and therefore increase consumption. Access to credit is also expected to reduce welfare inequalities by improving welfare for the less vulnerable through the widening their income pool or financial sources (Diagne and Zeller, 2001). Hence household who had accessed credit were expected to consume more along with households that were large in size, located in urban areas, with older household heads and those which had high levels of education and are employed (Hone and Marisennayya, 2019).

## 4.3. Diagnostics Issues

The econometric model as discussed above was subject to selection bias thus to ensure that valid estimates were acquired the two propensity score matching conditions (the balancing condition and the availability of the common support) were verified (Austin, 2011). Firstly, balancing diagnostics were carried out to ensure a balanced covariate distribution between those that accessed credit (treated group) and those that did not (untreated or control group).

Secondly, the overlap condition was computed using a density distribution graph that was plotted against the propensity score. Through the common support that verifies whether there was an appropriate overlap in the observed characteristics (denoted by the covariates) of the treated and untreated, was identified (Austin, 2011).

## 5. Results and discussions

This section discusses the results of the study as follows:

Table 1 provides descriptive results for both continuous variables presented as the mean, minimum and maximum value of per capita consumption expressed in its natural log form, access to credit and the covariates used in this study.

**Table 1: continuous variables**

| Variables | Mean | Minimum | Maximum |
|---|---|---|---|
| Log of consumption per capita | 11.97 | 9.91 | 18.54 |
| Household size | 4.33 | 1 | 17 |

Table 1 presents results for continuous variables of the study, as indicated. The dependent variable per capita consumption was a continuous variable with a mean of 220,641.90. In the table 1, the natural log of consumption per capita is presented instead since it is used in most of this study's analysis. On the other hand, about 25 % of the participants in this study accessed credit. The other continuous variable was household size the minimum number of people in a household was 1 and maximum of 17.

**Table 2: Categorical Variable**

| VARIABLE | male | female |
|---|---|---|
| GENDER | 75% | 25% |
| MARITAL STATUS | | |
| Married | 93% | 7% |
| Not married | 7% | 93% |

The other variables in the study categorical variables shown in table 2 below It shows that according to gender there were more male headed household (75%) as compared to the counterparts' women at 25%. The marital status of household head indicates that from those who indicated to be married males had a higher percentage of being married 93% as compared to females. The descriptive of access to credit is shown in figure 1 that a smaller percentage of the population (25%) had access to credit as compared to 75% who had no access to credit.

**Figure 1. Access to credit**
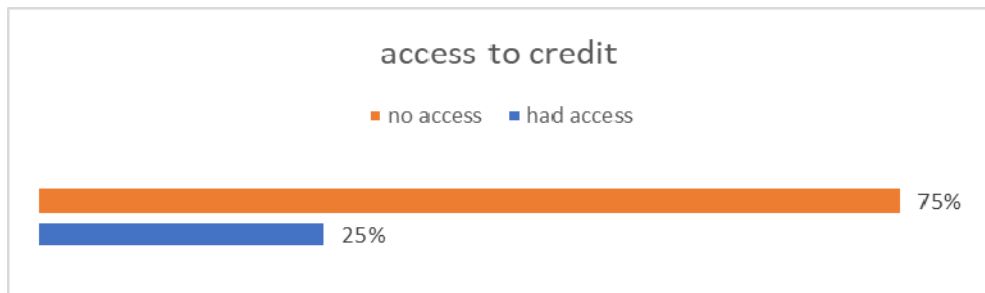


To address the impact of access to credit on welfare, a treatment effect model was adopted and the propensity score matching (PSM) method was used. In this study, 6,124 observations were matched out of which 3,062 were in the treated and untreated groups (as shown in Table 1 in the Appendix). The standardized differences of the matched data were approaching zero and the Variation ratios were approaching 1 which is considered a sign of covariate balance (Austin, 2011).

Secondly, the overlap condition was verified, and a common support of the treatment group was identified. Figures 2 and 3 show the overlap condition where the observations in the treated group and untreated groups were plotted given their corresponding propensity score. The existence of common support is seen by the overlapping of the two curves in Figure 2 and in Figure 3 where the propensity score histogram shows the existence of observations in the treated and untreated groups with similar propensity scores.

**Figure 2. Propensity Distribution Graph:**
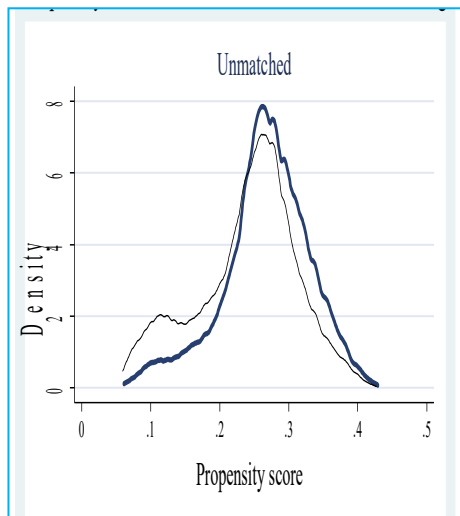
**Figure 3. Histogram graph:**
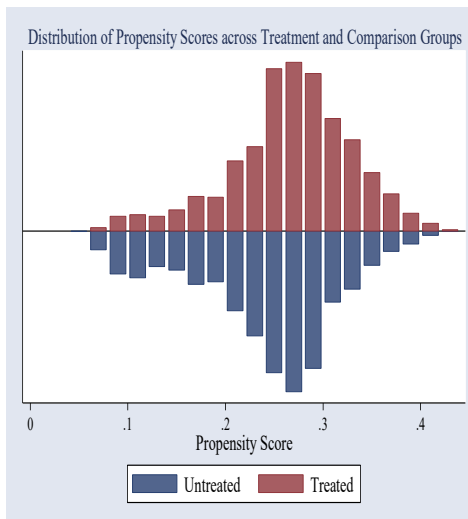


*Source: Author's own calculation using IHS4 dataset and STATA program.*

The results of the propensity score matching analysis are shown in table 3 below.


**Table 3: Results on Propensity Score Matching**

| Log of Consumption Per Capita | Coefficient | P-Value |
|---|---|---|
| Average Treatment Effect on Treated | | |
| Access to Credit | 0.105*** (0.013) | 0.000 |
| Number of Observations | 12447 | |

*Source: Author's own calculation using IHS4 dataset.*

The estimated Average Treatment Effect on the Treated (ATET) was 0.105 with a standard error of 0.023 and this result was statistically significant. This means that access to credit on average increases the consumption per capita of those that have access to it by 10.5%. Thus, implying a positive impact of access to credit on welfare.

**The Impact of Access to Credit on Welfare Inequality**

The main objective of this study was to examine the impact access to credit has on welfare inequality among Malawian households. To access the impact of access to credit on welfare inequality the Generalized Lorenz curve as

well as the Theil Indexes and the Gini coefficient were used. Finally, the decomposition of the Theil Indexes was used to examine whether the disparities in welfare were access to credit driven (between-group dominated Inequality) or due to other factors unrelated to access to credit (within group dominated inequality).

**Figure 1. The Generalized Lorenz Curve for people with access to credit and people without:**



Cumulative share of people(poorest to richest)

Source: Author's own calculation using IHS4 dataset and STATA program.
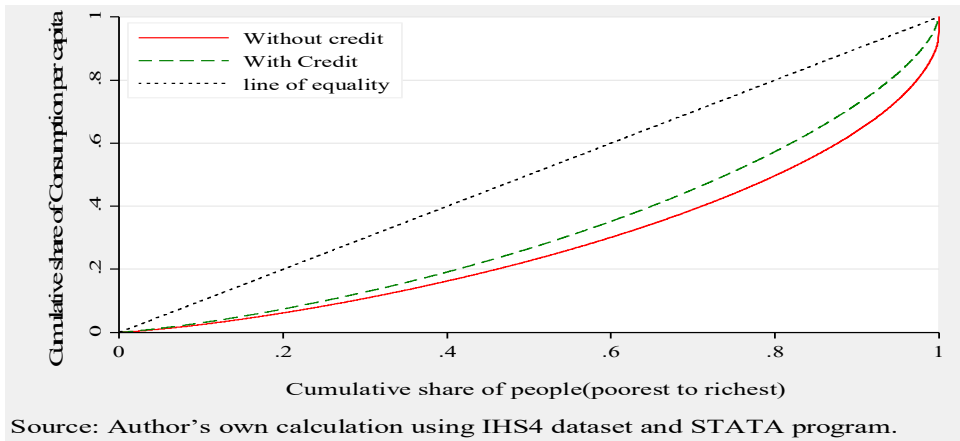
Figure 3 above depicts the Generalized Lorenz curve for those that had access to credit and those that did not along with the line of equality. The curve shows a gap between the line of equality and the Lorenz curves of those that have access to credit and those that do not. Both Lorenz curves lie below the equality depicting that the rich have much larger consumption shares than the poor, however inequality is more prominent among the households that did not access credit. This is shown by the Lorenz curve of those that accessed credit being much closer to the equality line. Thus, implying that access to credit places people much closer to a state of equality.

To further assess the viability of the implications made above, Theil Indexes were computed and compared among the two groups. Table 4 below presents the Theil indexes and the Gini index of households with and without credit.

**Table 4. Theil Indexes and The Gini Coefficient**

| Observations | Theil's L Index | Theil's T Index | Gini |
|---|---|---|---|
| With Credit | 0.204 | 0.226 | 0.351 |
| Without Credit | 0.327 | 0.602 | 0.435 |

*Source: Author's own calculation using IHS4 dataset.*

The results show that the Gini coefficient and Theil indexes are much higher among households that do not have access to credit. This implies that inequality is much higher among households that do not access credit which is consistent with the results shown by the generalized Lorenz curve.

However, the decomposition of these indices as shown in Table 5 indicate that access to credit only has a minor influence on intra-household welfare disparities. About 99% of these disparities are explained by within group (or unrelated to access to credit) factors.

**Table 5. Decomposition of Thiel's Index**

| Variables | Theil's L Index | % | Theil's T Index | % |
|---|---|---|---|---|
| Between-Group Inequality | 0.00145 | 0.49 | 0.0015 | 0.29 |
| Within-Group Inequality | 0.297 | 99.51 | 0.501 | 99.71 |
| Total | 0.29845 | 100 | 0.502 | 100 |

*Source: Author's own calculation using IHS4 dataset.*

## 5. Conclusion

The main aim of the study was to assess the impact that access to credit has on welfare inequality among Malawian households by using data from the Malawi's Integrated Household Survey that was compiled by the National Statistics Office in Malawi. This study added on to existing literature by assessing the direct impact that access to credit has on welfare inequality which was not the central focus for most studies done around in Malawi. Since welfare can be measured in many ways, consumption per capita was opted for as a proxy due to literature referring it as good measure of welfare (Attanasio and Pistaferri, 2016). Similarly, this study was done at a household level (which is why aggregate consumption was not used). To further understand the relationship between access to credit and welfare inequality, the impact of access to credit on welfare was also assessed (this was the first specific objective of the study) and propensity score analysis was employed in accordance with literature as a more feasible tool to obtain more valid results (Angrist, 2008). On the other hand, the Generalized Lorenz curve, Theil's Indexes as well as the Gini coefficient were used to assess the disparities in found in welfare.

The results were based on two objectives and hypothesis which were access to credit has no impact on consumption per capita and that disparities in consumption per capita do not exist between those that access credit and those that do not. Hence, it would imply that the relationship between access to credit and welfare inequality does not exist. However, the results based on the analysis of the first objective showed that there exists a positive relationship between access to credit and consumption per capita. Thus, it is implied that accessing credit improves a household's welfare.

The results on the second objective showed that consumption inequality was much higher among those that did not access credit than it was for those that did when the Generalized Lorenz curve, Theil's indexes and the Gini coefficient were considered. However, the decomposition of the Theil's indexes revealed that factors unrelated to access to credit had a stronger effect on the inter-household inequalities than access to credit. Consequently, this implied that welfare inequality is much higher for those that do not access credit and those that do experience lower levels of inequality, though the extent of its influence is quite low. In all, the results from the two specific objectives imply that the impact that access to credit has on welfare inequality, as the main objective of the study, is a positive one but its effect is substantially small. Thus, households with access to credit will experience

higher levels of welfare and the differences in welfare among them is also much smaller than if they do not have access to credit.

Overall, these results are similar to other studies findings such as Adebowale and Dimova (2017) and Sebu (2017) which also suggested a positive impact of access to credit on welfare inequality. These studies argued that such an outcome was the result of households' improvement in welfare, where those who access credit were able to consume more products to an increase of income. However, other studies have presented a negative outcome on welfare inequality. Particularly, Kling et al., (2020) outlined that access to credit worsens welfare inequality among households. And Delis et al., (2021) suggested that this negative outcome is a result of the costs attached to credit acquisition that leave an individual worse off after loan repayment. This was the case in the study done by Diagne and Zeller (2001) as discussed in the earlier chapters as one of the reasons why Malawians household became even poorer after accessing credit.

### Policy Implications

Since the results show that those that have access to credit experience lower levels of welfare inequality it means, Malawi's policies aimed at enhancing financial inclusion inclusive of different types of loans that best suit household's demands should continue to be a priority. Simultaneously, a more holistic approach on reducing inequality or poverty should be included at both household level and a national level in the country. When developing policies aimed at combating poverty and inequality through the use credit in Malawi, factors unrelated to access to credit must also be put into account and its influence examined.

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## APPENDIX

## COVARIATE-BALANCE SUMMARY STATISTICS

### Table 1. Covariate Balance Summary

|  | Raw | Matched |
|---|---|---|
| Number of Observations | 12,447 | 6,124 |
| Treated Observations | 3,062 | 3,062 |
| Control Observations | 9,385 | 3,062 |

### Table 2. Standardized Differences and Variance Ratio

|  | Standardized Differences | | Variance Ratio | |
|---|---|---|---|---|
|  | Raw | Matched | Raw | Matched |
| Log of Household Size | 0.22 | -0.00 | 0.83 | 1.08 |
| Central Region | 0.03 | -0.01 | 1.02 | 0.99 |
| Southern Region | -0.06 | -0.03 | 0.99 | 0.99 |
| Rural | -0.16 | -0.05 | 1.28 | 1.07 |
| Male | 0.11 | -0.06 | 0.89 | 1.07 |
| Marital Status | 0.14 | -0.07 | 0.87 | 1.09 |
| Education Status | 0.19 | 0.01 | 1.13 | 1.01 |
| Employment Status | 0.10 | 0.02 | 1.19 | 1.03 |
| Age Group 1: 16-24 Years | 0.12 | -0.03 | 1.13 | 0.98 |
| Age Group 2: 24-34 Years | 0.12 | -0.02 | 1.14 | 0.98 |
| Age Group 3: 35-44 Years | 0.02 | 0.04 | 1.03 | 1.08 |
| Age Group 4: 45-54 Years | -0.09 | 0.02 | 0.79 | 1.07 |
| Age Group 5: 55-64 Years | -0.19 | 0.03 | 0.50 | 1.13 |
| Age Group 6: 65-74 Years | -0.21 | 0.00 | 0.36 | 1.01 |

# AN EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN CAPITAL, MARKET RISKS, AND LIQUIDITY SHOCKS IN THE BANKING INDUSTRY

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**Abstract:** This study explores the relation between capital, market risks and banks' liquidity conditions. In estimating the SVAR regression model, Granger causality, impulse-response functions and forecast error variance decomposition were employed and used for estimation of the results. The data sample comprised of commercial banks over the 2009 to 2018 period. The empirical results showed that liquidity shocks are caused by a combination of structural shocks. The Granger causality, impulse-response functions and forecast error variance decomposition documented that sensitivity to market risk is the key factor affecting liquidity conditions in the banking sector in the long run. In addition, the empirical results showed that capital adequacy has minimal impact on liquidity conditions in the short run. The reforming rate to sensitivity to market risk policies, capital adequacy policies and liquidity policy measures can be valuable policy tools to minimize liquidity shortages and avoid insolvent banks.

**JEL classification:** C40, C52, E51, E58, G32;
**Keywords:** capital; market risks; liquidity shocks; banking industry; financial stability

## 1. Introduction

The global financial crisis of 2007-2008 was characterized by a lack of liquidity in banks and other financial institutions, which led to the bailout and closure of several financial institutions around the world (Nicolò, 2016). In banking, liquidity is the capability of banks to meet obligations and unexpected demand withdrawals from depositors (Vousinas, 2018). Financial analysts consider the provision of liquidity as a central function of banks and also as an essential element of the functioning of the economy as a whole. Karri, Meghani and Mishra

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(2015) pointed out that liquidity is essential for any institution working with money. Financial regulation and liquidity risk management are critical to financial stability of any economy. The fundamental role of banks in the maturity transformation of short-term deposits into long-term loans makes banks inherently vulnerable to liquidity risks both of an institution-specific nature and those which affect markets in general (BCBS, 2008). Banks are intermediaries between those aiming to save their money and those aiming to borrow from other banks. The rationale for intermediation between savers and borrowers is necessitated by different needs in terms of liquidity, maturity and yield. In playing this intermediary role, the banks are exposed to maturity transformation risks such as bank loans arising from the maturity mismatch of assets and liabilities as discussed by Bonfim and Kim (2017). The maturity transformation risk refers to a situation in which banks are unable to meet the obligations and unexpected withdrawals from depositors (Angora and Roulet, 2011). As a result, banks are inherently exposed to maturity transformation risks which derive from a maturity mismatch of assets and liabilities from a balance sheet. Thus, banks are fully located in maturity transformation and risk management (Hartlage 2013), while regulators ensure the safety and soundness of the banking system and maintain confidence and economic prosperity.

Capital adequacy within financial institutions is a crucial element and that determine banking operations and stability in terms of the available capital in the banks. Considering other previous works conducted by Hossain, Khan and Sadique (2018:10), Casu, Pietro and Trujillo-Ponce (2017:19), Distinguin, Roulet and Tarazi (2013:20); Horvath, Seidler, and Weill (2014:17) and Kapan and Minoiu (2017:15); Hossain *et al.* (2018:10) they have documented relationship between capital and liquidity conditions. For example, Horvath *et al.* (2014:17) found that higher capital ratio such as Tier 1 leads to deterioration of liquidity conditions of banks.

The 2007-09 global financial crisis exposed inadequate supervision, lack of sufficient capital reserves and insufficient liquidity buffers which appeared to have led to systemic risks to the banking systems in other parts of the world. Varotto (2011), Vermorken and Vermorken (2011), Giustiniani and Thornton (2011) cite the above-mentioned factors as the root causes of the crisis. The works of Casu et al. (2017:20), and Banti and Phylaktis (2019:86) also documented the relationship between market systemic risks and banks' liquidity conditions. Prior works by Le (2017:4) also established the relationship between interest rates, exchange rates and prices against the liquidity conditions of banks.

The remainder of this article is organized as follows. Section 2 provides a review of the literature on the relationships between capital, market risks and banks' liquidity conditions. Section 3 describes the methodology and structural VAR model for liquidity shocks in Namibia. Section 4 presents results and discusses robustness checks. Section 5 provides conclusions.

## 2. Literature review

The International Monetary Fund (2018:7) conducted Namibia's financial system stability assessment and arrived at sentiments that commercial banks faced liquidity shortages over time and they obtained funds from wholesale funding to provide loans to needy borrowers. Based on the available literature, there are limited studies that have attempted to identify the liquidity shocks in Namibia.

However, the knowledge gap has been persisting in this area of study which thus necessitated the present study to uncover the liquidity shocks in the Namibian context. It is against this backdrop that the present study sought to contribute to the liquidity management body of knowledge by identifying and establishing the liquidity shocks not only in Namibia but also for rest of the world. This study is vital for banking institutions, regulatory bodies and the economy as a whole since it focuses on liquidity risks which affect banking performances that could lead to bank failure. Besides, contributing to the body of knowledge, this research paper offers insights to bank managers in preventing liquidity risks.

Numerous studies have used the CAMELS approach in analyzing the performance of banking institutions over time. The Uniform Financial Institution Rating system which is referred to by the acronym CAMELS represents six components in evaluating the banks' conditions and these are capital adequacy, asset quality, management efficiency, earnings quality, liquidity, and sensitivity to market risks. The focus of this paper was to study the relationship between capital adequacy, sensitivity to market risks and banks' liquidity conditions.

Capital is one of the vital factors that determine banking operations and stability in terms of the available capital in the banks. Capital adequacy refers to the availability of capital from a bank to cover unexpected losses and to avoid reductions in asset value which could cause a banking institution's failure, and the banks' ability to satisfy depositors if they require their investments (Rena, 2006; Venkatesh and Suresh, 2014). Baek, Balasubramanian and Lee (2015) scrutinized US commercial banks from 2000 to 2013 covering the subprime crisis using quarterly data between failed and non-failed banks. The study used Tier 1 risk-based capital ratio and that revealed that Tier 1 capital ratio is a useful indicator and it is significant for detecting the bank's financial distress. Tier 1 refers to core capital which comprises common stock and surplus, undivided profits (retained earnings), qualifying non-cumulative perpetual preferred stock, minority interest in the equity accounts of consolidated subsidiaries, and selected identifiable intangible assets less goodwill and other intangible assets (Rose and Hudgins 2008).

Venkatesh and Suresh (2014) undertook a study on Bahrain banks for the period spanning from 2006 to 2012 comprising four banks. The study revealed that the Tier1 capital ratio was low which is associated with a bank's financial distress. This result was also demonstrated in the study of Kandrac (2014), who found that it would be better to enter the crisis with a higher Tier 1 capital ratio to absorb unanticipated losses with enough margins to enable the bank to continue as a going concern. Thus, the results suggest the significance of Tier 1 capital in detecting the likelihood of a bank's financial distress. Consequently, higher capital ratios (Tier 1) and lower liquidity creation lead to illiquidity amongst banks. This was supported by the works of Hossain *et al.* (2018:9), Casu, Pietro and Trujillo-Ponce (2017), Distinguin *et al.* (2013), Horvath, Seidler and Weill (2014), and Kapan and Minoiu (2017) who studied the influence of Tier 1 on the liquidity conditions of banks. In this view, the findings established the influence of capital adequacy on the liquidity conditions of a bank which lead to liquidity shocks and financial distress in the long run.

Sensitivity to market risk refers to the ability of a bank to identify, monitor, manage and control market risks that may impact the income (Tripathi, Meghani and Mahajan, 2014; Karri, Meghani and Mishra, 2015). It is used to measure the

market risks that are associated with the movement of prices such as interest rates, foreign exchange rates, commodity prices and equity prices on how they impact the income of a bank (Le, 2017). Venkatesh and Suresh (2014) stress that sensitivity to market risk looks at how the banks react to risks that adversely affect earnings and are derived from the movement of prices in terms of interest rate, commodity prices, equity prices, and currency rates.

Le (2017) undertook a study on Vietnamese banks over the 2008 to 2013 period, using the rate-sensitive assets to measure their sensitivity to market risks. The results revealed that rate-sensitive assets are significant in detecting the likelihood of bank financial shocks by differentiating between best and worst-performing banks. In addition, the works of Casu *et al.* (2017), and Rena, 2006 and Banti and Phylaktis (2019) also documented the effects of interest rates on the liquidity conditions of banks. Casu *et al.* (2017) found that an increase in interest rate can affect bank income and liquidity creation. Banti *et al.* (2019) found that any changes to repo rates lead to tightened liquidity conditions in banks and that contributes to the increase in house prices.

## 3. Methodology

The data was sourced from the Bank of Namibia and the Namibia Statistics Agency (NSA). The data sources were existing banks' balance sheets used to identify the relation between capital, sensitivity to market risks and banks' liquidity conditions in Namibia. Bank's financial data including balance sheets were taken from the Bank of Namibia, whilst economic performance data were taken from NSA. The sample period spans from 2009 to 2018, using quarterly data from the Namibian commercial banks. The study period covered the most recent financial crisis which took place in 2007-08 that was caused by the shortage of liquidity among other root causes.

We collected data related to financial variables that were used mostly for measuring capital adequacy, sensitivity to market risks and liquidity conditions. Most empirical studies (e.g. Sinkey, 1975, Altman, 1977, Martin, 1977, Demirguc-Kunt, 1989, Angora and Roulett, 2011, Distinguin, Roulet and Tarazi, 2013; Horvath, Seidler and Weill, 2014; and Kapan *et al.*, 2017) found these variables useful and statistically significant in identifying financial shocks.

As regard to the capital adequacy, the study proxy Tier 1 capital ratio (Tier 1 RWCR), which measures the total equity to total assets (Hossain *et al.* 2018)? Tier 1 capital ratio is a key indicator of capital adequacy within banks which is used by regulatory bodies in many parts of the world and recommended by the Basel Committee on Banking Supervision. Accordingly, banks with higher capital adequacy and profitability are likely to survive (Cole and Wu, 2014, Papanikolaou, 2017). Prior works by Casu *et al.* (2017); Horvath *et al.* (2014); Kapan *et al.* (2017) find a strong relationship between Tier 1 RWCR and liquidity conditions that could lead to liquidity shocks.

As regard to the sensitivity to market risk, the study proxies the rate-sensitive assets and rate-sensitive liabilities to total assets. The rate-sensitivity asset refers to assets or liability which is "repriced at or near the current market interest rates within a maturity bucket" (Saunders *et al.*, 2017:205). Accordingly, change in currency value and cumulative gaps adversely affect bank income (Saunders *et al.*,

2017:205 and Le, 2017:7). Prior studies find a positive correlation between bank income and liquidity conditions (Ghurtskaia and Lemonjava, 2016:1611; Pradhan and Shrestha, 2016:7). The results are assumed to be affected by interest rates, foreign exchange rates and prices and that could be one of the sources of liquidity shocks in banks.

In addition to the above mentioned variables, we add other explanatory variables as part of the control variables. From a literature perspective, bank size came into consideration as a result of the argument that is too big to fail. The natural logarithm of total bank assets less loan loss reserve (LNTA) is a proxy of the bank size and capital adequacy. A positive signal is the indication of a bank's probability of default (Angora *et al.* 2011). In addition, numerous researchers argued that an economic downturn is also an important factor when studying bank liquidity shortages and financial distress. For example, when a country is experiencing an economic downturn, it could lead to the deterioration of banks' loans and losses (Angora *et al.* 2011).

The annual growth rate of real Gross Domestic Product (GDP) is a proxy of the macroeconomic conditions of a country which determine bank liquidity shortages and financial distress. A negative signal determines the bank liquidity risk and financial distress. Lastly, the higher demand for liquidity from the interbank market is also taken into consideration for liquidity shortages and subsequently financial distress. For example, the shortage of liquidity from the interbank is likely to affect banking daily operations (Angora *et al.* 2011; Bonfim *et al.* 2017). The Spread of the one-month Interbank rate and the Central Bank policy Rate (SIB_CDR) are proxies of the demand for liquidity from the interbank market. The higher value of the spread of the one-month interbank rate and the central bank policy rate is likely to affect the bank in terms of accessing the liquidity from the interbank. A positive signal determines the bank's financial distress. In data analysis, all variables have been converted into natural logs except for GPD and SIB_CDR due to their lower values against the other ratios.

### *Econometric model*

The study adopted the structural vector autoregressive (SVAR) to identify the relation between capital adequacy, sensitivity to market risks and banks' liquidity conditions. A large body of empirical literature considered SVAR as a result of its appropriateness to display the interactions between sets of macroeconomic variables using panel data. With the help of Granger causality, impulse response functions and variance decompositions part of SVAR, the structural shocks to liquidity conditions were identified and established. The focal area was the liquidity conditions of banks caused by other macroeconomic variables.

The SVAR model used is as following:

$$L_{it} + a_T T_t = B_L + B_{LT1}T_{it-1} + B_{LT2}T_{it-2} + B_{LL1}L_{it-1} + B_{LL2}L_{it-2} + C_L GDP_{it} + e_L$$
$$a_L L_{it} + T_{it} = B_T + B_{TT1}T_{it-1} + B_{TT2}T_{it-2} + B_{TL1}L_{it-1} + B_{TL2}L_{it-2} + C_T GDP_{it} + e_{T...3.1}$$

$L_{it}$ = Current level of Liquidity conditions

$T_{it}$ = Current level of T

$T_{it-1} = T$ lagged once

$T_{it-2}$ = T lagged twice (T- test varience)

$L_{it-1}$ = L lagged once

$L_{it-2} = L$ lagged twice

$GDP_{it}$ = current level of GDP

$e_T$ = white noise error term with zero mean and constant variance.

$B_L$ = slope parameter for equation [1] variance intercept

$B_T$ = vertical intercept for equation [2]

The Granger causality test provides causation links between variable in determining which variables are truly exogenous that can be used for data analysis (Amisano and Giannini, 1997; Gottschalk, 2001). The Granger causality tool is a hypothesis that evaluates the usefulness one variable on forecasting another variable (Wei, 2013). The Granger causality test has been used to establish causality between bank capital adequacy (Tier 1 Risk-Weighted Capital Ratio (RWCR), asset quality or Non-Performing Loans (NPL) and earnings quality which means Return on Assets (ROA) against liquidity conditions in Namibia.

The impulse response functions are a tool that displays the response of each variable to structural shocks derived from economic time series (Barnichon and Brownless, 2018). The impulse response functions were proposed by Sims (1980), they show the patterns of movement of variable over time. Yu, Ju'e and Youmin (2008) point out that impulse response function is a useful tool in showing the direction of an endogenous variable in identifying the shocks. The impulse function has been used to trace the response of liquidity conditions against bank capital adequacy (Tier 1 RWCR), asset quality (NPL) and earnings quality (ROA).

In relation to impulse response function, forecast error variance decomposition provides complementary analysis by identifying which variable contributes mostly in causing the shocks (Lanzarotti cited by Amisano, 1997). The variance decomposition displays the disparity of an endogenous variable in causing the shocks. For example, which of these bank capital adequacy (Tier 1 RWCR), asset quality (NPL) and earnings quality (ROA) is contributing mostly shocks to the liquidity conditions in Namibia.

## 4. Results and Discussion

In this paper, we identify the relationship between capital adequacy, sensitivity to market risks and banks' liquidity conditions for the period 2009 to 2018. We test the relationships between capital adequacy and sensitivity to market risks against the liquidity conditions of banks. Thus, we estimate a Structural VAR model by relating capital adequacy and sensitivity to market risks against liquidity ratios, namely, total loans to total customer deposit ratio (LO_DEPO), Natural Logarithm of Total Bank Assets (LNTA), Rate Sensitivity to Assets and Liabilities (RSA_RSL) and total loans to total assets ratio (LO_TA). Firstly, we display descriptive statistics of the variables used in the SVAR model. Descriptive statistics

attempt to describe the main characteristics of data used in this study. The descriptive statistics were measured as mean, median, maximum, minimum and standard deviation.

**Table 1: Descriptive statistics**

| Variables | Mean | Median | Max | Min | Std Dev | Observations |
|-----------|------|--------|-----|-----|---------|--------------|
| TIER1 RWCR | 12 | 12 | 16 | 8 | 2 | 185 |
| LO_TA | 74 | 74 | 87 | 17 | 9 | 188 |
| LO_DEPO | 90 | 89 | 158 | 66 | 12 | 188 |
| RSA_RSL | 98 | 97 | 184 | 74 | 17 | 188 |
| GDP | 3.6 | 4.3 | 15.34 | -6.09 | 4.97 | 156 |
| LNTA | 16.66 | 16.67 | 17.5 | 15.57 | 0.48 | 144 |
| SIBR_CDR | 0 | 0 | 0 | -1 | 1 | 124 |

*Source: Authors' own construction*

The Tier 1 capital has a mean value of 12 with a standard deviation of 2 and a minimum and maximum value of 8 and 16 respectively. The results suggest that banks are profitable and adequately capitalised by scoring higher percentages over 8% required. The LO_TA ratio indicates an average value of 74 which is close to the 75 per cent statutory minimum requirement. The standard deviation stood at 9 while the minimum and maximum is 17 and 87 respectively. The average LO_DEPO reported for sampled banks is 90, while the standard deviation stood at 12 values. On the other hand, minimum and maximum values are 66 and 158 respectively. The RSA_RSL shows an average value of 98 with a standard deviation of 17. On the other hand, the minimum and maximum values are 74 and 184 respectively. The GPD has a mean value of 3.6 with a standard deviation standing at 4.97, whilst minimum and maximum values of -6.09 and 15.34 respectively. Considering LNTA, on average, the mean value stands at 16.66 while the standard deviation is at 0.48 values. However, the reported minimum and maximum are 15.57 and 17.5 respectively. Lastly, the Spread of the one-month interbank rate and the Central Bank policy Rate (SIB_CDR) variable has an average value of 0 during the sample period. Therefore it is not statistically significant. The minimum and maximum values are -1 and 0 respectively. The reported standard deviation value is 1%, which implies that there is small dispersion in terms of interbank rates over the sample period.

Considering the Granger causality between LO_DEPO and other CAMELS variables, Tier1 RWCR is Granger causing the liquidity variable at a 6% level of significance. This implies that the causality between Tier1 RWCR and LO_DEPO is weak. Further to this, NPL accounts for about 21% of Granger causality towards liquidity variables. This means that there is no causality between NPL and LO_DEPO. The ROA is Granger causing the liquidity variable at a 73% level of significance. This means that there is no causality between income and liquidity. Finally, RSA_RSL account for about 11% level of significance of Granger causality. This means that there is no causality between RSA_RSL and LO_DEPO. This

indicates that it is only Tier 1 RWCR that has minimal Granger causality with LO_DEPO (see Appendix 1).

Considering impulse responses, Panel (a) in Figure 1, displays that LO_DEPOs positively respond to the availability of liquidity impulses. Thus, availability liquidity shocks affect the liquidity conditions in Namibia. The Panel (b) displays that LO_DEPOs positively respond to capital requirements impulses at an early stage and then afterwards respond negatively for the remainder of the study period. The results suggest that Tier 1 RWCR significantly lower liquidity in banks in the long run. Finally, Panel (c) displays that LO_DEPOs respond positively to rate sensitivity assets and liabilities in the first 3 years and then remain closed to zero or borderline. The performance demonstrated that the relationship is weak. Overall, all ratios have effects on the liquidity conditions in Namibia.

### Fig. 1: Response of LO_DEPO to other CAMELS indicators

Response to Generalized One S.D. Innovations ± 2 S.E.

(a) Response of LNLO_DEPO to LNLO_DEPO

(b) Response of LNLO_DEPO to LNTIER1RWCR



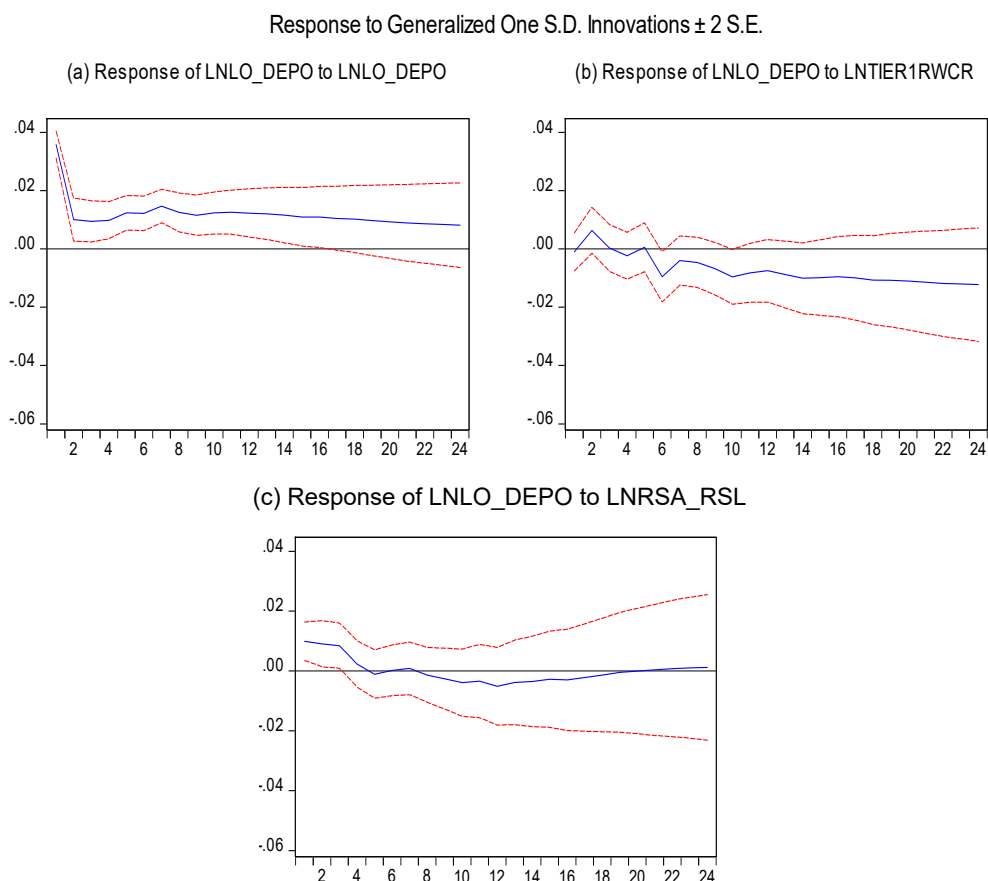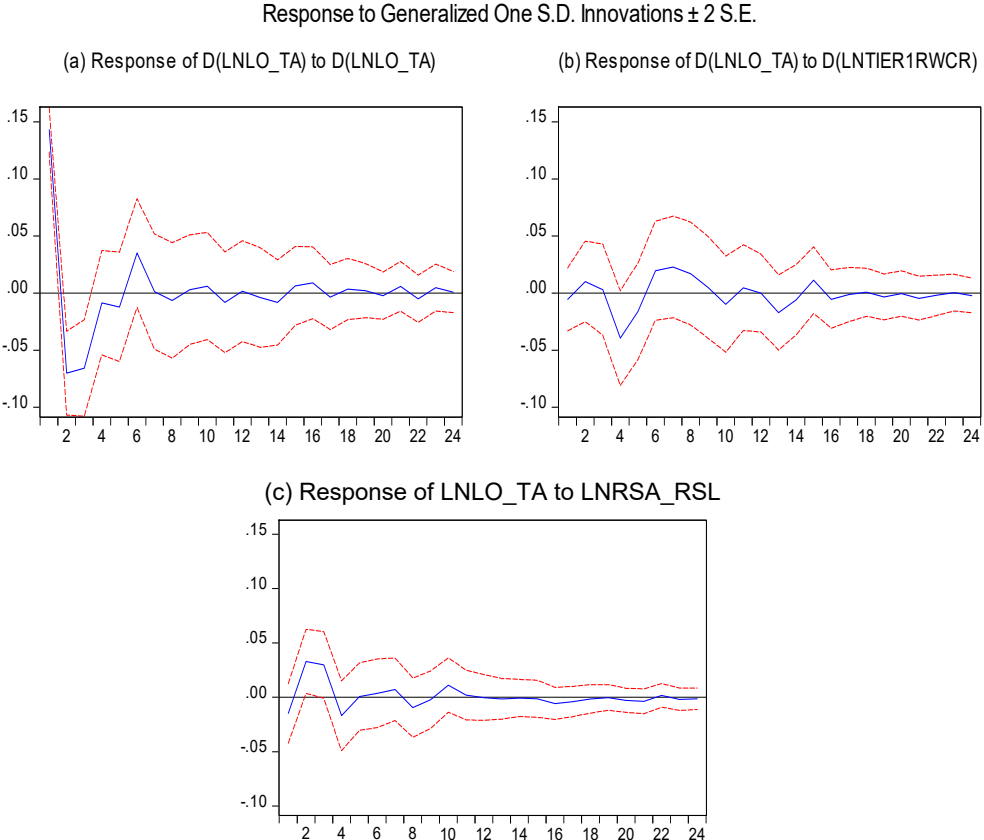(c) Response of LNLO_DEPO to LNRSA_RSL



Table 2 displays the importance of Tier1 RWCR, NPL, ROA and RSA_RSL on the forecast error variance of liquidity conditions. Accordingly, Tier 1 RWCR shocks are the most important factor in the forecast error variance of liquidity conditions.

Tier 1 RWCR shocks increase from 0% to 11% over the period. In contrast, RSA_RSL shocks have the least important impact on the forecast error variance of liquidity conditions. Thus, Tier 1 RWCR shocks have the most important impact on the forecast error variance of liquidity conditions. Again, the SVAR Model is efficient and the results can reliable.

Considering the Granger causality between LO_DEPO and other CAMELS variables, Tier1 RWCR is Granger causing the liquidity variable at a 6% level of significance. This implies that the causality between Tier1 RWCR and LO_DEPO is weak. Furthermore, RSA_RSL account for about 11% level of significance of Granger causality. This means that there is no causality between RSA_RSL and LO_DEPO. This indicates that it is only Tier 1 RWCR that has minimal Granger causality with LO_DEPO (see Appendix 1).

### Fig. 2: Response of LO_TA to other CAMELS indicators

Response to Generalized One S.D. Innovations ± 2 S.E.

(a) Response of D(LNLO_TA) to D(LNLO_TA)

(b) Response of D(LNLO_TA) to D(LNTIER1RWCR)



(c) Response of LNLO_TA to LNRSA_RSL



Considering impulse responses, the Panel (a) in Figure 2, displays that LO_DEPOs positively respond to the availability of liquidity impulses. Thus, availability liquidity shocks affect the liquidity conditions in Namibia. The Panel (b) displays that LO_DEPOs positively respond to capital requirements impulses at an early

stage and then afterwards respond negatively for the remainder of the study period. The results suggest that Tier 1 RWCR significantly lowers liquidity in banks in the long run. Finally, Panel (e) displays that LO_DEPOs respond positively to rate sensitivity assets and liabilities in the first 3 years and then remain closed to zero or borderline. The performance demonstrated that the relationship is weak. Overall, all ratios have effects on liquidity conditions in Namibia.

Considering the forecast error variance of liquidity conditions, Tier 1 RWCR shocks are the most important factor in the forecast error variance of liquidity conditions. Tier 1 RWCR shocks increase from 0% to 11% over the study period. In contrast, RSA_RSL shocks have the least important impact on the forecast error variance of liquidity conditions. Thus, Tier 1 RWCR shocks have the most important impact on the forecast error variance of liquidity conditions. Again, the SVAR Model is efficient and the results can reliable.

In this section, the study reveals the robustness checks concerning the efficiency of the SVAR model and liquidity shocks. The summarised statistics are derived from LO_DEPO and LO_TA ratios. Considering the residual normality test of LO_DEPO results, the results suggest that the residuals from the SVAR model are normally distributed or asymptotically normally distributed. In addition, the results also indicated that LO_TA are also normally distributed.

**Table 3: LO_DEPO normality test**

| Component | Jarque-Bera | df | Prob. |
|---|---|---|---|
| 1 | 4.124284 | 2 | 0.1272 |
| 2 | 2.151541 | 2 | 0.341 |
| 3 | 0.776663 | 2 | 0.6782 |
| 4 | 0.322413 | 2 | 0.8511 |
| 5 | 6384.244 | 2 | 0 |

*Source: Authors' Own calculation from E-views 8*

Focusing on autocorrelation, both LO_DEPO and LO_TA results imply that they are free from autocorrelation (see Appendix 2). Additionally, the inverse roots of AR characteristics polynomial for showing stability, indicates that characteristics roots lie within the circle and concludes that the parameters used in the SVAR model are stable (see Appendix 3). Focusing on the heteroscedasticity test, the results imply that the residuals from the model are homoscedastic (see Appendix 4).

**Table 4: LO_TA normality test**

| Component | Jarque-Bera | df | Prob. |
|---|---|---|---|
| 1 | 721.3787 | 2 | 0 |
| 2 | 2.820746 | 2 | 0.2441 |
| 3 | 1.696334 | 2 | 0.4282 |
| 4 | 0.844069 | 2 | 0.6557 |
| 5 | 3805.11 | 2 | 0 |

*Source: Authors' own calculation from E-views 8*

The diagnostic tests from the SVAR model show that the errors from the model are normally distributed. Furthermore, the tests show that the results do not suffer from autocorrelation. In addition, the tests are not suffering from heteroscedasticity and also that there is no parameter instability. Overall, the results obtained are reliable and valid for this study.

## 5. Conclusion

The results revealed that sensitivity to market risk (RSA_RSL) is the most important sources of liquidity shocks. The RSA_RSL demonstrated a strong relationship with LO_TA, which caused liquidity shocks. The empirical literature findings revealed that an increase in the spread between the one-month interbank rate and the policy rate of the regulatory bodies leads to illiquid in the banking system (Distinguin, Roulet and Tarazi, 2013:21; Casu, Pietro and Trujillo-Ponce, 2017:20; and Banti and Phylaktis, 2019:86). The market risks are associated with the fluctuation of interest rate, foreign exchange rates and prices. These results raised concerns for bank managers and regulatory institutions to monitor the movement of interest rates and ensure that banks are coping with set interest rates. The results show that capital adequacy (Tier 1 RWCR) is the least source of liquidity shocks. The Tier 1 RWCR demonstrated a relationship with LO_DEPO, which could cause liquidity shocks. The empirical literature findings also revealed that higher capital ratios lower liquidity creation and lead to illiquidity amongst banks (Hossain et al. 2018:9; Casu et al. 2017:19; Distinguin et al. 2013:20; Horvath et al. 2014:17; and Kapan et al. 2017:15). These results raised some important concerns for bank managers and regulatory institutions to monitor capital adequacy and ensure that banks are within the required capital on their books.

The empirical results reveal robust implications for financial policy and other related financial regulations. The effects of sensitivity to market risk (RSA_RSL) on liquidity shocks will be a wakeup call for macroeconomic policy design. Again, considerable efforts should be placed on current financial regulations derived from Basel III. The findings shed a light on the importance to investigate why commercial banks are exposed to market risks, thus led to liquidity shocks in the long run. The findings provide strong policy implications for sensitivity to market risk such as fluctuation of interest rate, currency and prices and so on. The findings are in line with empirical literature, for example, that fluctuation of interest rate, currency and prices lead to illiquid in the banking system (Distinguin *et al.* 2013:21; Casu *et al*. 2017:20; and Banti *et al.* 2019:86). The findings of this study call for a strong policy implications both for the banks and regulatory institutions (Central Bank), which may protect banks against unfavourable conditions and market risks. Lastly, capital adequacy (Tier 1 RWCR) also plays a role in influencing shocks in the short run. The findings provide strong evidence of the relationship with liquidity conditions of banks in the short run. The findings are consistent with empirical literature that higher capital ratios lower liquidity creation can lead to illiquidity amongst banks (Hossain et al. 2018:9; Casu et al. 2017:19; Distinguin et al. 2013:20; Horvath et al. 2014:17; and Kapan et al. 2017:15). This paper propose the liquidity measures as part of the Basel III that may strengthen the liquidity conditions of the banks.

**Appendix: 1 Variance decomposition of LO_DEPO**

| Period | S.E. | LNLO_DEPO | LNTIER1RWCR | LNRSA_RSL |
|---|---|---|---|---|
| 1 | 0.035789 | 100.0000 | 0.000000 | 0.000000 |
| 2 | 0.038340 | 93.93917 | 3.011774 | 2.589726 |
| 3 | 0.040131 | 91.24699 | 2.764608 | 4.912446 |
| 4 | 0.041656 | 90.22019 | 2.825410 | 4.578429 |
| 5 | 0.044129 | 88.16727 | 2.560885 | 4.924219 |
| 6 | 0.046992 | 84.47720 | 6.106959 | 4.595984 |
| 7 | 0.050591 | 81.27836 | 5.773490 | 4.129495 |
| 8 | 0.053281 | 78.77999 | 5.863125 | 4.221530 |
| 9 | 0.056263 | 74.83727 | 6.572736 | 4.392866 |
| 10 | 0.059720 | 70.66541 | 8.240098 | 4.843653 |
| 11 | 0.063576 | 66.26800 | 8.813684 | 4.920396 |
| 12 | 0.067814 | 61.52817 | 8.861746 | 5.262102 |
| 13 | 0.071955 | 57.44767 | 9.256505 | 5.158175 |
| 14 | 0.076177 | 53.55874 | 9.892820 | 4.921565 |
| 15 | 0.080318 | 50.04169 | 10.31680 | 4.590314 |
| 16 | 0.084841 | 46.50335 | 10.43395 | 4.258862 |
| 17 | 0.089173 | 43.47391 | 10.60811 | 3.915893 |
| 18 | 0.093647 | 40.60691 | 10.86186 | 3.563490 |
| 19 | 0.098077 | 38.00032 | 11.04102 | 3.249024 |
| 20 | 0.102621 | 35.53066 | 11.17941 | 2.974523 |
| 21 | 0.107034 | 33.35097 | 11.36447 | 2.752158 |
| 22 | 0.111377 | 31.40756 | 11.58581 | 2.575827 |
| 23 | 0.115658 | 29.65189 | 11.77492 | 2.433618 |
| 24 | 0.119864 | 28.06435 | 11.97188 | 2.317295 |

*Source: Authors' Own calculation from E-views 8*

**Variance decomposition of LO_TA**

| Period | S.E. | DLNLO_TA | DLNTIER1RWCR | DLNRSA_RSL |
|---|---|---|---|---|
| 1 | 0.143182 | 100.0000 | 0.000000 | 0.000000 |
| 2 | 0.162780 | 95.97559 | 0.205202 | 2.866783 |
| 3 | 0.184394 | 87.49815 | 0.160258 | 3.953947 |
| 4 | 0.190350 | 82.30886 | 4.526760 | 4.823345 |
| 5 | 0.192320 | 81.02928 | 5.177398 | 4.741041 |
| 6 | 0.200513 | 77.59451 | 5.859732 | 4.375687 |
| 7 | 0.207242 | 72.64097 | 6.711851 | 4.172288 |
| 8 | 0.208550 | 71.83217 | 7.275347 | 4.371319 |
| 9 | 0.209044 | 71.51390 | 7.295832 | 4.358921 |
| 10 | 0.209746 | 71.11835 | 7.455157 | 4.599626 |
| 11 | 0.210382 | 70.84360 | 7.453080 | 4.577620 |
| 12 | 0.210504 | 70.76774 | 7.444487 | 4.577184 |
| 13 | 0.211684 | 70.01381 | 8.025847 | 4.527869 |
| 14 | 0.212706 | 69.49351 | 8.033932 | 4.495933 |

| 15 | 0.213981 | 68.75418 | 8.231847 | 4.468128 |
|----|----------|----------|----------|----------|
| 16 | 0.214490 | 68.60456 | 8.249411 | 4.477407 |
| 17 | 0.214795 | 68.43677 | 8.230712 | 4.481087 |
| 18 | 0.214949 | 68.36591 | 8.220621 | 4.476661 |
| 19 | 0.215101 | 68.27809 | 8.232513 | 4.474381 |
| 20 | 0.215557 | 68.00144 | 8.198139 | 4.461143 |
| 21 | 0.215883 | 67.86991 | 8.213594 | 4.452364 |
| 22 | 0.215979 | 67.86382 | 8.216335 | 4.452798 |
| 23 | 0.216054 | 67.86566 | 8.211271 | 4.457299 |
| 24 | 0.216174 | 67.79156 | 8.212974 | 4.452717 |

Source: Authors' Own calculation from E-views 8

## Appendix 2: Depended variable: LO_DEPO

| VAR Granger Causality/Block Exogenety Wald Tests | | | |
|---|---|---|---|
| Sample: 2009Q1 2018Q3 | | | |
| Included observations: 120 | | | |
| Dependent variable: LNLO_DEPO | | | |
| Excluded | Chi-sq | df | Prob. |
| LNTIER1RWCR | 11.72844 | 6 | 0.0683 |
| LNNPL | 8.298996 | 6 | 0.2170 |
| LNROA | 3.572932 | 6 | 0.7342 |
| LNRSA_RSL | 10.34406 | 6 | 0.1109 |
| All | 45.88996 | 24 | 0.0046 |

## Depended variable: LO_TA

| VAR Granger Causality/Block Exogeneity Wald Tests | | | |
|---|---|---|---|
| Sample: 2009Q1 2018Q3 | | | |
| Included observations: 108 | | | |
| Dependent variable: D(LNLO_TA) | | | |
| Excluded | Chi-sq | df | Prob. |
| D(LNTIER1RWCR) | 6.242541 | 8 | 0.6201 |
| D(LNNPL) | 14.73268 | 8 | 0.0646 |
| D(LNROA) | 9.934967 | 8 | 0.2696 |
| D(LNRSA_RSL) | 17.55064 | 8 | 0.0249 |
| All | 49.86702 | 32 | 0.0230 |

## Appendix 3: LO_DEPO autocorrelation

| VAR Residual Serial Correlation LM Tests | | | | | |
|---|---|---|---|---|---|
| Sample: 2009Q1 2018Q3 | | | | | |
| Included observations: 120 | | | | | |
| Null hypothesis: No serial correlation at lag h | | | | | |
| Lag | LRE* stat | df | Prob. | Rao F-stat | df | Prob. |
| 1 | 20.00602 | 25 | 0.7465 | 0.795849 | (25, 291.3) | 0.7470 |
| 2 | 21.42263 | 25 | 0.6688 | 0.854222 | (25, 291.3) | 0.6694 |

| VAR Residual Serial Correlation LM Tests | | | | | | |
|---|---|---|---|---|---|---|
| Sample: 2009Q1 2018Q3 | | | | | | |
| Included observations: 120 | | | | | | |
| 3 | 30.29914 | 25 | 0.2133 | 1.226268 | (25, 291.3) | 0.2139 |
| 4 | 32.97919 | 25 | 0.1316 | 1.340758 | (25, 291.3) | 0.1321 |
| 5 | 27.40050 | 25 | 0.3362 | 1.103574 | (25, 291.3) | 0.3369 |
| 6 | 21.92509 | 25 | 0.6401 | 0.874992 | (25, 291.3) | 0.6407 |
| 7 | 26.70662 | 25 | 0.3707 | 1.074377 | (25, 291.3) | 0.3715 |

**LO_TA autocorrelation**

| VAR Residual Serial Correlation LM Tests | | | | | | |
|---|---|---|---|---|---|---|
| Sample: 2009Q1 2018Q3 | | | | | | |
| Included observations: 108 | | | | | | |
| Null hypothesis: No serial correlation at lag h | | | | | | |
| Lag | LRE* stat | df | Prob. | Rao F-stat | df | Prob. |
| 1 | 21.17548 | 25 | 0.6828 | 0.842671 | (25, 209.5) | 0.6839 |
| 2 | 27.54485 | 25 | 0.3292 | 1.112340 | (25, 209.5) | 0.3306 |
| 3 | 16.40961 | 25 | 0.9021 | 0.645914 | (25, 209.5) | 0.9025 |
| 4 | 40.06743 | 25 | 0.0287 | 1.665729 | (25, 209.5) | 0.0291 |
| 5 | 37.33317 | 25 | 0.0537 | 1.542209 | (25, 209.5) | 0.0542 |
| 6 | 19.08837 | 25 | 0.7929 | 0.755983 | (25, 209.5) | 0.7937 |
| 7 | 19.92142 | 25 | 0.7509 | 0.790485 | (25, 209.5) | 0.7519 |
| 8 | 21.49972 | 25 | 0.6644 | 0.856212 | (25, 209.5) | 0.6656 |
| 9 | 26.07054 | 25 | 0.4038 | 1.049226 | (25, 209.5) | 0.4053 |

### Appendix 4: LO_DEPO Polynomial



Inverse Roots of AR Characteristic Polynomial

**LO_TA Polynomial**
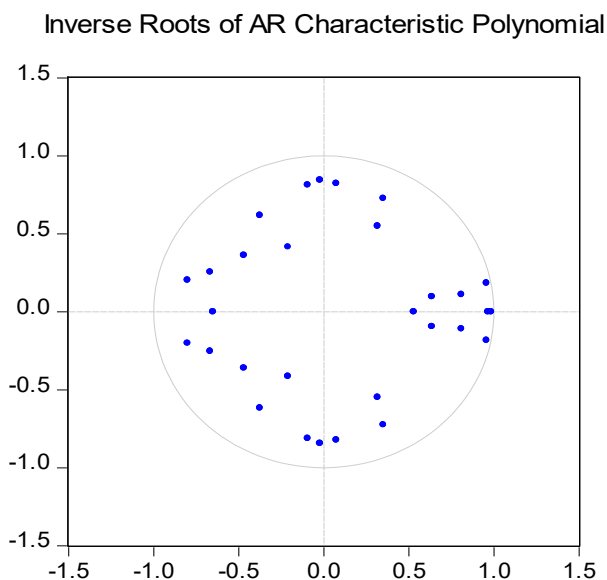
Inverse Roots of AR Characteristic Polynomial
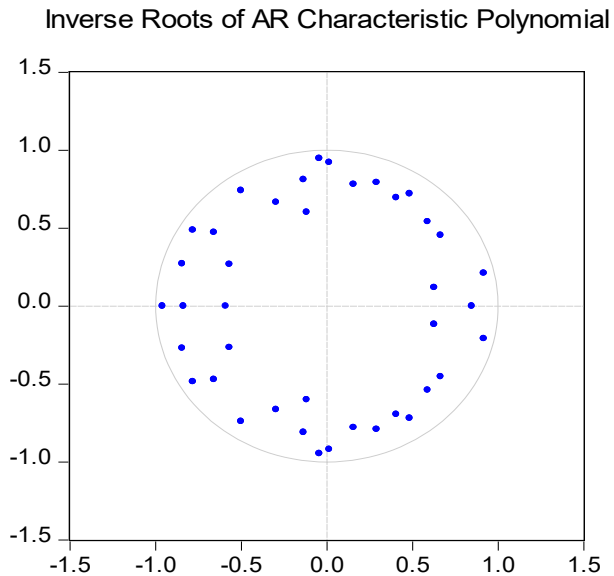


**Appendix 5: LO_DEPO Heteroscedasticity Tests**

| VAR Residual Heteroscedasticity Tests (Levels and Squares) | | | | | |
|---|---|---|---|---|---|
| Sample: 2009Q1 2018Q3 | | | | | |
| Included observations: 120 | | | | | |
| Joint test: | | | | | |
| Chi-sq | df | Prob. | | | |
| 1003.721 | 960 | 0.1591 | | | |

**LO_TA Heteroscedasticity Tests**

| VAR Residual Heteroscedasticity Tests (Levels and Squares) | | | | | |
|---|---|---|---|---|---|
| Sample: 2009Q1 2018Q3 | | | | | |
| Included observations: 108 | | | | | |
| Joint test: | | | | | |
| Chi-sq | df | Prob. | | | |
| 1263.877 | 1260 | 0.4640 | | | |

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