Commodity Prices, Exchange Rate Fluctuation and Sustainable Development Goals in Sub-Saharan Africa: An Empirical Investigation

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ABSTRACT

This dissertation examines the impact of commodity price change and exchange rate fluctuations on the capacity of Sub-Saharan African (SSA) countries to attain the UN 2030 agenda on sustainable development by using the dynamic panel data of forty-five (45) countries in Sub-Saharan Africa over a twenty-year timeframe (1999–2018). The study used the commodity terms of the trade index to measure commodity price behaviour, the real effective exchange rate index to measure bilateral exchange rate behaviour and lastly, human development index was used as a measure of human development outcomes that are consistent with the 17 SDG targets. The following control variables were included in the model specification: financial development index (a measure of resource allocation efficiency), external financial flow (a measure of foreign exchange flow) and governance indicators (a measure of institutional quality).

Furthermore, the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) modeling technique was used in predicting annual volatilities for commodity terms of trade and real effective exchange rate. The generated data was included in the panel data set and the Generalized Method of Moments (GMM) estimation technique was utilised in estimating the regression model.

The main findings of this dissertation are that commodity prices, commodity price volatility and the real effective exchange rate all have a positive and significant correlation with sustainable human development, while the real effective exchange rate volatility has a negative and significant correlation with sustainable human development. Financial development was also observed to have a significant and positive effect on sustainable human development, whereas external financial flow and governance quality were found to have an inverse relationship with sustainable human development.

However, further analysis of the regression result reveals the presence of 'resource curse' amongst SSA countries. This can be ascribed to the consistent declining trend in the region's commodity terms of trade and a corresponding decline in the human development index.

This situation is simply reminiscent of the need to transform the resource-dependence profile of SSA through the implementation of intuitive policies and strategies that will promote the efficient utilisation of primary commodities to improve the wellbeing of the populace. Hence, focusing on economic diversification, industrialisation of the commodity sector, building quality institutions and better management of the economy should be of greater concern towards the attainment of Sustainable Development Goals rather than depend on foreign aids.

ACRONYMS AND ABBREVIATIONS

CDDC	Commodity Dependent Developing Country
CTOT	Commodity Terms of Trade
EFF	Externa Financial Flow
FD_INDEX	Financial Development Index
FDI	Foreign Direct Investment
GARCH	Generalized AutoRegressive Conditional Heteroskedasticity
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
HDI	Human Development Index
IMF	International Monetary Fund
IV	Instrument Variable
ODA	Official Development Assistance
REER	Real Effective Exchange Rate
SDG	Sustainable Development Goals
SSA	Sub-Saharan Africa
TOT	Terms of Trade
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
VAR	Vector Autoregression
VECM	Vector Error Correction Model
WG_INDEX	World Governance Indicator

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CHAPTER 1
INTRODUCTION

1.1 BACKGROUND

In recent times, events relating to the behaviour of the global commodity markets have triggered curious discussions on the interrelatedness between primary commodity prices and exchange rate fluctuations for commodity dependent developing countries (CDDCs) and particularly amongst Sub-Saharan Africa countries whose economies are dependent on the export of primary commodities and thus extremely vulnerable to external shocks. Commodity price volatility has become an inherent attribute of the global commodities market, partly due to the financial development of the market. Sub-Saharan African (SSA) countries are marginal players in this market and are unable to control the adverse effect of price volatility which eventually adversely affects key development priorities. Nkurunziza, Tsowou, and Cazzaniga (2017) rightly observed that SSA countries are highly vulnerable to commodity price shocks as they are characterised by limited human capital, constrained financial resources and weak institutions. There is numerous research literature on this topic and some of the findings reveal that, in the short term, commodity price increase provides a corresponding increase in foreign exchange earnings from commodity export revenues, thereby causing the domestic currency to appreciate in value, but in the long run, this effect might then be compounded by a large and growing foreign direct investment portfolio, largely because the high prices have made the commodity sector more attractive to investors. Therefore, commodity price fluctuations have been observed to disrupt economic variables (including the exchange rate) in countries with a high dependence on primary commodities.

Historically, dependence on primary commodity as a major source of government revenue in developing countries has long been associated with slow growth and underdevelopment. The majority of Sub-Saharan Africa countries are known to derive a sizable percentage of their revenue from the sale of primary commodities, and at the same time, some exhibit a high volume of commodity import. This situation explains the structural imbalance that exists in these economies. Literature reveals that quite a few researchers have explored the resultant effect of these “mono-product” economic systems on the microeconomic and macroeconomic variables of these countries and how it impacts economic growth and human development. However, not much empirical investigation has established its impact on all dimensions of sustainable development. Many studies have concentrated on monetary variables that influence economic development in Sub-Saharan Africa. However, one research area that has not been adequately explored, but remains important and relevant, is the interrelationship between commodity price volatility, exchange rate fluctuation and the attainment of the Sustainable Development Goals (SDG) by 2030. Carmignani and Avom (2010), by all accounts, are among the first to explore the correlation between commodity dependence and non-monetary aspects of development. They established the existence of a negative correlation between “non-monetary” indicators of development and commodity dependence. This thesis expands on the works of Carmignani and Avom (2010) by utilising the latest disaggregated data in SSA to determine the effect of primary commodity dependence and exchange rate fluctuation on sustainable human development outcomes.

The general implications of the commodity dependence profile of Sub-Saharan African countries on sustainable development are apparent through several channels that present the interrelationship between events in the global commodities market and the socio-economic and human development conditions of the exporting country. Understanding these relationships and how they affect developmental outcomes is critical towards a well-informed policymaking process.

1.2 PROBLEM STATEMENT

Considering the economic development performance of SSA countries over the last four decades, one could infer that the most topical problem confronting the region is the unpredictable movement of primary commodity prices in the international market and its attendant consequences on the economic growth and wellbeing of its citizens and by extension how this could hinder the attainment of the UN Sustainable Development Goals (SDG). This is largely because commodity dependent Sub-Saharan African countries have little or no control over commodity prices, which tend to move in long cycles and can be highly volatile over the short term. In SSA countries, higher commodity prices as a rule infer higher export revenues and faster economic growth but little impact is seen in human development during this period. This can be explained as largely attributable to the failure of SSA governments and policymakers to effectively utilise proceeds from the resource booms to invest in the structural transformation of their respective economies. The lack of structural transformation, therefore, means that most SSA countries experience periods of economic growth during the boom and long depressions afterwards.

This has remained the trend over the years as SSA countries are unable to expand their respective economies into agro-processing, value-added manufacturing and innovation, as well as the development of intellectual property through a comprehensive and sincere diversification policy.

Agri, Inusa and Kennedy (2016) in their research work observed that the elasticity of change in commodity prices on macroeconomic variables is so perfect that the economy responds to even mere speculation. Therefore, persistent commodity price shocks could have a severe impact on government revenue and pose a significant problem to fiscal challenges, macroeconomic stability and, subsequently, human development outcomes. The problem is compounded by decades of corruption, poverty, unemployment, poor processing and distribution of costs, as well as social conflicts.

Many studies have concentrated on variables that influence the socioeconomic development of African states thus establishing the linkages between commodity price volatility, macroeconomic variables and socioeconomic development. However, one issue that remains ambiguous, but important, especially since the adoption of the 2030 Agenda for Sustainable Development, is the extent of the relationship between commodity prices, exchange rate variability and its impact on the attainment of the Sustainable Development Goals. This dissertation proposes to investigate how the fluctuations in commodity prices, as the leading source of revenue, influence the achievement of the 2030 Agenda for Sustainable Development in Sub-Saharan Africa.

This study examined the implication of the price behavior of agricultural, metal and energy products vis-á-vis exchange rate reactions in the international markets and the consequential impact on human development. It is expected to promote a better understanding of the impact of commodity prices and the exchange rate movements on the 2030 Agenda for Sustainable Development. It will further evaluate the ability of Sub- Saharan African countries to achieve the Sustainable Development Goals by 2030 within the context of its limited resources, low industrial capacity and resource dependence. Sub- Saharan African countries are major producers of primary commodities in agriculture, metal and energy and have over the years demonstrated a considerable reliance on the revenues from the export of these commodities. This dependence on commodity export revenues highlights their vulnerability to external commodity price volatility. However, whether these variables also adversely affect the human development index, thereby posing a threat to the attainment of Sustainable Development Goals by 2030, is examined and investigated in this study.

This dissertation sought to answer the following research questions:

1. Does exposure to commodity price fluctuations affect the achievement of Sustainable Development Goals of Sub-Saharan African countries?

2. Does a relationship exist between exchange rate volatility and the attainment of Sustainable Development Goals?

1.3 RESEARCH OBJECTIVES

Primary commodities irrespective of their classification as agriculture, metal or energy are central to the economic performance and human development outcome of Sub-Saharan Africa and cannot be overemphasised. Therefore, the focal objective of this dissertation was the empirical investigation of the effect of primary commodity prices and exchange rate fluctuations on the attainment of the SDG by 2030. The Human Development Index's parameters are used as a proxy for measuring the level of attainment of Sustainable Development Goals. Furthermore, it is expected that the study will identify and analyse the vulnerability of SSA economies to primary commodity dependence and recommend appropriate resource management policies that will promote better human development outcomes. Specifically, the study sought to achieve the following ancillary objectives:

- To ascertain the impact of commodity price changes on human development and SDG.

- To ascertain the impact of currency fluctuation on human development and SDG.

This research is intended to contribute to the development of finance literature on the advantages of the skilful management of the commodity sector of Sub-Sahara African countries with a view towards achieving the Sustainable Development Goals. The study focussed on 45 Sub-Saharan African countries that are heavily dependent on export revenue from primary commodities in the agricultural, metal and energy sectors. The study will also add to the existing body of knowledge on the complex interlinkages between the performance of a commodity-dependent economy and the socio-economic/human development condition of Sub-Saharan African countries. In view of the on-going discussions on the factors which threaten the attainment of the 2030 Agenda for Sustainable Development by African countries, this research aimed at bridging the research gap to provide adequate understanding towards policy formulation for Sub-Saharan Africa in the context of using its commodity dependence status to achieve the 2030 Agenda for Sustainable Development.

1.4 SCOPE AND JUSTIFICATION OF THE STUDY

In its Trade and Development publication, UNCTAD (2003) noted that the clamour for trade liberalisation and export orientation has led to a phenomenal growth in world merchandise trade and even though Sub-Saharan Africa has in recent years witnessed an increase in trade contribution to GDP, the region's share of world export volume has dropped significantly.

Sub-Saharan African countries, historically have a high dependence on primary commodities as a source of revenue to fund the economy, therefore, the entire region is exposed to unfavourable economic conditions which could be due to declining commodity prices, supply shocks and terms-of-trade losses that have resulted in high indebtedness, low investment, high incidence of poverty and low human development.

The scope of this study includes data, facts, theories and findings on the behaviour of commodity price volatility and exchange rate fluctuations, as well as the reaction of macroeconomic and human development variables to these parameters. Though there are studies by several researchers on commodity prices and macroeconomic variables, their findings are contentious and country-specific. By applying secondary time series data in various regression analysis techniques, researchers have found that fluctuations in commodity prices do substantially lead to declining government revenues and expenditures thus affecting a wide range of macroeconomic variables including unemployment, interest rates, balance of payments, exchange rates, etc.

Therefore, against this background, it is implied that for most Sub-Saharan African countries to achieve high human development outcomes through the attainment of the 2030 Sustainable Development Goals, the region must record substantial economic performance leading to full employment, poverty reduction, a favourable balance of trade, and low inflation, amongst other macroeconomic variables. This has precipitated calls for resource management strategies to be consolidated across the region, as well as diversifying the economies away from commodity dependence. In the years to come, this will be the major focus of development finance practitioners, development economists, policy makers, government and multilateral institutions.

1.5 ORGANISATION OF THE STUDY

This study has five chapters which are summarised below:

Chapter 1: Introduction and Background of Study

This chapter provides a general introduction to the impact of commodity price shocks and exchange rate fluctuations in the achievement of Sustainable Developments Goals by Sub-Saharan African countries. The chapter further presents the background of the study, the problem statement, including the questions and objectives of the study, justification of the study, and the definitions of key terms used in this study.

Chapter 2: Literature Review

This chapter examines available literature on the topic and the suitability of the research study to address the gaps identified in the literature. It provides theoretical fundamentals to the changes in behaviour of commodity prices and exchange rate fluctuations and its implications on the economies of Sub-Saharan African countries, as well as establishing a nexus of the ability of SSA to meet the Sustainable Development Goals by 2030. In addition, the role that the governments of these countries need to be playing, in terms of policy formulation and implementation, in order to ensure that the developments achieved are sustained, are discussed in this chapter.

Chapter 3: Methodology

Chapter 3 outlines the research methodologies and describes the study area and parameters. This chapter outlines the research strategy utilised. It covers the selection of the sample data collection process and the overall research methodology employed in this study.

Chapter 4: Discussion of Findings

Chapter 4 presents the analysis of data collected. The objective of this chapter was to provide a discussion on the results of the data, as well as the interpretation of the data.

Chapter 5: Conclusion and Recommendation

In Chapter 5, the researcher outlines the conclusions and provides recommendations derived from the findings of this study. The recommendations made are for the purpose of assisting with the attainment of sustainable development goals.

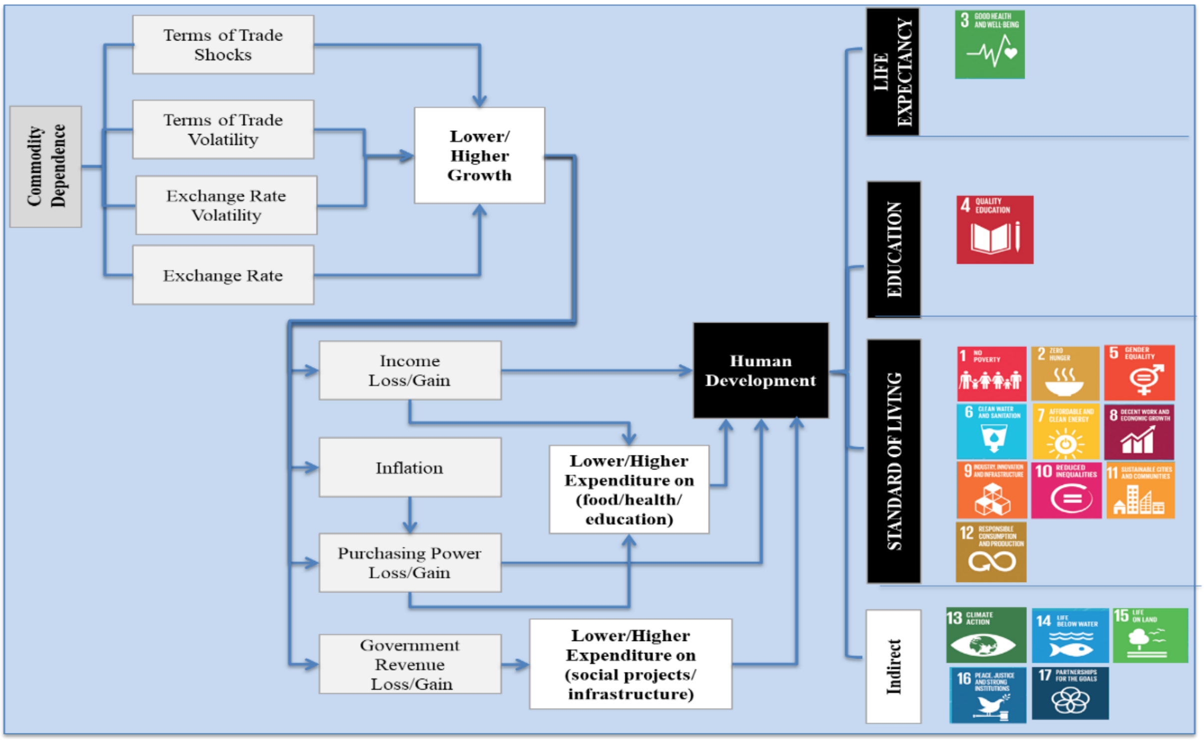
CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

This chapter endeavours to summarise the relevant theories and empirical work related to the interrelationship between resource dependence, economic & macroeconomic variables and human development. This literature review is divided into two sections: the first section covers the theoretical literature on the correlation between commodity price and human development as well as exchange rate and human development and concludes with an assessment of some other dimensions or transmission channels that depict the nexus between commodity resource dependence and sustainable development. The second section provides an empirical literature on the resource dependence, commodity dependence profile of Sub-Saharan Africa and previous literature on exchange rate effect on economic growth and human development outcomes.

2.2 THEORETICAL LITERATURE

There are several theories and empirical studies by research economists and development finance practitioners attempting to draw conclusions on the dynamics that influence economic growth and human development. As observed by Lucas (1988) and cited by Pritchett (2000), an aspect of economic growth that makes it "hard to think about anything else" is the consequence of large and persistent growth on human welfare. He also notes that the lack of persistence in the economic growth of most developing countries might be responsible for the low human development outcomes in comparison to the developed countries. Hausmann, Pritchett and Rodrik (2005) also share the same view in their research. They argue that even though poor commodity dependent countries have experienced checkered periods of temporary rapid growth, they lack the capacity to sustain growth over a longer period for any impactful progress on economic and human development. Easterly, Kremer, Pritchett and Summers (1993) go further and establish that unstable economic growth and human development patterns in developing countries, especially in Sub-Saharan Africa, might possibly be due to external shocks. They particularly make reference to instability in the terms of trade as a major contributory factor. Elbadawi and Ndulu (1996) further buttress the proposition that commodity price shocks have an indirect relationship with economic growth, often exacerbated through the implementation of inconsistent fiscal and monetary policies that often further contribute to weak inclusive growth and poor human development outcomes. Commodity dependence is primarily expressed through fiscal and monetary policy and terms of trade channels and are further transmitted directly and indirectly via macroeconomic variables. Commodity price and exchange rate are known to be some of the key channels through which commodity resource dependence impacts on economic and human development outcomes. Figure 2.1 below shows a simplified overview of the various transmission channels through which commodity price and exchange rate can impact on human development and by extension the attainment of the Sustainable Development Goals.



Source: Author's own compilation from research data

Figure 2.1: Transmission Channels for Primary Commodity Dependence

Figure 2.1 is a simplistic graphical explanation which shows how commodity prices and exchange rate fluctuation affects economic growth and human development outcomes. These human development outcomes include economic, sociopolitical, environmental and sustainable development outcomes amongst others that can traced to the 17 SDGs. Its evidently clear that goals 1,2,3,4,5,6,7,8,9,10,11,12 are directly linked to the three HDI dimensions while 13,14,15,16,17 are indirectly linked to HDI in terms of impact and consequence.

Therefore figure 2.1 explains how HDI is a reliable mechanism linking CTOT and REER to SDGs. It seems likely to explain most of the transmission channels or pathways. To follow up on the evidence, this thesis investigated how the SSA commodity dependence profile has affected the member countries' HDI and SDGs progress

2.2.1 Commodity Prices and Human Development

Theoretically, primary commodity dependence is anchored on the ‘resource curse’ theory and also referred to as the Dutch disease. The dependence on primary commodities has been shown in the literature to exhibit negative effects on non-commodity-based sectors of the economy as a result of windfalls triggered by commodity price volatility and accompanied by the appreciation of exchange rates. Exchange rates’ appreciation from natural resource boom receipts can render the non-natural resource tradable sectors less competitive, thus leading to de-industrialisation, declining export volumes, increasing imports, rising unemployment, inflation, macroeconomic instability and low human development. According to the IMF and the World Bank, Sub-Saharan African countries are characterised by a high dependence on commodity export and, therefore, have seen decades of deteriorating economic and human welfare conditions principally because primary commodity exports and domestic currency display a much greater volatility.

Furthermore, Van der Ploeg and Poelhekke (2009) and Ramey and Ramey (1995) in their respective research work observed that commodity price volatility determines the variability of the commodity exports contribution to a country’s GDP. The reason is that variability of the share of natural resources as part of GDP will, in turn, result in a spike of the quantity of goods and services produced by the domestic economy while at the same time weakening output per capita growth, this phenomenon is prevalent amongst in CDDCs particularly SSA countries.

Therefore, in general terms, the share of the natural resources contribution to GDP has a positive effect of stimulating economic growth~~,~~ and subsequently contributing to better human development outcomes. In contrast, the volatility of the share of the natural resources contribution to GDP has a negative growth effect and worsening human development outcomes. As observed in the literature, most Sub-Saharan African countries have had to deal with the consequences of commodity dependence mainly as a result of frequent changes in the price of primary commodities. Some researchers such as Deaton (1999) and Ocran and Biekpe (2007) have rightly pointed out that commodity price volatility often presents or creates the difficult task of macroeconomic management and increases the level of uncertainty in general economic conditions. The resultant effect is a low investment environment occasioned by low government expenditure on physical and social infrastructure and thereby a poor human development outcome. A major adverse effect of high commodity dependence is the consistent pressure it has on foreign exchange earnings of the country. However, according to Blomstroom and Kokko (2007), rents from commodity dependence, when appropriately managed by the government, can ease common resource constraints to growth such as savings, diversification, foreign reserve stability and reduced fiscal constraints.

The World Bank has also suggested that the principal reason for the poor economic performance of the Sub-Saharan Africa over the last two decades is undoubtedly the adverse impact of unfavourable terms of trade caused by incessant commmodity price shocks. Bidarkota & Crucini (2000) combined terms-of-trade data of 66 developing countries with 33 primary commodities prices in a creative econometric model and discovered that the price volatility of three or fewer primary commodities is responsible for at least 50% of the terms of trade volatility for a typical developing country. This validates the importance of terms of trade and a major transmission channel for commodity price and human development.

2.2.1.1 Terms of Trade

Terms of trade represent the ratio between a country's export prices and its import prices. It serves as an important transmission channel of commodity price shocks to the economic and human welfare conditions of SSA countries. In accordance with the Prebisch-Singer theory, the terms of trade of economies in Sub-Saharan Africa tend to deteriorate in the long-run due to the consistent material decline of commodity prices, therefore, the over-reliance on commodity exports posture by SSA cannot be a pragmatic basis for long-term economic planning and human development strategy. The transmission links for terms of trade include: terms of trade shocks and terms of trade variability. Sub-Saharan African countries are prone to the vagaries of terms-of-trade shocks and volatility that have being widely identified as responsible for the adverse or otherwise impact on economic growth and human development. To support this position, Dollar and Kraay (2002) and several other researchers have established that the incomes of the poor increase upon economic growth, therefore, it can be inferred that terms-of-trade has a direct relationship with human development. However, according to Blattman, Hwang and Williamson (2007), countries whose economies are dependent on commodities with substantial price volatility have shown adverse movement in their terms of trade, attract less foreign direct investment, and consequently, suffer lower economic growth rates. The researchers also maintain that undiversified economies that are exposed to volatile commodity prices are all behind in terms of economic and human development. In summary, an increase in the terms of trade of a country implies increased demand for the country's export which also means rising foreign exchange earnings and increased demand for the country's currency which leads to an increase in currency value. This also implies that the exchange rate mechanism is an important transmission channel.

2.2.2 Exchange Rate and Human Development

The bilateral exchange rate is the relative currency value of a country compared to another country's currency (Bagh, Azad, Razzaq, Liaqat and Khan, 2017). The real effective exchange rate (REER) has been used for this research and is defined as the relative price of traded goods to non-traded goods produced as in the domestic economy, mathematically defined as:

$$REER = \frac{P_T}{P_{NT}}$$

where P_T is the domestic currency price index of traded goods and P_{NT} is the domestic currency price index of non-traded goods (Montiel and Hinkle, 1999 and Montiel, 1999). It can also be defined as the nominal exchange rate adjusted for price changes in the domestic economy relative to those of trading partners (Fosu, 1992); that is,

$$REER = \frac{EP'}{P}$$

where E is nominal exchange rate, P' is foreign price level, and P is domestic price level.

A negative sign implies the impact of a variable causes an appreciation of the real effective exchange rate, while a positive sign means that the effect of a variable causes a depreciation of the REER. A fall in REER implies a real exchange rate appreciation and an increase in the opportunity cost of the production of tradable goods (Bourdet and Falck, 2008). An appreciation of real exchange rate (i.e. a fall in REER) is understood as a deterioration of the country's external competitiveness given unchanged relative prices of trading partners. Conversely, an increase in REER indicates real exchange rate depreciation and an improved international competitiveness.

The real exchange rate (REER) is undoubtedly a key macroeconomic variable which according to the large body of literature has a significant and direct impact on the external sector (exports, imports and capital flows) of SSA economies. REER fluctuation are known to be the immediate impactful cause of high fluctuations in foreign trade and balance of payments and in accordance with the effectiveness of economic decision-making they readily become key determinants of economic growth and human development outcomes. Therefore, real exchange rate volatility, which is the risk associated with unexpected movements in the exchange rates, has a significant and direct effect on the economic policy of countries (Meniago and Eita, 2017).

The real exchange rate is largely dependent on the bilateral exchange rate system, therefore the adoption of an appropriate exchange rate system for developing countries particularly SSA has become a vital aspect of economic management and policy making since the collapse of the Bretton Woods system in 1971. Developing countries especially SSA countries have ever since being challenged with the choice of an appropriate exchange rate system that will spur sustained economic growth and human development. Based on the work of several researchers and as enumerated by Basirat, Nasirpour and Jorjorzadeh (2014), the adoption of an inappropriate exchange rate system coupled with ineffective exchange rate policies in most developing and SSA countries has had negative effects on economic growth and human development. In a flexible exchange rate regime, real exchange rate volatility adversely impacts on foreign direct investment and international trade, thereby causing slow economic growth. Some countries have adopted the fixed exchange rate regime in order to better manage the consequences of exchange rate fluctuations, this is also not without its drawbacks. The task of establishing a convincing nexus between exchange rate volatility and economic growth has gained widespread prominence amongst researchers and policymakers, and on an overall basis, the nexus is assumed to be one of the key drivers of modern economy. However, the literature is replete with contradictions and inconsistencies supported with credible arguments on both negative and positive correlations of exchange rate volatility on economic growth and human development.

Furthermore, the valuation of the exchange rate affects current account balances and even though there are other determinants of current account imbalances, none is perhaps more important than the currency valuation ceteris paribus. Exchange rate undervaluation has a positive effect on current account balance and exchange rate overvaluation negatively impacts current account balance, Bhalla (2012). The undervalued currency is associated with high growth and large current account surpluses and the overvalued currency may be associated with slower growth and current account deficits. Previous literature has duly researched and analysed several theories to explain the random walk behaviour and valuation of exchange rate and some of which includes: purchasing power parity, interest rate parity, real options theory, portfolio balance model, traditional flow theory, mint parity etc. However, this thesis is concerned with the purchasing power parity theory and the interest rate parity theory. The application of these theories has caused researchers to give more attention to the relationship between exchange rate volatility and economic growth.

2.2.2.1 Purchasing Power Parity (PPP) Theory

The PPP theory can be traced back to the works of Wheatley and Ricardo, yet the credit for developing it in a systematic way has gone to the Swedish economist Gustav Cassel. (Frenkel, 1978). The Purchasing Power Parity (PPP) theory states that the equilibrium rate of exchange is determined by the ratio of the purchasing power of two currencies. It implies that the rate of exchange between two currencies is determined by the internal price levels in the two countries, measured in their own currencies. In other words, the PPP theory, defines the real exchange rate as exactly equal to a ratio of two sets of prices: the domestic and the foreign under the assumption of the 'Law of One Price'; meaning that in a free trade transaction between two countries, the price of a commodity is the same for both countries measured in their respective currencies in line with the supply and demand operating in both markets at the same time. The PPP theory is applied through the use of price indexes.

The purchasing power parity (PPP) theory is an important concept that reinforces the flexible and fixed exchange rates system and attempts to explain determinants of inflation under a floating exchange rate regime. Balassa (1964) went further to propose the absolute purchasing power parity rule which states that the relative price of commodities is a proxy for the valuation of currencies (Genberg, 1978). Clearly, this indicates that the exchange rate between two currencies is a function of the forces of demand and supply. The baseline of the PPP theory is anchored on the analogy that given a pair of currency the exchange rate differentials is expected to reflect disparities due to the relative purchasing powers of each currency (Anyanwu, Ananwude & Okoye, 2017). The purchasing power parity theory has undergone reforms over time and general acceptance by international financial market operators in determining the exchange rate between two currencies. (Anyanwu et al., 2017)

The PPP theory has been subjected to several criticisms and has proved to be more powerful as an explanation of exchange rate variations. It has mostly been criticised as an empirical proposition because its assumptions such as; the 'Law of One Price', homogeneous commodities and identical goods baskets and price weights for each basket are not realistic assumptions and cannot hold (Dornbusch, 1985).

2.2.2.2 Interest Rate Parity (IRP) Theory

Interest rate parity (IRP) theory is the asset approach to exchange rate determination and used to explain the exchange rate valuation and fluctuation. The theory is built on the assumption that the investment appetite of international investors are driven by variances in the rates of return on comparable assets across countries. Their actions therefore induce changes in the spot exchange rate. Interest rate parity establishes a condition of equality between the rates of return of comparable assets between two countries.

"The interest rate parity theory has its historical origin in the works of David Hume and David Ricardo but was however formalised by John Maynard Keynes (1923). The Interest Rate Parity (IRP) relationship is one of the most relied upon indicators of financial globalization. When the parity relationship holds, covered yields are identical on assets that are similar in all important respects (e.g. maturity, default risk, exposure to capital controls, and liquidity) except for their currency of denomination. The parity relationship plays such a key role in global macroeconomic models that IRP is taken as a benchmark for perfect capital mobility between markets". (Levich, 2011)

2.2.3 Fiscal and Monetary Policy Channels

Commodity price volatility can generate strong fluctuations in capital flows, which in turn exert pressure on the balance of payments of countries. When this happens, countries that depend on primary commodity trade as a significant source of revenue are often challenged with a constant contest to avoid economic disruption and worsening human development outcomes. Therefore, dependence on primary commodity exports creates a direct relationship between the volatile international commodity markets and government revenues of CDDCs. Hence, price shocks on global commodity markets have a direct impact on governments' policy space as a result of the fiscal imbalance that leads to volatility in public spending. In many CDDCs, especially Sub-Saharan African countries, this situation has often had an adverse impact on the continuity of economic and social inclusion programmes, infrastructure expansion and other socio-economic and human development plans. According to UNCTAD (2012), the situation is made worse by unfavourable fiscal policies.

2.2.3.1 Inflation

In several studies, researchers have established a link between commodity price spikes and the resultant increase in consumer prices. Cecchetti and Moessner (2008) and Liu and Weidner (2011) state that commodity price shocks induce a rise in nominal wage rates which result in a further increase in consumer prices, as employers pass on increased wage costs to consumers. Also, commodity-import-dependent developing countries are prone to the risk of imported inflation during periods of commodity price hikes. Fuel and food typically absorb a large share of household expenditure in developing countries, therefore, a spike in commodity prices may lead to imported inflation, which can erode real incomes.

2.2.3.2 The Micro-level transmission

Producers in CDDCs that are dependent on commodities for their incomes and livelihoods are negatively affected by commodity price shocks and exchange rate volatility. Changes in prices in the global commodity market have a direct impact on individual producers. A sudden price decrease may force commodity producers to forego important expenditures, such as those pertaining to health or education, and this could have a long-term impact on human development.

Consumers in developing countries are also directly affected by increases in food and fuel prices. This micro-level transmission channel is particularly significant for countries that import these commodities. Food price increases affect incomes of different population segments in developing countries in different ways. Two key distinctions in this context are between net food buyers and net food sellers, and between the short-term and longer-term effects. For poor net food buyers, the effect is straightforward in the short term: price increases have an immediate negative effect, as higher food prices directly translate into lower purchasing power for these households. Consequently, poor households fall deeper into poverty, and households living slightly above the poverty line become poor. Overall, the short-term effect of food price increases seems to exacerbate poverty in the developing world (Ivanic & Martin, 2014). Food price increases can also generate or exacerbate food insecurity in commodity-import-dependent developing countries, which may lead to chronic hunger, malnutrition and a serious long-term negative impact on health, education, child mortality and life expectancy.

2.2.4 Sustainable Development Goals and Human Development

The twin concepts of ‘sustainable development’ and of ‘human development’ have evolved in recent decades, mutually enhancing each other to progressively converge into the idea that a national development path cannot claim to be ‘sustainable’ except if it is based on ‘human’ advancement. UN conferences on sustainable development have regularly called for a better measurement of human development, but an agreed measure is still a remote vision. With the adoption of the transformative Sustainable Development Goals at the September 2015 UN Sustainable Development Summit, as well as the outcome of the COP21 meeting in Paris in December 2015, the issue of robust and consistent indicators to monitor sustainable human development moved a step closer from the realm of academic research and advocacy towards an informed policymaking process.

The Human Development Index (HDI) is currently the only scientific and quantitative measurement of human well-being/sustainable human development across several countries. Nevertheless, there is no consensus on the measurement of what constitutes sustainable human development despite the numerous proposals in academic literature. Ivanov and Peleah (2017) are some of the reputable leaders on this subject matter and they have proposed a pragmatic compromised approach to the measurement of sustainable human development. It builds on a specific understanding of 'sustainability' as the "ability to sustain human development levels without relying on debts". Their proposal analyses two aspects of development: the status of human well-being achieved as presented in the HDI score and the process by which the status has been achieved. The human well-being status is the development aspect captured in the four dimensions of the HDI. The four dimensions reflects the status of human development attainment and not whether the achievement was in a sustainable or unsustainable way.

The Human Development Index (HDI) is a multifaceted index designed to address three basic dimensions of human development: the ability to lead a long and healthy life, measured by life expectancy at birth; the ability to acquire knowledge, measured by mean years of schooling and expected years of schooling; and the ability to achieve a decent standard of living, measured by gross national income per capita. To measure sustainable human development more comprehensively, the UNDP (2018) Human Development Report presents four other composite indices: the inequality-adjusted HDI which discounts the HDI according to the extent of inequality, the Gender Development Index which compares female and male HDI values, the Gender Inequality Index which highlights women's empowerment and the Multidimensional Poverty Index which measures non-income dimensions of poverty. HDI, as released by the UNDP, provides a consistent tracking report of key indicators and statistics. It provides a brief overview of the state of human development across all countries, as well as the current conditions and long-term trends. However, there are new challenges to human development, especially concerning the issues of inequality and sustainability. There are ongoing efforts to strengthen the analysis, insights, relevance and reach of future reports through improved technologies and new partnerships developed out of the 2030 Agenda for Sustainable Development. This dissertation, however, uses the existing data on HDI as a proxy for human development and a basis for assessing the capacity of SSA countries to achieve the SDG by 2030.

2.3 EMPIRICAL LITERATURE

Over the past century, the relationship between commodity resource dependence and the socio-economic development of nations has generated significant raging debates amongst academics and political actors. The debates have explicitly focused on the outcome of dependence on primary commodities for economic growth and sustainable human development, and therefore, academic literature has successfully established a connection between industrialisation and economic growth that promote decent and sustainable human development outcomes. This is well-researched in the literature by Andreoni and Chang (2016), Chang (1993, 2005), Kaldor (1967), Myrdal (1956), Palma (2014), Prebisch (1950) and Rowthorn and Ramaswamy (1999). However, drawing from the findings of van der Ploeg (2011) and Rodriguez and Sachs (1999), economies that depend wholly on their natural resources have recorded poorer economic performance compared to other diversified economies. The focal concept that describes the situation in which commodity dependence negatively affects economic performance and sustainable human development is known as the ‘resource curse’. These debates have seen the emergence of orthodox and heterodox schools of thought; however, all the theories and arguments are categorised by the twin concepts of ‘resource pessimism’ and ‘resource optimism’.

2.3.1 The Pessimistic View: ‘Resource Curse’

The pessimistic view of resource dependence is the negative impact of natural resources on industrial and economic development, also known as the ‘resource curse’. Auty (1994, 2001) and Sachs and Warner (1995, 1997), in their respective research establish a negative relationship between economic growth and resource dependence and thus inferred that natural resource dependent countries are more likely to record an undesirable economic and hmand development performance because of the ‘resource curse’ phenomenon. Beblawi and Luciani (1987), Bhattacharyya and Hodler (2010), Gylfason (2001) and Ross (1999) also argue that the ‘resource curse’ is as a result of fiscal inflows from primary commodities which generate externalities that lead to both market and government failures and by so doing disrupt macroeconomic variables that adversely affect sustainable human development outcomes. Furthermore, the ‘resource curse’ can be explained via political and economic explanatory factors.

2.3.1.1 Political explanations

There are three key political explanations of the ‘resource curse’ and they include: cognitive explanations, societal explanations, and rentier state explanations (Ross, 1999).

- Cognitive explanations: These stipulate that rapid resource booms encourage laziness and cause short-sightedness among policymakers, according to Ross (1999). This is evident in the poor economic performance of most resource dependent developing countries. They are unable to transform the structure of their economies through transformative and growth-conducive investments that lead to long-run socio-economic development.

- Societal explanations: Non-state actors or interest groups that are beneficiaries of the resource boom often wield enough power to resist a policy change. Ross (1999) observed that the non-state actors are often in favour of inefficient industrial policies. Furthermore, this appears to be pervasive amongst SSA countries.

- Rentier state explanations: These explanations contend that resource booms weaken the state institutions. According to Lane and Tornell (1999) and Mahdavy and Cook (1970), governments of resource-dependent countries often sacrifice efficient natural resource management for other priorities, such as the funding of impracticable development projects, redistribution and elite capture and maintenance of the patronage system. Karl (1997) finds that there are strong similarities amongst countries such as Algeria, Venezuela, Nigeria, Iran and 16th century Spain. In most cases, the state is the direct recipient of rent wealth, which reduces the need for taxation, and, in turn, erodes the nature of the social contract between the government and its citizens.

2.3.1.2 Economic explanations

Ross (1999) identified four main economic explanations of the 'resource curse' as follows:

- Declining terms of trade for primary commodities: Ross (1999) notes that the terms of trade for most primary commodities have fallen since the 1980s caused by the rising volume of commodity exports (a symptom of the debt crisis and structural adjustment programs of the 1980s), the collapse of international commodity agreements and the disintegration of the Soviet Union. Researchers on secular trends in the terms of trade agree that the aggregate terms of trade for primary commodities has declined since at least the beginning of the twentieth century; Easterly et al. (1993), Sala-i-Martin and Barro (1995), Cuddington (1992) and Mendoza (1997) go further illustrating that the terms of trade for primary commodities are sound determinants of economic growth and its effect is statistically significant at global and regional levels. Hence, a decline in the terms of trade for primary commodities can account for much of the ‘resource curse’ observed amongst CDDCs.

- Commodity price volatility: Cashin and McDermott (2002), in their research work, found that commodity price volatility was more damaging than a predictable and stable decline in commodity prices. However, there are contradicting findings on this topic. Some researchers such as Abo Eida (2016), Hesse (2008) and Araujo Bonjean, Combes and Combes Motel (2001) argue that export instability leads to higher economic growth while others such as Bakare and Oyelekan (2015), Kaushik, Arbenser and Klein (2008) and Özler and Harrigan (1988) argue that export instability either has no impact or negative impact on growth.

- Dutch Disease: Sachs and Warner (1997, 2001) made the term popular and argue that it is the major growth-impeding factor for resource dependent countries. It formally refers to two combined effects of the appreciation of a state’s currency and the tendency of a booming resource sector to draw capital and labour away from the country’s manufacturing and agricultural sectors. According to Neary and Van Wijnbergen (1986), these two effects raise the production costs of the manufacturing and agricultural sectors and lead to a loss in competitiveness in the country’s traditional export. Critics of the Dutch disease model, such as Echavarria, Vázquez Moreno and Sherdek (2016), and Lederman and Maloney (2007) argue that the abundance of natural resources cannot be a ‘curse’ and the blame is directed at poor leadership and economic mismanagement.

- Poor economic linkages between resource and non-resource sectors: This scenario is predominant in commodity extraction activities where foreign firms repatriate their profits instead of making local investments to enhance productive activities. In their respective studies, Singer (1950), Hirschman (1981), Auty and Gelb (2000), and Auty (2001), all traced this scenario to capital intensive and the concentrated ownership nature of extraction activities and, consequently, fewer production and consumption linkages. In a similar study, Ross (1999) shared Fosu’s (1996) findings that growth in commodity exports between 1967 and 1986 had a negligible effect on the performance of the non-export sector. However, governments do have the capacity to foster the linkage between these two sectors but they have failed to do so. This scenario subtly introduces the concept of good governance and institutional quality. The ‘resource curse' phenomenon can be reversed with the existence of strong quality institutions that promote accountability, rule of law, government effectiveness and a strong financial system that efficiently allocates capital and resources.

2.3.2 The Optimistic View: Resources as the driver of inclusive development

The optimistic view of resource dependence is the positive correlation between natural resources and economic development. An increasing number of studies including those of Echavarria, Vázquez Moreno and Sherdek (2016), and Lederman and Maloney (2007) have questioned the 'resource curse' hypothesis by arguing that there is nothing inherent about natural resources that make them detrimental to inclusive development. Storey and Hall (2018) cite the staples approach to economic growth formulated by Innis (1930, 1940, 1956), Watkins (1963) and Mackintosh (1923, 1939) which emphasises the historical and cultural role of commodity exports as a fundamental driver of economic development. They submit that primary commodity exports stimulate growth in less developed areas by attracting capital and labor, and can trigger growth if investment is continuously made to reduce production costs. A few decades ago, several development economists, such as Viner (1952) and Spengler (1960), suggested that resource abundance would help developing countries suffering from labour surplus and capital shortages. A plethora of studies, including Bravo-Ortega and De Gregorio (2007), Brunnschweiler (2008), Findlay and Lundahl (1999) and Pineda and Rodriguez (2010), have found a positive correlation between resource dependence and economic and sustainable human development, thus directly challenging the 'resource curse' idea analysed in section 2.2.1 above.

It thus appears that natural resources are not necessarily detrimental to inclusive economic development and that the 'resource curse' phenomenon is a model that is essentially an observation rather than a systemic explanation. Findings from the literature suggest that commodity dependence is usually as a result of the underdevelopment of the industrial sector rather than the occurrence of primary commodities. Thus, "what is interpreted as a manufacturing sector weakened by a commodities specialisation, is in fact often a commodities specialisation in an economy with little or no history of industrial development" (Kaplinsky, 2011).

In conclusion, it suffices to say that despite the fact that empirical results from the literature are mixed and perhaps inconclusive, it is worthwhile to note that the presence of the 'resource curse' phenomenon in any country is to a large extent dependent on other factors such as good governance, institutional quality, rule of law, etc. Countries with a positive governance indicator have exhibited a positive correlation between commodity dependence and inclusive economic growth (as evident in Norway, UAE and Australia). On the other hand, countries with a negative governance indicator have been observed to exhibit a negative correlation between commodity dependence and sustainable human development as observed in most SSA countries. (Isham, Woolcock, Pritchett, & Busby, 2005).

2.3.3 Resource Dependence and Human Development in Sub-Sahara Africa

According to the IMF (2000), “almost all countries hit hardest by falling commodity prices are also among the world’s poorest. All but two (Brazil and Chile) are classified as low-income countries by the World Bank; over half are in Sub-Saharan Africa; and 16 are Heavily Indebted Poor Countries” (Page and Hewitt, 2001). In a recent publication of UNCTAD (2018), 89% of the Sub-Saharan African countries are highly dependent on commodity export. This section of the literature focuses on the commodity dependence profile of SSA and how this dependence is transmitted through primary commodity prices and REERs. The commodities being profiled are focused on agricultural, energy, metal, and food and beverages commodity prices, which constitute the most traded commodity highly important for the SSA economies. All SSA countries are dependent on export of primary commodities and the interplay of this profile with REER and by extension the impact on SDG progress is pervasive and recurring amongst SSA. This can be illustrated across 4 select African countries who are dominant exporters of cocoa, oil, gold and copper representing the focus areas defined above.

The four SSA countries have been selected based on the size of economy and their status as dominant exporter for each of the commodity in focus. Ie. A dominant SSA exporter was selected for each commodity focus.

The major commodities are cocoa, crude oil, gold and copper, dominated by the following countries as illustrated in Table 2.1. These countries have been selected to demonstrate the commodity dependence profile of SSA. The thesis assumes that the findings of these select 4 African countries is somewhat valid for a possible generalization for primary commodity-exporting countries in SSA.

Table 2.1: Country Selection for Commodity Dependence Profile

Country	**Gross Domestic Product as at 2018**	**Commodity Export Dominance**
Cote d'Ivoire	$43,032 billion	Cocoa
Nigeria	$397.270 billion	Crude oil
South Africa	$ 368,135 billion	Gold
Zambia	$ 25,179 billion	Copper

Source: The World Bank, https://data.worldbank.org/

These countries have been selected to further demonstrate the impact of their commodity dependence profile on sustainable human development from which valuable inferences can be deduced for other SSA countries.

2.3.3.1 The Cote D'ivoire economy and cocoa price shock

As observed by Coulibaly and Erbao (2019), the Côte d'Ivoire economy is primarily dependent on export products such as cocoa and coffee. Its commodity sector makes a 23% contribution to GDP, employs about 60% of the national population and feeds about nine million people. Côte d'Ivoire's status as a net exporter of cocoa implies that when the price of cocoa in the international market increases, Côte d'Ivoire tends to reap large revenues from its exports. Bogetic, Noer and Espina's (2007) research work focuses on the causes of commodity price volatility and examines the impact of major external shocks to the Cote d'Ivoire economy. Using the vector auto regression (VAR) statistical approach, they established the following results:

- GDP, trade indices, and the cocoa price all share common cyclical patterns.
- Cote d'Ivoire has developed a strong influence in the cocoa market and the cocoa price -quantity relationship experienced a shift in 1976 and a currency devaluation in 1994.
- Cocoa price volatility, terms of trade and exchange rate fluctuations are the sources of economic growth volatility to Cote d'Ivoire.
- As the revenue from its cocoa export increases, the bilateral real exchange rate with France appreciates as well.

Despite the global dominance of the cocoa sector, the derived revenue has not significantly impacted on the sustainable development of the country; the poverty rate remains high, low quality of education, relatively low life expectancy and low standard of living despite increased government spending on the poor. Experts are of the view that the downward growth trend is expected to continue in the short term. This implies the need for a radical and rapid improvement in political, security, and economic management to reverse the two decades of economic decline.

2.3.3.2 The Nigerian economy and the crude oil price shock

The Nigerian economy is undoubtedly propelled by the petroleum sector. Nigeria is known for the export of crude oil, as well as the importation of refined products thus making the investigation of the impact of oil price volatility on Nigerian macroeconomic variables, a complicated task to undertake. There is much literatures on the effect of the oil price shock on macroeconomic variables, mostly as it affects developed economies, while in the recent past a few studies have focussed on Sub-Saharan Africa. The research work of Madueme and Nwosu (2010), using Engle Granger and Augmented Engle Granger test, demonstrated that there is a positive relationship between government capital expenditure and crude oil prices, implying that escalating crude oil prices makes a positive contribution to Nigeria's economic growth. Also, as cited by Eneji, Mai-Lafia and Nnandi (2016), Oriakhi and Osazel (2013) examine the consequences of oil price volatility on the growth of the Nigerian economy using the Vector Auto Regression method. Their study finds that oil price volatility has a direct relationship on government expenditure, the real exchange rate and import capacity and an indirect relationship on the real GDP, real money supply and inflation. Their summary is that oil price volatility has an influence on the government expenditure level, which in turn determines economic growth and sustainable human development outcomes in Nigeria.

Furthermore, Agri, Inusa and Kennedy (2016) also note that historically Nigeria's revenue earnings have been deeply impacted by global oil price volatility. Akpan (2009) observes that in the 1990s, a US$1 increase in the oil price meant Nigeria's foreign exchange earnings increased by about US$650 million and government revenues by about US$320 million. Towards the end of the decade, the oil price fell progressively from about $20 in 1997 to below $11 in 1999 as noted by Aliyu (2009), Isemede (2013), Umar and Abudlhakeem (2010). Ismaila and Imoughele (2015) investigate the determinants of economic growth in Nigeria using a co-integration statistical approach. Their study concludes that Nigeria's economic growth has a positive correlation with gross capital formation, government expenditure and foreign direct investment.

The last four decades have recorded several oil price shocks and it is empirically clear that this has damaged the long term macroeconomic framework of Nigeria. Hence, it can be deduced that the total dependence on oil as a major export, its attendant corruption and weak institutions, as well as constant price volatility, are the major causes of poverty, low quality of education, relatively low life expectancy, low standard of living and under-development.

2.3.3.3 The South African economy and the gold price shock

South Africa is one of the leading producers of gold, producing an estimated 140 metric tons in 2016, the seventh highest mark in the world. The resilient gold mining sector has continued to make major contributions to South Africa's economy notwithstanding declining investment and the emergence of China as the number one gold producing economy. In recent years, the declining trend of commodity prices in the international market has hurt the gold mining industry. South Africa's gold mines have become depleted of their proven reserves, although they are still located on top of possible reserves. However, further investment in gold mining is not attractive in view of the low-commodity-price environment that has made it economically not viable to explore further. Furthermore, macroeconomic issues have left the country in a precarious position. Power outages and drought have hurt the agricultural sector and manufacturing respectively, leading to unemployment and devaluation of the local currency.

There are a number of studies attempting to establish a connection between commodity price and terms of trade. These studies often concentrate either on the persistence of commodity price shocks or how commodity price change affects terms of trade. In South Africa, the rise in the price of solid minerals meant an improvement in its terms of trade leading to high revenues. In a study empirically analysing the interrelationship between the price of minerals and the value of the South African rand, Frankel (2007) reports that an index of mineral prices is an important determinant of the value of the South African rand. This was particularly true in the times when the rand was strongly appreciating in real terms between the periods of 2003 and 2006. As observed by Aron, Elbadawi and Kahn (1997), it is possible that the exchange rate instability in South Africa is the direct result of previous terms of trade shocks caused by increases in commodity prices. In their study on the duration of terms of trade shocks on countries in Sub-Saharan Africa, Cashin and Pattillo (2000) find that the persistence of terms of trade shocks occurred consistently for about half the Sub-Saharan African countries. They also noted that South Africa exhibited long-lived terms of trade shocks. They went further to conclude that movement in the terms of trade of commodity-exporting countries of Sub-

Saharan Africa is a key determinant of macroeconomic performance and has a material effect on real national incomes. Furthermore, Ngandu (2005) in his work noted that commodity price volatility has a strong correlation with the relative value of the rand and that there is empirical evidence that explains the persistent nature of the impact of changes in commodity prices on the terms of trade, as well as the apparent co-movement that exists between commodity prices and the real exchange rate.

In summary, literature have shown that a strong correlation exists between the price of gold and the South African rand and, as such, it also impacts on export performance, the level of employment and output in manufacturing.

2.3.3.4 The Zambian economy and the copper price shock

Zambia is the largest producer of copper in Africa and holds about 10 percent of the world's copper deposits. The country's economy is dependent on the mining sector, which contributes about 10 percent to its GDP, about 1.4 percent of total employment, a further 70 percent of total export compared to a low rate of 2.1 percent for the manufacturing sector and is a major source of export revenue for the country. The Zambian economy is commodity export dependent and vulnerable to copper price shocks in the international market. Revenue from copper mining has traditionally been used for the development of Zambia and, therefore, international copper prices are known to influence the development prospects of Zambia. However, studies conducted by the International Monetary Fund (IMF) and the World Bank suggest that the mining sector has not significantly impacted on economic and sustainable human development.

Chizonde (2016) investigated the factors that influence economic growth in Zambia using the Autoregressive Distributed Lags (ARDL) Model with copper prices as one of the dependent variables. His result indicates that in the short-run, international copper prices only influence economic growth and in the long-run, economic growth is determined by crude oil prices, government spending, agricultural productivity and stable macroeconomic variables.

2.3.4 The Exchange Rate Volatility and Human Development

Several empirical researches have examined the effect of exchange rate volatility on economic growth and sustainable human development and findings from the literature shows that there are contrasting conclusions. Findings from some studies established the existence of a negative nexus, other studies demonstrated a positive correlation, while others did not find any significant relationship (Meniago and Eita, 2017).

For instance, the research work of Edwards and Levy-Yeyati (2005) and Shafi, Hua & Idrees (2015) led to the conclusion that exchange rate volatility has a positive relationship with economic growth. As shown in figure 2.1 economic growth impacts on government income/revenue, inflation and purchasing power parity which are established pathways that eventually also impacts positively on sustainable development. Chowdhury and Wheeler (2008) investigated the connection between exchange rate volatility and FDI flow using the vector autoregressive (VAR) method and found a significant and positive relationship. Furthermore, Jakob (2016) provided empirical evidence to support a significant and positive correlation between the fixed exchange rate and sustainable growth. Kasman and Kasman (2005) investigated the impact of exchange rate volatility on export volume in Turkey and concluded that exchange rate volatility has a positive and significant effect on export volume in the long run. Export volume has an impact on balance of trade and government revenue which has an impact of the capacity to fund SDGs.

On the other hand, several other studies have proven the negative relationship between exchange rate volatility and economic growth. For instance, Barguellil, Ben-Salha and Zmami (2018) and Hooper and Kohlhagen (1978) established that the volatile exchange rate has an inverse effect on economic growth through other transmission channels such as trade flows, inflation and FDI. Sekkat and Varoudakis (2000) in their study showed exchange rate volatility has a significant negative relationship with international trade. Also, Khosa, Botha, Pretorius (2015) and Arize, Osang and Slottje (2000) established an inverse relationship between exchange rate volatility and exports in developing countries. However, Aghion, Bacchetta, Ranciere and Rogoff (2009) discovered that negative impact of exchange rate volatility on economic growth appears to decline weaken in countries with high financial development index. In a study of SSA Countries, Oseni (2016) demonstrates a negative and significant relationship between exchange rate volatility and private consumption.

Nonetheless, some studies did not find any significant linkages between exchange rate volatility and growth. Clark, Tamirisa, Wei, Sadikov and Zeng (2004), Hondroyiannis, Swamy, Tavlas and Ulan (2008) amongst others, could not establish a linkage between exchange rate volatility and trade performance.

2.4 CONCLUSION

It is widely demonstrated in the literature that primary commodity markets provide substantial explanation of real exchange rate movements (Ayres et al., 2019). Most of the early studies related to this research topic are largely restricted to the oil and gas sector. A few other studies such as Balcilar et al., (2019); Churchill et al., (2019); Jain and Ghosh, (2013); Sari et al., (2010) etc investigated the dynamics of precious metal prices and exchange rate fluctuations. It appears that agricultural commodities have not received the same level of attention. Most of the research work focussing on agricultural product are concentrated on the nexus between individual primary commodity prices and real exchange rate developed/emerging countries. Their findings and conclusions often not relevant to SSA countries.

In accordance with the research work of the author, there are limited literature on the independent and joint effect of commodity prices and real exchange rate on the ability of SSA countries to attain the SDGs by 2030 as measured by the transmission channels expressed in the human development index. An important gap in the current literature is that past studies on the performance of primary commodity-exporting countries in SSA are not linked to the attainment of SDGs. To bridge this gap, this study has focused on the effects of primary commodity price shocks and the real exchange rates volatility on the attainment of SDGs in SSA. This is important and relevant in modern day discourse as most of the commodity-exporting countries in SSA react differently to shocks in commodity and foreign exchange markets but often occasioned by lower income and economic growth thereby significantly impacting on the ability of SSA countries to address the SDGs. This limitation is evidently observed in the HDI which serves as a measuring tool. After observing the findings of the relevant literature given above, this article addresses the following research questions (RQ):

RQ 1: Does exposure to commodity price fluctuations affect the achievement of Sustainable Development Goals of Sub-Saharan African countries?

RQ 2: Does a relationship exist between exchange rate volatility and the attainment of Sustainable Development Goals?

CHAPTER 3
METHODOLOGY

3.1 INTRODUCTION

The research methodology of this dissertation outlines the research strategy, methodology, research approach, model specifications, methods of data collection, sample selection, definition of variables and estimation techniques.

3.2 RESEARCH APPROACH

Research approach refers to the plans and procedures that includes defining broad assumptions and analysing detailed methods of data collection, analysis, and interpretation. Every research study sets out which approach is appropriate for the study. This decision is guided by the philosophical assumptions an approach brings to the study, research designs and specific research methods of data collection, analysis, and interpretation. There are three widely accepted research approaches that can be applied in any research study and they include: quantitative (approach of measurements and numbers), qualitative (approach of words and images) and mixed methods (approach of measurements, numbers, words and images), which is the combination or integration of qualitative and quantitative techniques (Creswell, 2003). This study adopts the quantitative method of research approach to explore the research problem.

3.2.1 Quantitative Research

The quantitative research approach in concerned with quantifying and analysing variables to ascertain causal results. It includes the utilization of numerical data on relevant statistical techniques to answer research questions. (Leedy & Ormrod 2001; Williams, 2011). Also, in the words of Aliaga, and Gunderson (2002), quantitative research is the explaining of a phenomenon involving numerical data gathering and the use of statistical techniques for analysis. Leedy & Ormrod (2001) and Williams (2011) observed that "quantitative research involves the collection of data so that information can be quantified and subjected to statistical treatment in order to support or refute alternative knowledge claims" Furthermore, Williams, (2011) remark that quantitative research starts with a statement of a problem, generating of hypothesis or research question, reviewing related literature, and a quantitative analysis of data. Similarly, (Creswell 2003; Williams, 2011) states, quantitative research "employ strategies of inquiry such as experiments and surveys, and collect data on predetermined instruments that yield statistical data" The main purpose of quantitative research deals with testing of hypothesis, looking at cause and effect as well as making a prediction. Furthermore, (Fraser Health Authority 2011, p 6) see quantitative research as "research based on traditional scientific research which generates numerical data and usually seeks to establish causal relationships between variables as well as using statistical methods to test the strength and significance of the relationships". Quantitative research requires the reduction of phenomena to numerical values in order to carry out the statistical analysis. In quantitative research, Variables are very essential because it is the phenomenon that is classified and quantified. The quantitative approach was selected for this study largely for the following main reasons:

- The approach is more scientific, objective, fast focussed and acceptable
- The approach aims for objectivity without bias
- Th approach seeks to establish the presence or lack of a cause-and-effect relationship while at the same time making predictions. This is especially relevant as the author is looking for a correlation between commodity prices, exchange fluctuations and the attainment of SDGs in SSA. The quantitative approach will best apply to this research problem.

3.3 RESEARCH DESIGN

This study applied the Quantitative Research Approach to answer the research questions in section 1.2 above. The Quantitative Research Approach focusses on the collection of numerical secondary data as a representation of a larger population to explain the phenomenon that exists between the volatility of commodity prices, exchange rate fluctuations and the attainment of the 2030 Sustainable Development Goals by Sub-Saharan African countries. This approach is designed to follow objective measurements and the numerical analysis of data collected from pre-existing statistical data with the use of computational techniques such as the formulation of hypotheses, the estimation of the size of the phenomenon of interest, the collection of adequate unbiased data, and the statistical methods used to test predetermined hypotheses regarding the relationship between the dependent and independent variables.

The research undertaken is a quantitative correlational study. In particular, cross-country and panel data analyses are used to compare a set of countries in order to test the correlation between the variables: the human development index (HDI), commodity terms of trade index

(CTOT_INDEX), real effective exchange rate index (REER_INDEX), commodity terms of trade volatility (CTOT_VOL), real effective exchange rate volatility (REER_VOL), external financial flows (LN_EFF), financial development index (FD_INDEX) and the governance index (WG_INDEX).

This dissertation made use of a regression analysis technique that reflects the dynamic and cross-sectional nature of the data obtained for investigation in order to examine the implications of commodity resource dependence and exchange rate fluctuations on the attainment of sustainable development goals across 45 Sub-Saharan African countries spanning a 20-year period (1999-2018).

A dynamic panel data observation was obtained for the analysis with the following key features:

(i) Collected data is made up of cross-sectional units and time series observations. The cross-sectional units include countries that run from 1………. N while the time of observations are the time period that run from 1………. T.

(ii) The dynamic nature of the panel data obtained is such that the observations of the variables are also dependent on the previous period observations.

The results of the research were expected to identify the existence, significance and direction of the relationship between commodity resource dependence variables and sustainable human development, and by so doing determine the capacity of the respective SSA countries to attain the Sustainable Development Goals.

3.3.1 Sample

The sampling size for this research was defined to include the economic data of forty-five (45) out of the forty-six (46) countries listed by the United Nations as Sub-Saharan African countries (see Appendix I) over a timeframe of 20 years from 1999–2018. The availability of data for the six regression variables was the major factor that determined SSA countries to be included in the sample.

3.3.2 Data Source and Period

This dissertation used a panel data set covering forty-five (45) Sub-Saharan African countries over a 20-year period from 1999–2018. The selected timeframe was as a result of data availability, the years before 1999 and after 2018 are excluded due to data unavailability. All the data used in this study was secondary data collected from the United Nation Development Program database, the UN COMTRADE database, the International Monetary Fund database and the World Development Indicators (WDI) database publications by the World Bank.

Furthermore, this dissertation collected data from a comprehensive commodity terms of trade index database of 182 countries published by Gruss and Kebhaj (2019) and the Bruegel database of real effective exchange rate index of 178 countries published by Darvas (2012).

The commodity terms of trade index database comprise composite price of 45 primary commodities and are particularly suitable to regression models that have to contend with exogeneity issues (Gruss and Kebhaj, 2019). Similarly, the real effective exchange rate index database is made up of CPI-based real effective exchange rate (REER) data derived from input parameters such as the bilateral exchange rates, consumer price indices and a weighted matrix.

3.4 DYNAMIC PANEL MODEL

The estimation technique used in this study is the Generalized Method of Moment (GMM) by Arellano and Bond (1991). GMM was applied in a dynamic panel data to estimate the parameters of the regression model.

3.4.1 Model Specification

In examining the impact of commodity price fluctuation and exchange rate volatility on the attainment of Sustainable Development Goals in Sub-Saharan Africa, the selected variables for analysis were informed by the literature review set out in Chapter 2. The model specification for this dissertation is based on Ross's (1999) economic explanations of the 'resource curse' hypothesis described in sub-section 2.2.1.2.

This study presents dynamic models with the following specification:

$$HDI_{i,t} = \beta_0 + \beta_1 CTOT_{INDEX_{i,t}} + \beta_2 CTOT_{VOL_{i,t}} + \beta_3 REER\_INDEX_{i,t} + \beta_4 REER\_VOL_{i,t} + \beta_5 X_{i,t} + \varepsilon_{i,t}$$

where t denotes year of data observation and i denotes country; HDI represents Human Development Index (dependent variable) which is a proxy for Sustainable Development Goals; CTOT_INDEX represents Commodity Terms of Trade Index; CTOT_VOL represents Commodity Terms of Trade Volatility; REER_INDEX represents Real Effective Exchange

Rate Index; REER_VOL represents Real Effective Exchange Rate Volatility; $X_{i,t}$ denotes a vector of control variables such as External Financial Flow (EFF), Financial Development Index (FD_INDEX) and Governance Index (WG_INDEX). $\varepsilon_{i,t}$ the error term.

3.4.2 Description of Regression Variables

According to UNCTAD and FAO (2017), the impact of commodity dependence is always immediately noticed in the terms of trade, fiscal and monetary policy challenges and micro-level production and the consumption patterns of the SSA countries. A decline in the price of primary commodities in the international market generally leads to Terms-of-Trade Shock, which translates into supply shock and declining revenue that adversely affects economic growth and development outcomes. Therefore, the following variables were selected with a discussion of their justification effect on the impact of commodity price and exchange rate fluctuation on sustainable development.

3.4.2.1 Dependent variables

Human Development Index (HDI): This is the geometric mean of normalised indices for the three dimensions of human development which covers life expectancy, the quality of education and the standard of living. It is a summary measure of average achievement by individual countries by assigning quantitative and qualitative scores to the indicators. The HDI stresses that a country has to implement policies that encourage usage of a nation's economic wealth for the welfare of its citizens (Omodero, C. O., 2019).

3.4.2.2 Independent variables

Commodity Terms of Trade Index (CTOT_INDEX): These are market prices that are associated with commodity purchasing. Commodities can be priced on weight, or by standard unit. Prices are determined by the open market supply and demand. A drop in commodity prices in the international markets can increase the incidence of poverty and poor human development from low spending on health, education and infrastructure (Agri, E. M., Inusa, M. D., & Kennedy, N. D. 2016). Sub-Saharan African countries are known to have faltered in this regard; hence a low commodity price environment is likely to reverse the progress made in promoting economic growth and sustainable human development outcomes. This is expected to significantly impact on SDGs.

In order to focus on the effects of commodity price fluctuations on SSA countries, the

CTOT_INDEX data is derived by transforming the real commodity prices through the use of the ratio of weighted real commodity export prices to weighted real commodity import prices, as follows:

$$CTOT_{INDEX_{i,t}} = \prod_{j} \left(\frac{COMM_{PRICE_{j,t}}}{MUV_{INDEX_t}} \right)^{X_{j,i}} \div \prod_{j} \left(\frac{COMM_{PRICE_{j,t}}}{MUV_{INDEX_t}} \right)^{M_{j,i}}$$

where $COMM_{PRICE_{j,t}}$ is commodity price for each commodity, MUV_{INDEX_t} is a manufacturing unit value index, X_{ji} is the ratio of commodity exports to GDP and M_{ji} is the ratio of commodity imports to GDP. The weighting is done by firstly grading exports and imports as a proportion of total trade and then by the ratio of total trade in each of the country's GDP. (Spatafora, N., & Tytell, I., 2009).

The overall goal is to examine how commodity price changes affect the dynamics of the human welfare of a country measured by the Human Development Index.

Therefore, a nexus between price movements on global commodity markets and sustainable human development can be established.

H_o: There is no relationship between commodity prices and the Human Development Index in Sub-Saharan Africa Countries.

Commodity Terms of Trade Volatility (CTOT_VOL): Commodity prices in the international market are unstable, unpredictable and governments of commodity dependent countries have experienced difficulties in implementing sound macroeconomic policies during adverse commodity price movements. Furthermore, commodity price volatility has been linked to the livelihoods of poor households in developing countries.

To examine commodity price uncertainty in developing countries, Dehn (2000) built a geometrically weighted index of 57 commodity prices by using the methodology of Deaton and Miller (1995). The database by Gruss and Kebhaj (2019) follows the same methodology. However, the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) was used to generate the measure of volatility using the constructed commodity price index. (See 3.3.3 Modelling volatility).

Therefore, a relationship between price volatility in global commodity markets and sustainable human development outcomes can be established.

H_o: There is no relationship between commodity price volatility and the Human Development Index in Sub-Saharan African Countries.

Real Effective Exchange Rate (REER_INDEX): An exchange rate is the relative value of one nation's currency against the currency of another nation or economic zone. This study used the real effective exchange rate index as a measure of currency value. This choice allowed the study to benefit from the REER comparison of a nation's currency value against the weighted average of a basket of other major currencies. This study relied on the REER_INDEX data computed by Darvas (2012) and which gives the benefit of how the currencies of SSA countries fluctuate against many others, as well as incorporating the international trade capacities of SSA. Based on empirical data, the REER index is a better measure than the bilateral exchange rate.

Generally, it is a well-established fact that currency mismatch risks can be attributed to commodity price shocks and its persistent occurrence can lead to a sudden decline in the exchange rate, commodity price drop is often associated with a decline in foreign currency earnings. Governments of commodity dependent countries usually react to this phenomenon by issuing US dollar denominated bonds to shore up the revenue gap and thus maintain the domestic currency value. Hence, domestic currency devaluation could impact on productivity growth, high inflation and the reduction of foreign currency reserves, thereby triggering a decline in public spending on physical infrastructure and social investment programs with a significant impact on sustainable development.

Therefore, a mutual relationship between the real effective exchange rate and sustainable human development outcomes can be established.

H_o: There is no relationship between exchange rate and the Human Development Index in Sub-Saharan African Countries.

Real Effective Exchange Rate Volatility (REER_VOL): This study relied on the real effective exchange rate (REER) index formulated by Darvas (2012) in which the bilateral exchange rates of each SSA country were compared based on a weighted matrix on the consumer price index. Furthermore, the GARCH (1, 1) iterative process was used to generate the real effective exchange rate volatility series for annual REER_INDEX data by the use of a mean equation and a conditional variance equation as specified by Oseni (2016). The obtained annual volatility for each country was included in the panel data. (See 3.3.3 Modelling volatility).

Therefore, a relationship between real effective exchange rate volatility and sustainable human development outcomes can be established.

H_o: There is no relationship between real effective exchange rate volatility and the Human Development Index in Sub-Saharan African Countries.

3.4.2.3 Control variables

External Financial Flow (LN_EFF): External financial flow is the sum total of gross private capital flows made by firms, remittances by individuals and official development assistance from multilateral institutions into another country for business and development purposes. They are the control variables selected for use in this study.

Strong variations of external financial flows borne out of commodity price volatility are a probable cause of economic disruption that can exert pressure on balance of payments and Government revenue (Combes, J. L., Kinda, T., Ouedraogo, R., & Plane, P., 2019). This can lead to domestic currency devaluation thus triggering a decline in public spending on physical infrastructure and social investment programmes. Therefore, a nexus between external financial flow and sustainable human development can be established.

H_o: There is no relationship between capital flow and the Human Development Index in Sub-Saharan Africa.

Financial Development Index (FD_INDEX): This is a composite dataset of nine indicators drawing from the work of King and Levine (1993) and several other researchers in the literature. The literature collectively defines the level of development of financial institutions and financial markets in terms of indicators such as accessibility, depth and efficient allocation of resources. The composite index of financial development is thus computed from the cumulative weighted average of these indicators. This study makes use of the World Bank statistical data on financial development index ranking.

H_o: There is no relationship between the financial development index and the Human Development Index in Sub-Saharan Africa.

Governance Index (WG_INDEX): The governance index is a dataset of world governance indicators developed by Kaufmann, Kraay and Mastruzzi (2010) for the World Bank. The dataset contains aggregate indicators of six broad areas of governance including: "Voice and Accountability, Political Stability, Government Effectiveness, Regulatory Quality, Rule of

Law and Control of Corruption" (Kraay and Mastruzzi, 2010). The data obtained are based on underlying data sources that report on the perceptions of governance from a large number of survey respondents and expert assessments.

H_o: There is no relationship between the governance index and the Human Development Index in Sub-Saharan Africa.

Table 3.1: Summary of Variables

Variable	Symbols	Expected signs
Dependent variable		
Human Development Index	HDI	Positive
Independent variables		
Commodity Terms of Trade Index	CTOT_INDEX	Positive
Commodity Terms of Trade Volatility	CTOT_VOL	Positive
Real Effective Exchange Rate Index	REER_INDEX	Positive
Real Effective Exchange Rate Volatility	REER_VOL	Negative
Control variables		
External Financial Flow	LN_EFF	Negative
Financial Development Index	FD_INDEX	Positive
Governance Index	WG_INDEX	Positive

Source: Author's own compilation from research data

3.4.3 Modelling Volatility

The standard deviation has been widely used in the literature as a measure of volatility for exchange rates and commodity prices. As observed by Alagidede & Ibrahim (2017), this approach has been criticised by several researchers who argue that firstly, it assumes exchange rates and commodity prices have a normal distribution and secondly, it fails to include past information of exchange rates and commodity prices. Therefore, a more robust approach to measuring volatility is the use of the autoregressive conditional heteroskedasticity (ARCH) or the generalised autoregressive conditional heteroskedasticity (GARCH). This thesis applied the GARCH model developed by Bollerslev (1986), largely because the GARCH model captures past values of the data and according to McKenzie (1999), the data for commodity prices and exchange rates are best known to follow the GARCH process. In the GARCH model, the real exchange rates and commodity prices depend on their preceding values for the mean equation. The conditional variance equation also captures the mean, information about the previous volatility (ARCH term) and the past forecast error variance or GARCH term. In order to reflect actual volatilities, the error term in the GARCH model is also allowed to have a time-varying variance that depends on the past behaviour of the series (Alagidede & Ibrahim, 2017).

To obtain conditional variance, the GARCH (1,1) specification of the mean equation and the conditional variance equation for the exchange rate index and commodity price index is utilised in generating the exchange rate, as well as the commodity price volatility series for the period and for each country in the sample and this is included in the dynamic panel data model loaded on EViews 12. Therefore, the derived volatility is the conditional variance computed from annual data for exchange rates and commodity prices.

3.5 ESTIMATION TECHNIQUES

This dissertation used the long, balanced and dynamic panel data to investigate the long-run interrelation that exists between commodity price change, exchange rate fluctuation and sustainable development goals in SSA. This study was designed to follow a method selection framework that ensured the use of an appropriate methodology for the time series data. The framework started with a panel data modelling structure. The choice of data structure allowed the research to benefit from the time series nature and cross-sectional properties. Ocran and Biekpe (2008) state that the panel data structure allows for greater flexibility in modelling differences in behaviour across countries in Sub-Saharan Africa.

In accordance with Hsiao (2007) and several other researchers, this thesis used the panel data analysis procedure considering the benefits it provides over and above the time series and cross-sectional data structure. The panel data structure is known to decrease the problem of collinearity between independent variables and also address issues of omitted variables that might be correlated with explanatory variables.

However, before proceeding with the estimation of the panel data, a sequence diagnostic test was performed in order to identify such potential problems as heteroscedasticity, autocorrelation and multicollinearity.

As mentioned in the methodology section, sustainable human development outcomes of today depend on past sustainable human development outcomes, and therefore, this study applied the dynamic panel model which is particularly useful when the dependent variable depends on its own past realisations:

$$Y_{i,t} = \delta Y_{i,t-1} + \beta X_{i,t} + \alpha_i + \varepsilon_{i,t} \quad \text{i = 1,…,N (individuals), t = 1,…,T (time)}$$

The lagged dependent variable, being a function of fixed effects, was correlated with fixed individual effects. An attempt was made to eliminate the fixed individual effect through a first difference transformation. This is what renders the ordinary least squares (OLS) and generalised least squares (GLS) estimators as inappropriate since the GLS and OLS estimators are biased, inconsistent and therefore, not appropriate for estimating a dynamic panel data model. Arellano and Bond (1991) conducted a study to compare the result accuracy or performance of the difference-GMM, OLS and within-group (WG) estimators. Their research showed that the difference-GMM estimator recorded the least bias and variance and therefore, concluded that the GMM estimator is a more efficient technique than the ordinary least squares estimator, because the OLS is not consistent in a dynamic data environment. However, the dynamic panel data model also has an endogeneity problem, since by the dynamic nature of the first difference transformation equation, the transformed lagged dependent variable is correlated with the transformed error term. Anderson and Hsiao (1982) attempted to solve this problem by using an Instrument Variable (IV) procedure with two choices of instruments and four steps to the estimation of parameters to control endogeneity. As observed by Hansen (1982), Arellano and Bond (1991) propose a method that makes use of all possible instruments. They obtain estimators through the use of moment conditions generated by lagged levels of the dependent variable with the transformed error term. These estimators, also known as difference GMM estimators, and the instrumental variables are unbiased.

The generalized method of moments (GMM) was proposed by Holtz-Eakin et al. (1988) and Arellano and Bond (1991) to solve the problems of omitted variables, reverse causality and simultaneity bias. According to Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998), the notable researchers on the subject, the GMM method provides a complete and adequate configuration for estimating asymptotically efficient results and has underlying assumptions that must be satisfied so as to obtain unbiased and efficient estimates. As observed by Nickell (1981), the GMM addresses important modelling issues such as unobserved heterogeneity bias, endogeneity and dynamic panel bias. The GMM method also considers issues relating to unbalanced panels and multiple endogenous variables. Essentially, there are two types of GMM estimators in a dynamic panel data structure: the first difference GMM estimator and the system GMM estimator. Arellano and Bond’s (1991) first difference GMM estimator usually starts with the elimination of fixed individual effects by taking the first difference of the linear regression model for each period, and thereafter, instrumenting the explanatory variables from the first difference regression model lagged by at least one period. Blundell and Bond’s (1998) model resulted in a system GMM whereby the at level regression model and the first difference regression model are combined and the resulting variables are then used to create instrumental variables by taking the first difference. This dissertation applies the difference generalised method of moment (difference-GMM) by Arellano and Bond as the appropriate estimation technique.

3.6 CONCLUSION

This dissertation examines the impact of commodity price change and exchange rate fluctuations on the capacity of Sub-Saharan African (SSA) countries to attain the UN 2030 agenda on sustainable development by using the dynamic panel data of forty-five (45) countries in Sub-Saharan Africa over a twenty-year timeframe (1999–2018). The study used the commodity terms of the trade index to measure commodity price behaviour, the real effective exchange rate index to measure bilateral exchange rate behaviour and lastly, human development index was used as a measure of human development outcomes that are consistent with the 17 SDG targets. The following control variables were included in the model specification: financial development index (a measure of resource allocation efficiency), external financial flow (a measure of foreign exchange flow) and governance indicators (a measure of institutional quality).

Furthermore, the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) modeling technique was used in predicting annual volatilities for commodity terms of trade and real effective exchange rate. The generated data was included in the panel data set and the Generalized Method of Moments (GMM) estimation technique was utilised in estimating the regression model.

CHAPTER 4
DISCUSSION OF FINDINGS

4.1 INTRODUCTION

The purpose of this section is to present empirical results obtained from modelling the relationship between the commodity terms of trade index, the real effective exchange rate index and the HDI for a panel data of 900 observations. The datasets are merged into one dataset in order to apply the estimation techniques on EViews 12. The estimation result is expected to identify the existence, significance and direction of the interrelationship between changes in commodity prices, currency fluctuations and the sustainable human development profile of Sub-Saharan African countries and by so doing provide further explanation on the capacity of the respective SSA countries to attain the UN Sustainable Development Goals by 2030.

The presence of multicollinearity was resolved by the specification of two regression models. Therefore, the difference GMM estimation results are obtained for two dynamic panel models. The first model introduces the CTOT_INDEX and REER_INDEX variables into the linear regression (Model 1), the second model introduces the CTOT_VOL and REER_VOL variables in a linear form (Model 2). Both models used the Human Development Index (HDI) as the dependent variable. The explanatory variables in Model 1 include (a) the one-period lagged HDI; (b) CTOT_INDEX; (c) REER_INDEX; (d) LN_EFF; (e) FD_INDEX; and (f) WG_INDEX. The explanatory variables in Model 2 include (a) the one-period lagged HDI; (b) CTOT_VOL; (c) REER_VOL; (d) LN_EFF; (e) FD_INDEX; and (f) WG_INDEX.

4.2 DESCRIPTIVE STATISTICS

Overall, there are 45 Sub-Saharan African countries in the sample based on data availability (see Appendix I for listed countries). The summary statistics presented below in Table 4.1 allowed for identifying a considerable heterogeneity across Sub-Saharan African countries. For example, commodity terms of trade volatility have a minimum value of 39.2054 and a maximum value of 126.4364, an illustration of the large variation across countries. The same diverse range is applicable to the real effective exchange rate volatility. In relation to the governance indicator, the negative mean value result infers that most SSA countries have to deal with the low quality of governance and institutions.

Table 4.1 Summary of Descriptive Statistics

Variable	Obs	Mean	Median	Max	Min	Std. Dev.
HDI	900	0.4729	0.4685	0.8010	0.0000	0.1305
CTOT_INDEX	900	99.2448	101.1400	127.0730	0.0000	11.0252
CTOT_VOL	900	99.2119	101.1148	126.4364	39.2054	10.4927
REER_INDEX	900	105.4701	100.5557	340.5590	40.1165	24.7721
REER_VOL	900	105.1813	100.8798	337.6353	40.3243	24.6679
LN_EFF	900	20.1705	20.4764	24.2264	0.0000	2.8597
FD_INDEX	900	0.1370	0.1084	0.6484	0.0188	0.0967
WG_INDEX	900	-0.5696	-0.5749	0.8747	-1.8942	0.5825

Source: Author’s own compilation from research data

NOTE: HDI=Human Development Index; CTOT_INDEX= Commodity Terms of Trade index; CTOT_VOL= Commodity Terms of Trade Volatility; REER_INDEX= Real Effective Exchange Rate; REER_VOL= Real Effective Exchange Rate Volatility; LN_EFF= Financial Development Index; FD_INDEX=External Financial Flow; WG_INDEX= Governance Index

The sample mean HDI of 0.4729 is well below the global average of 0.734 and developing countries’ average of 0.685 according to the UNDP Human Development Report (2018). The observed mean undoubtedly presents an accurate representation of the status of human development in the region. SSA is characterised by a low development index and this supports the need to stimulate inclusive growth towards the attainment of SDG.

4.3 MULTICOLLINEARITY RESULTS

In assessing the interlinkages between the variables, the correlation matrix was derived as shown in Table 4.2 below, correlating the dependent variable, the Human Development Index, with the independent variables. Using the recommended multicollinearity threshold of 0.7 (Kennedy, 2008), strong associations were observed between the REER_INDEX and REER_VOL (around 0.88) and CTOT_INDEX and CTOT_VOL (0.83). In order to address the potential multicollinearity associated with using highly correlated variables in the same models, two models were generated. The first model (Model 1) includes CTOT_INDEX and REER_INDEX while excluding CTOT_VOL and REER-VOL, while the second model (Model 2) includes CTOT_VOL and REER-VOL while excluding CTOT_INDEX and REER_INDEX as presented below:

$$HDI_{i,t} = \beta_0 + \beta_1 CTOT_{INDEX_{i,t}} + \beta_2 REER_{INDEX_{i,t}} + \beta_3 X_{i,t} + \varepsilon_{i,t} \quad \ldots\ldots\ldots 1$$

$$HDI_{i,t} = \beta_0 + \beta_1 CTOT_{VOL_{i,t}} + \beta_2 REER_{VOL_{i,t}} + \beta_3 X_{i,t} + \varepsilon_{i,t} \quad \ldots\ldots\ldots 2$$

Table 4.2 Correlation Matrix

Variables	HDI	CTOT_INDEX	CTOT_VOL	REER_INDEX	REER_VOL	LN_EFF	FD_INDEX	WG_INDEX
HDI	1							
CTOT_INDEX	0.033299	1						
	(0.3184)							
CTOT_VOL	0.032601	0.830503	1					
	(0.3286)	(0.0000)						
REER_INDEX	0.075596**	0.038028	0.036953	1				
	(0.0233)	(0.2544)	(0.2681)					
REER_VOL	0.062068*	0.021543	0.030386	0.88152	1			
	(0.0627)	(0.5186)	(0.3625)	(0.0000)				
LN_EFF	-0.015645	0.024065	0.072274**	-0.093479***	-0.084989**	1		
	(0.6393)	(0.4709)	(0.0302)	(0.005)	(0.0107)			
FD_INDEX	0.545879***	0.138194***	0.150617***	-0.017259	-0.016839	0.075284**	1	
	(0.0000)	(0.0000)	(0.0000)	(0.6051)	(0.6139)	(0.0239)		
WG_INDEX	0.342306***	0.212973***	0.265171***	-0.154684***	-0.107655***	0.018933	0.55155***	1
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0012)	(0.5706)	(0.00000)	

Source: Author’s own compilation from research data

NOTE: HDI=Human Development Index; CTOT_INDEX= Commodity Terms of Trade Index; CTOT_VOL= Commodity Terms of Trade Volatility; REER_INDEX= Real Effective Exchange Rate Index; REER_VOL= Real Effective Exchange Rate Volatility; LN_EFF = External Financial Flow; FD_INDEX = Financial Development Index; WG_INDEX= Governance Index. Values in parentheses are the p-values; ***, ** and * denotes significance at 1%, 5% and 10% respectively

4.4 PANEL DATA ANALYSIS (STATIONARITY, COINTEGRATION AND VECM)

The condition for an accurate GMM estimation is the stationarity of variables. Testing for stationarity properties of variables is fundamental towards determining the most suitable methodology for the dynamic panel data and also helps to avoid spurious regression by ensuring that financial variables follow a random walk. According to Holtz-Eakin et al. (1988) and Arellano (2003), testing for stationarity is particularly relevant since the issues associated with the non-stationarity of variables is noticeable in a panel data when the number of cross-sectional units (N=45) is much greater than time-series observations (T=20).

Four panel unit root tests are used to identify the stationarity of the variables used in this thesis and they include: (1) Levin, Lin, and Chu (LLC), (2) Im, Pesaran, and Shin (IPS), (3) Augmented Dickey Fuller - Fisher (ADF-Fisher) and (4) PP-Fisher. The stationarity test results are shown in Table 4.3 below.

Table 4.3 Summary of Panel Unit Root Tests Result

	LLC t-Statistics		IPS W-Statistics		ADF – Fisher Chi-Square		PP – Fisher Chi-Square	
	@Level	@First Difference	@Level	@First Difference	@Level	@First Difference	@Level	@First Difference
HDI	-7.1604 (0.0000)	-316.2740 (0.0000)	-14.6869 (0.0000)	-129.4870 (0.0000)	1206.4200 (0.0000)	2114.0400 (0.0000)	792.3040 (0.0000)	2396.4000 (0.0000)
CTOT_INDEX	-13.8662 (0.0000)	-59.3510 (0.0000)	-7.3549 (0.0000)	-25.4471 (0.0000)	378.3580 (0.0000)	693.4930 (0.0000)	638.0370 (0.0000)	944.3070 (0.0000)
CTOT_VOL	-5.3828 (0.0000)	-14.9636 (0.0000)	-2.9052 0.0018	-12.4843 (0.0000)	117.6920 0.0132	309.5680 (0.0000)	49.8725 0.9994	280.5640 (0.0000)
REER_INDEX	-0.8799 0.1894	-19.3581 (0.0000)	-1.4486 0.0737	-17.9686 (0.0000)	121.6170 0.0148	451.7360 (0.0000)	110.3630 0.0714	460.5590 (0.0000)
REER_VOL	-3.3678 0.0004	-15.1934 (0.0000)	-1.2437 0.1068	-12.7117 (0.0000)	124.8450 0.0089	328.4210 (0.0000)	54.3685 0.9989	302.1990 (0.0000)
LN_EFF	-8.5802 (0.0000)	-26.0429 (0.0000)	-3.8920 (0.0000)	-23.6115 (0.0000)	143.0230 0.0003	602.3490 (0.0000)	169.7450 (0.0000)	1851.6900 (0.0000)
FD_INDEX	-1.4501 0.0735	-21.9184 (0.0000)	0.4004 0.6556	-21.6822 (0.0000)	84.6558 0.6393	563.2210 (0.0000)	103.4220 0.1577	1426.3900 (0.0000)
WG_INDEX	-6.5823 (0.0000)	-33.3879 (0.0000)	-16.0094 (0.0000)	-41.5401 (0.0000)	1065.5700 (0.0000)	2128.9300 (0.0000)	558.7810 (0.0000)	5807.6100 (0.0000)

Source: Author's own compilation from research data

NOTE: HDI=Human Development Index; CTOT_INDEX= Commodity Terms of Trade index; CTOT_VOL= Commodity Terms of Trade Volatility; REER_INDEX=Real Effective Exchange Rate Index; REER_VOL= Real Effective Exchange Rate Volatility; LN_EFF=External Financial Flow; FD_INDEX=Financial Development Index; WG_INDEX= Governance Index; LLC=Levin,Lin, Chu: IPS=Im,Pesaran and Shin; ADF=Augmented Dickey Fuller. Values in parentheses is the p-values.

The HDI, CTOT_INDEX and WG_INDEX variables are stationary at level for all the unit root tests conducted. CTOT_VOL is stationary at level for LLC test only and REER_INDEX, REER_VOL and FD_INDEX are not stationary at level and only become stationary at first difference. The results of the panel unit root tests as illustrated in table 4.3 above show that the panel dataset is consistently stationary at first difference. Therefore, since all the variables are stationary at first difference, the panel cointegration test should be performed to examine the presence of a long-run equilibrium relationship among the variables. Two panel cointegration tests: the Pedroni residual cointegration test, and the Kao residual cointegration is applied and the cointegration test results presented in Table 4.4 below.

Table 4.4 Summary Results of Cointegration Test

		Model 1		Model 2	
Cointegration Test	Statistics	Statistic	Prob.	Statistic	Prob.
Pedroni Residual Cointegration Test	within-dimension				
	Panel v-Statistic	-0.39586	0.65390	0.52179	0.30090
	Panel rho-Statistic	1.12898	0.87050	0.82917	0.79650
	Panel PP-Statistic	-12.15160	0.00000	-13.62193	0.00000
	Panel ADF-Statistic	-13.02641	0.00000	-15.05490	0.00000
	between-dimension				
	Group rho-Statistic	5.53639	1.00000	5.87258	1.00000
	Group PP-Statistic	-6.45573	0.00000	-5.37920	0.00000
	Group ADF-Statistic	-7.17529	0.00000	-6.44038	0.00000
Kao Residual Cointegration Test	ADF	-19.17830	0.00000	-18.84251	0.00000

Source: Author's own compilation from research data

The results of the two panel cointegration tests demonstrate that the variables in the two models (i.e., Model 1 and Model 2) are cointegrated; implying the existence of a long-run equilibrium relation between the variables of each model. This is validated with the Vector Error Correction Model (VECM) test. The VECM test result is shown in Table 4.5 below.

Table 4.5 Summary Result of VECM Estimation

	Model 1				Model 2			
	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.063	0.008	-7.733	0.000	-0.055	0.008	-6.921	0.000

Source: Author's own compilation from research data

The VECM estimation results for Models 1 and 2 show that the error coefficient (C(1)) is negative and significant, which implies a long-term equilibrium relationship is present amongst the variables, and therefore, the models will converge to the long-term equilibrium relationship.

4.5 REGRESSION RESULTS: ARELLANO-BOND DIFFERENCE GMM

After conducting the panel data analysis and diagnostic tests, Arellano and Bond's (1991) GMM estimation process was used to obtain estimation results. Other statistical tests such as the serial correlation test and the Sargan-Hansen test was performed to establish the validity of the regression results. The Sargan-Hansen test inferred that the lagged variables are valid instruments while the serial correlation test could not reject the no serial correlation hypothesis. However, the regressions were controlled for autocorrelation by organizing the panel data chronologically. The presence of autocorrelation implies that a positive residual is succeeded by another positive residual, and the other way around for negative residuals. To control this, the data is sorted in ascending order, starting with the data for 1999.

4.5.1 Difference GMM Estimation Result

The GMM estimation results for Models 1 and 2 are presented in Table 4.6 below. In both Models, the lagged endogenous dependent variable, HDI(-1), is positive and statistically significant at 1% which points to the existence of a dynamic relationship in the model. The inference that is drawn from this result is that an increase in human development index (HDI) in any given year, implies an improvement in HDI in the following year. The positive and strong coefficient of the lagged value of HDI suggests that sustainable human development and SDGs progress improves slowly over time. This assertion is validated by Nkurunziza, Tsowou and Cazzaniga (2017).

The impact of commodity price (CTOT_INDEX) on sustainable human development outcomes (HDI) is positive and statistically significant at 5% level amongst SSA countries; so, an increment of 1% in CTOT_INDEX leads to an increase of 0.019% in HDI in the long run, ceteris paribus. Therefore, positive commodity price movement results in an improvement in the TOT followed by increased foreign exchange inflow which leads to the increase of the REER, increased real output growth and promotion of domestic export in the long run. This is supported by the research work of Kassouri and Altıntas (2020). In their respective research work, Easterly et al. (1993), Sala-i-Martin and Barro (1995), and Mendoza (1997) show that terms of trade are sound determinants of economic welfare.

Table 4.6. Difference GMM estimate

Dependent Variable: HDI	Model 1		Model 2	
	Coefficient	t-Statistic	Coefficient	t-Statistic
HDI(-1)	0.916784*** (0.00000)	366.331	0.936588*** (0.00000)	128.637
CTOT_INDEX	0.000187*** (0.00000)	8.258		
REER_INDEX	0.00000446** (0.04240)	2.033		
CTOT_VOL			0.000271*** (0.00000)	28.861
REER_VOL			-0.000051*** (0.00000)	-5.982
LN_EFF	-0.0000199 (0.69440)	-0.393	-0.000112** (0.0241)	-2.335
FD_INDEX	0.145808*** (0.00000)	39.379	0.1128*** (0.00000)	141.566
WG_INDEX	-0.010121*** (0.00000)	-15.573	-0.011628*** (0.00000)	-25.858
Hansen's J test (p-value)	44.917 [0.311]		45.417 [0.293]	
Arellano-Bond AR(1): F[p-value]	-1.724 [0.085]		-0.0001 [0.999]	
Arellano-Bond AR(2): F[p-value]	1.270 [0.204]		0.0001 [0.999]	
Countries	45		45	
Observations	810		810	

Source: Author's own compilation from research data

NOTE: HDI=Human Development Index; CTOT_INDEX= Commodity Terms of Trade Index; REER_INDEX= Real Effective Exchange Rate Index; CTOT_VOL= Commodity Terms of Trade Volatility; REER_VOL= Real Effective Exchange Rate Volatility; LN_EFF = External Financial Flow; FD_INDEX = Financial Development Index; WG_INDEX= Governance Index. ***, ** and * denotes significance at 1%, 5% and 10% respectively.

Furthermore, as explained by Spatafora and Tytell (2009) and cited by Emara, Simutowe and Jamison (2015), the increase in CTOT_INDEX is a net trade gain on account of a commodity price increase. Therefore, an increase in the CTOT_INDEX infers a statistically significant and positive impact on economic welfare and sustainable human development outcomes expressed through GDP per capita growth rate. Deaton and Miller (1995) also notes that SSA economies are historically heavily dependent on primary commodities and only achieve better economic performance when the price of commodities are trending upwards. Similarly, empirical results of this dissertation suggest that the real effective exchange rate index (REER_INDEX) is statistically significant at 5% level and positively affects sustainable human development. A statistical interpretation of this relationship will mean that an increase in the real effective exchange rate implies an increase in the real output growth, leading to the devaluation of the domestic currency in the long term and in turn the promotion of domestic exports. This scenario undoubtedly has a major multiplying effect on economic and social development outcomes. In addition, there is a large body of literature confirming the positive correlation between the real effective exchange rate (REER_INDEX) and economic growth. Findings from previous studies conducted by Chen and Rogoff (2003), Cashin et al (2004), Coudert, Couharde and Mignon (2015) and Boubakri, Guillaumin and Silanine (2019) suggest that in the long run, REER_INDEX of commodity-exporting countries in SSA exert a significant and positive effect on CTOT_INDEX which also has a positive correlation with HDI. This behaviour of the real effective exchange rate is to a large degree attributed to the overdependence of SSA countries on export of primary commodities. As similarly observed by Hausmann et al. (2005), economic growth is often correlated with real exchange rate depreciations. Di Nino, Eichengreen and Sbracia (2011) also establish that currency undervaluation has a positive relationship with economic growth for a long panel dataset over the period 1861-2011. In summary, the researchers in the literature have shown that currency undervaluation supports economic growth through increased exports.

The impact of commodity price volatility (CTOT_VOL) on sustainable human development outcomes (HDI) is positive and statistically significant amongst SSA countries; so, an increment of 1% in CTOT_VOL leads to a 0.0271% increase in HDI in the long run, ceteris paribus. The CTOT_VOL often implies that increasing the price of primary commodity products drives an increase in export revenue, increased foreign inflow and improved TOT. According to the works of Jawaid and Waheed (2011), the terms of trade volatility was shown to have a significant and positive effect on economic growth. Edwards (2007) also finds a positive but insignificant impact of trade volatility on economic growth. Stastny and Zagler (2007) also confirm the robust and positive impact of output volatility on economic growth. Therefore, the positive impact of terms of trade volatility on economic growth is logical and will be a recurring phenomenon as SSA countries face more shocks from increased interdependency. Also, the empirical results of this thesis shows that real effective exchange rate volatility (REER_VOL) has statistically a significant and negative relationship with the level of human development/SDG attainment in the long run, ceteris paribus. An increase in the real effective exchange rate volatility implies weak macroeconomic variables and an adverse effect on the financial system, and thereby, unfavourably impacting on sustainable human development outcomes. This position is supported in literature by the works of Aghion et al. (2009) when they demonstrated that the inverse effect of real exchange rate volatility on economic growth diminishes in countries with well-developed financial systems and during periods of high exchange rates fluctuation, foreign trade, investments and economic growth, capital movements and international trade are usually negatively affected. In their study, Ahiabor and Amoah (2019) observed that real effective exchange rate volatility has a statistically significant and negative effect on economic growth in Ghana. Similarly, Alagidede and Ibrahim (2017) note that excessive volatility has an adverse effect on economic growth and Bagella, Bechetti and Hasan (2006) show that volatility is inversely proportional to growth of per capita income.

The regression result shows that the impact of external financial flows (LN_EFF) on sustainable human development outcomes (HDI) is negative but only significant at the 5% level in Model 2, which essentially implies that external financial flows have an adverse effect on economic and social development outcomes. SSA countries are largely constrained by limited savings and financial resources and as such, over the years, they have attracted an unprecedented flow of external finance (remittances, foreign aids and ODA and FDI) to bridge the gap between domestic supply and demand for finance. However, the presence of weak institutions, poor governance and corruption have hindered the long-term effect of external finance on productivity and thus slowed the prospect for economic growth, poverty eradication and sustainable development. Furthermore, a sizable chunk of external finance is in the form of portfolio investments which are unstable, do not enhance the productive sector and exert an adverse impact on economic and social development.

Findings from available studies on this subject indicate that the conclusions are mixed. Kapingura and Alagidede (2016) cite the Economic Commission for Africa (2006) report which shows that external financial flows exhibit negative effects on SSA economies (Dutch disease effects). The increase in external financial flow typically increases the demand for domestic currency resulting in currency appreciation. Appreciation of domestic currency means a reduction in the competitiveness of the receiving country thus making imports cheaper and depleting the country's foreign exchange reserves. According to findings by Kapingura (2018), the external financial flows also increase a country's vulnerability to high volatility and unpredictability. Another point of view was presented by Macias and Massa (2009) in which the 2008 global financial crisis was identified as impacting negatively on the volume of external financial flows to developing countries as donor countries cut budgets and focused on their domestic economy. In the research work of Combes et al. (2019), external financial flows can affect economic growth both directly and inversely. They also note that the instability of FDI and portfolio investments exacerbates the instability of economic growth. In conclusion, it can be inferred from the estimation result of this thesis that SSA countries require trade and investments that enhance productive capacity rather than foreign aid in order to promote sustainable development.

The financial development (FD_INDEX) coefficient is positive and statistically significant at the 1% level in Models 1 and 2 which implies that a 1% increase in the financial development of SSA countries will respectively result in a 14.581% and 11.28% increase in sustainable human development in the long run, ceteris paribus. This is in accordance with economic and expectation theories which defines that the efficient allocation of resources within the economy has a direct link to the welfare growth of the economy.

The impact of financial system development on economic growth and sustainable human development have been extensively researched and analysed in the literature. According to Chuah and Thai (2004), all the research findings can be summarised under four hypotheses: the first being the supply-leading hypothesis which hypothesizes the direction of causality flows from financial development to economic growth. A well-developed financial sector will provide financial products and services to increase the efficiency of intermediation and a more efficient allocation of resources, thus prompting long-term economic growth. The second hypothesis is the demand-following theory which states that economic growth leads to financial development. Demetriades and Hussein (1996) validate this theory when they proved that economic growth induces an increased demand for financial services and the deepening of the sector. The third hypothesis is the bi-directional causality hypothesis which is a combination of the supply-leading and demand-following hypotheses. It is based on the works of Greenwood and Jovanovic (1990), Berthelemy and Varoudakis (1996), Blackburn and Hung (1998) and Harrison, Sussman and Zeira (1999). It postulates that financial deepening and economic growth are mutually or bi-directionally causal. Lastly, the fourth theory is the independent hypothesis which states that financial deepening and economic growth are causally independent. Lucas (1988) argues that, at best, financial deepening plays a very minor role in economic growth, while Stern (1989) ignores the role of financial development in the growth process.

According to Pagano (1993), the academic theories that underpin the relationship between financial intermediation and economic development is attributed to the research work of Schumpeter (1912), McKinnon (1973) and Shaw (1973), who provided statistically significant evidence to prove the positive correlation between financial development and economic growth. McKinnon (1973) also studied the interlinkages between the financial system and economic development and concluded that a well-organised and operative financial system accelerates economic growth. Another influential study on the subject was done by King and Levine (1993). They demonstrate a strong positive link between financial development and economic growth and conclude that financial development has predictive powers for future economic growth. They use their finding as evidence of a causal relationship between financial development and economic growth. With reference to Sub-Saharan Africa, Gelbard and Pereira Leite (1999) found that even though the region only recorded modest progress in terms of developing its financial systems, there is much empirical evidence that infers the positive relationship between financial system development and economic growth which also has a snowball effect on human development and SDGs progress in the region.

Lastly, the governance index (WG_INDEX) coefficient is negative and significant at the 1% level, thereby presenting an adverse impact on the Human Development Index. This result is not surprising considering the low level of institutional quality amongst SSA countries. In fact, Hechmy (2016) rightly notes that financial systems are positively impacted by institutional quality only at a certain threshold of institutional development and most SSA countries have not attained that limit. A case in point is the general improvement in the legal and regulatory framework amongst SSA countries which has taken a long time to have any meaningful impact on the socio-economic development of the region. Another potent explanation for the negative regression result can be seen in how widespread war, political unrest, and terrorism in the region has resulted in a burgeoning informal financial sector which does not promote efficient resource allocation and thereby reverses the usually expected relationship between institutional quality and sustainable human development outcomes. As observed by several researchers such as Acemoglu, Johnson, Robinson and Yared (2008), Levine (1998), Barth, Nolle, Phumiwasana and Yago (2003) and Wurgler (2000), the financial reforms of each SSA country have not had any significant favourable impact on the financial systems. This is because almost all SSA countries have less developed and weak institutions (Hechmy, 2016). Corruption, political instability, rule of law, government ineffectiveness, inadequate accountability and unreliable regulatory frameworks are immensely responsible for the current economic and human welfare underdevelopment of the region.

CHAPTER 5
CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

The economic and human development models of the last couple of decades have led to the emergence of key elements that have enhanced the global standard of living. The global economic system is increasingly becoming more integrated through the global network of trade, communication, immigration and transportation, allowing for increased international trade, and employee and capital mobility. However, the emergent economic growth and development model has triggered the unacceptable consequences of depletion on natural resources and the environment. In recent times, environmental concerns and issues around sustainability are on the front burner and a new idea of parallel economic growth and environmental protection is rapidly emerging. This situation led to the UN 2030 Agenda for Sustainable Development. This sustainable development framework shaped the foundation for a paradigm shift, where further economic growth could be achieved alongside human development outcomes defined via specific goals, also known as SDGs.

This dissertation focused on the linkages between commodity prices, exchange rate fluctuations and sustainable development in Sub-Saharan Africa. This study attempts to add to the existing body of knowledge by applying the appropriate econometric model that identifies the significant behaviour of commodity prices and exchange rates that affect sustainability and, by extension, the capability of SSA countries to achieve the SDGs by 2030 under the current economic model. Therefore, this thesis attempted to demonstrate reliable conclusions that could employed in the basis for future policy making in SSA countries. General and specific policy directions are recommended for SSA countries in line with the region's peculiar economic conditions.

5.2 SUMMARY AND CONCLUSION

The derived econometric model for this study included one dependent variable, one lagged dependent variable and seven independent variables. All the variables (except external financial flow) proved to be statistically significant. From the results of the estimation as presented in Chapter 4, we could argue that 'financial development' and 'governance indicators' have the highest coefficient values and should be examined with greater interest. This implies that for SSA countries to attain the SDGs, emphasis should be on developing their financial systems for a more efficient resource allocation while at the same time improving governance and the quality of their institutions. Indeed, the negative sign of the governance index, external financial flow (when added to the model) and the real effective exchange rate, together with the positive sign of commodity terms of trade index and financial development index, appears to establish the distortions of the current economic growth and development model amongst SSA countries. These findings bring to the fore the need for an overall transformation of the current economic and human development framework thus making a strong case for the diversification of the economies of SSA countries to increase sustainable industrial productivity and improve trade performance to drive human development outcomes.

5.3 POLICY RECOMMENDATIONS

The regression estimates presented in Chapter 4 are indicative of the presence of the ‘resource curse’ through the transmission channels of commodity terms of trade and the real effective exchange rate amongst SSA countries. In order for SSA countries to attain the SDGs by 2030, this dissertation recommends the following:

1. The improvement of policy alignment, coordination and cooperation for the sustainable management of natural resources and the reduction of risks from the global commodity market. This will involve implementing effective decision-making processes based on economic, market and environmental data. Continuous investment in the commodity sector needs to be implemented to increase productive capacity in a sustainable manner.

2. One of the key implications for policy makers and development economists emanating from the research findings of this thesis is that SSA countries cannot afford to overly rely on foreign exchange inflows from upward trending commodity prices, especially when they are substantial. Instead, the appropriate policy response must focus on the effective management of exchange rate appreciation risks associated with commodity price change. In addition, SSA countries should proactively implement homegrown and fit for purpose macroprudential strategies to stabilise exchange rates in the short-term and mitigate any form of systemic risk in order to promote efficient resource allocation while also maintaining adequate foreign reserves from other sources. Furthermore, SSA policy makers ought to adopt measures that will prioritise maintaining a healthy balance between capital inflows and outflows. Lastly, SSA countries should begin to modernise their economies and deepen its economic management capabilities through the use of modern macroeconomic management tools, empirical based strategies and globally-rated skillsets to better manage capital accounts, foreign reserves and aggressively enforce diversification strategies to

improve demand for locally manufactured goods and services while also re-positioning the productive sector to compete in the global markets. These ideas are profoundly crucial towards mitigating a real exchange rate crisis in the long-run.

3. There is an urgent need to develop the financial systems in SSA in order to stimulate real growth through the efficient allocation of capital to producers. This should be strategically directed towards the controlled exploitation of natural resources and the enhancement of productive capability in each country's dominant primary commodity. SSA countries will need to protect and nurture its industries in their infancy while at the same time fostering intra-Africa trade.

4. SSA countries should implement strategies to mitigate the occurrence of political instability, high and uncontrollable incidence of corruption as well as improve the effectiveness of government actions and decision-making to enhance the quality of regulation. Furthermore, the control of corruption, respect for democratic principles and respect for the rule of law are strategic imperatives necessary for the success of any developmental policy intending to promote sustainable economic growth and human development outcomes. Thus, it is noted that government effectiveness, control of corruption, political stability and regulatory quality are vital for human development. The governments of SSA countries should establish metrics to measure and control these indicators in order to improve the wellbeing of its citizenry.

5.4 AVENUES FOR FUTURE RESEARCH

To conclude, one of the limitations of this thesis was not being able to examine the impact of social capital on human development. Social capital in the literature is generally accepted as a way of incorporating the role of values and norms in economic development. Norms that give rise to social capital often include behavioural patterns around sincerity, loyalty, cooperation and reciprocity. They are usually determined by the level of confidence and trust between economic agents. The relationship between social capital and human development is explained by the social contract theory introduced by early modern scholars such as Thomas Hobbes, John Locke, Samuel Pufendorf, and Hugo Grotius. Future research could be structured to provide further insights into the interaction between social capital and human development, and specifically ascertain if the relationship between the presence of social capital and institutional and financial development is likely to lead to sustainable human development outcomes.

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APPENDIX I: LIST OF SUB-SAHARAN AFRICAN COUNTRIES

Country	Country_ID
Angola	1
Benin	2
Botswana	3
Burkina Faso	4
Burundi	5
Cabo Verde	6
Cameroon	7
Central African Republic	8
Chad	9
Comoros	10
Congo	11
Congo DR	12
Côte d'Ivoire	13
Djibouti	14
Equatorial Guinea	15
Eritrea	16
Ethiopia	17
Gabon	18
Gambia	19
Ghana	20
Guinea	21
Guinea-Bissau	22
Kenya	23
Lesotho	24
Liberia	25
Madagascar	26
Malawi	27
Mali	28
Mauritania	29
Mauritius	30
Mozambique	31
Namibia	32
Niger	33
Nigeria	34
Rwanda	35
Sao Tome and Principe	36
Senegal	37
Seychelles	38
Sierra Leone	39
South Africa	40
Sudan	41
Tanzania	42
Togo	43
Uganda	44
Zambia	45

APPENDIX II: VOLATILITY MODELLING RESULT

	Angola	Benin	Botswana	Burkina Faso	Burundi	Cabo Verde	Cameroon	Central African Republic	Chad
Average	77.36557	102.5059303	96.89154778	102.9386139	101.5920776	104.1553558	98.61952629	100.6791603	91.09192696
Standard deviation	17.39859	2.113689073	22.84531808	2.363261043	2.566542808	2.777973142	2.19504404	0.827142001	6.162426819
Variance	302.71102	4.467681497	521.9085584	5.585002757	6.587141988	7.717134777	4.818218336	0.68416389	37.9755043
Constant (mu)	0.00100	0.00100	0.00100	0.001	0.001	0.001	0.001	0.001	0.001
Unconditional variance (omega)	69.47256	3.012708883	511.731271	2.86531446	4.813301682	3.947897152	3.103344804	0.464047761	37.9755043
ARCH (alpha)	0.69123	0.438946662	0.00000000	0.706186116	0.66611761	0.687847964	0.906309473	0.46658551	0.866474211
GARCH (beta)	0.28353	0.560782361	0.948224157	0.293553072	0.333437933	0.311811026	0.093340596	0.533370007	0.128375626
alpha+beta	0.97476	0.999729023	0.948224157	0.999739188	0.999555543	0.99965899	0.999650069	0.999955517	0.994849837
Long run volatility	52.46392	105.4417176	99.41625305	104.8146672	104.0654453	107.5968146	94.17245283	102.1371227	85.86996769
Log Likelihood Fxn to maximise	-115.21327	-120.9771166	-120.3650829	-121.0614767	-120.7978134	-121.2963014	-120.2007719	-120.6170441	-118.632103

	Comoros	Congo	Congo DR	Côte d'Ivoire	Djibouti	Equatorial Guinea	Eritrea	Ethiopia	Gabon
Average	102.77404	98.84188	77.42701	99.30684	109.24513	76.59631	101.63854	102.81975	82.01603
Standard deviation	2.33731	1.97389	18.97409	3.39480	6.74135	21.28799	1.61350	2.09589	13.06847
Variance	5.46304	3.89625	360.01591	11.52467	45.44580	453.17855	2.60338	4.39275	170.78499
Constant (mu)	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100
Unconditional variance (omega)	2.58703	2.97622	1.21972	259.92120	40.06378	0.11084	2.15486	2.76919	113.52214
ARCH (alpha)	0.93273	0.53936	0.92229	0.95558	0.88145	0.99974	0.56416	0.60214	0.97084
GARCH (beta)	0.06705	0.46034	0.07708	0.01608	0.11534	0.00019	0.43564	0.39761	0.00000
alpha+beta	0.99977	0.99970	0.99937	0.97166	0.99679	0.99993	0.99980	0.99976	0.97084
Long run volatility	106.52923	99.66743	43.91714	95.76597	111.77051	39.56848	103.87249	106.41349	62.39493
Log Likelihood Fxn to maximise	-121.02601	-120.24961	-115.15722	-120.34454	-122.25791	-114.84757	-120.80610	-121.03878	-116.52478

	Gambia	Ghana	Guinea	Guinea-Bissau	Kenya	Lesotho	Liberia	Madagascar	Malawi
Average	104.99884	100.97443	101.83078	103.05362	102.90756	98.74586	100.63184	103.45731	101.76275
Standard deviation	3.81732	2.83472	2.25687	2.15411	2.38717	23.48084	4.65731	2.90063	1.65401
Variance	14.57191	8.03566	5.09347	4.64020	5.69858	551.34974	21.69052	8.41367	2.73575
Constant (mu)	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100
Unconditional variance (omega)	6.29218	5.69230	3.95462	2.40680	3.99145	406.56471	15.07470	8.14605	1.78881
ARCH (alpha)	0.70644	0.35779	0.55691	0.73873	0.29708	0.00000	0.34264	0.27861	0.63418
GARCH (beta)	0.29304	0.64169	0.44270	0.26104	0.70256	0.96040	0.65577	0.72068	0.36565
alpha+beta	0.99948	0.99948	0.99961	0.99977	0.99964	0.96040	0.99841	0.99929	0.99983
Long run volatility	110.52901	104.40324	100.41111	102.09560	105.25066	101.32845	97.45259	107.04823	103.37232
Log Likelihood Fxn to maximise	-121.45160	-120.67575	-120.84925	-121.08484	-121.05839	-120.75281	-120.62258	-121.16194	-120.83321

	Mali	Mauritania	Mauritius	Mozambique	Namibia	Niger	Nigeria	Rwanda	Sao Tome and Principe
Average	104.22679	91.35349	102.52508	104.08196	104.19305	102.20778	90.31199	99.31526	103.24995
Standard deviation	3.07094	10.49723	2.57233	2.79397	2.28741	2.88794	8.26463	1.23092	2.14250
Variance	9.43070	110.19186	6.61687	7.80628	5.23224	8.34020	68.30417	1.51516	4.59033
Constant (mu)	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100
Unconditional variance (omega)	6.84736	86.13515	4.57614	6.13980	3.24346	1.23459	45.70409	0.86193	2.59285
ARCH (alpha)	0.80907	0.98699	0.64106	0.58788	0.18856	0.70579	0.95330	0.42824	0.48094
GARCH (beta)	0.19036	0.00000	0.35852	0.41157	0.81114	0.29410	0.03889	0.57167	0.51882
alpha+beta	0.99943	0.98699	0.99958	0.99945	0.99970	0.99989	0.99218	0.99991	0.99976
Long run volatility	109.20348	81.38238	103.89102	106.10860	104.07791	106.55977	76.46093	98.09189	104.80685
Log Likelihood Fxn to maximise	-121.30733	-118.58810	-120.98576	-121.28395	-121.30785	-120.91316	-118.40318	-120.34417	-121.12225

	Senegal	Seychelles	Sierra Leone	South Africa	Sudan	Tanzania	Togo	Uganda	Zambia
Average	104.51863	113.50241	99.72178	100.60488	96.61601	103.08027	103.42069	102.15118	96.06830
Standard deviation	3.41867	6.89985	6.42583	0.66010	3.69382	2.37329	3.17601	1.69574	4.69113
Variance	11.68733	47.60791	41.29135	0.43574	13.64430	5.63249	10.08701	2.87554	22.00670
Constant (mu)	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100
Unconditional variance (omega)	10.73085	25.22575	26.87556	0.39685	7.76018	4.40855	8.10340	2.61452	12.11049
ARCH (alpha)	0.75645	0.92756	0.98493	0.53255	0.59193	0.87131	0.97806	0.24116	0.95846
GARCH (beta)	0.24265	0.07071	0.01276	0.46741	0.40715	0.12830	0.02130	0.75859	0.04002
alpha+beta	0.99910	0.99827	0.99768	0.99996	0.99907	0.99962	0.99935	0.99976	0.99848
Long run volatility	109.07071	120.77693	107.64989	100.64369	91.57716	107.04898	111.84729	103.44528	89.22764
Log Likelihood Fxn to maximise	-121.36399	-123.02179	-120.40380	-120.60311	-119.78593	-121.09012	-121.15484	-120.90977	-119.67543

APPENDIX III: PANEL UNIT ROOT TEST

Panel unit root test: Summary
Series: CTOT_INDEX i.e at level
Date: 01/29/21 Time: 21:38
Sample: 1999 2018
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on AIC: 0 to 4
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-13.8662	0.00000	45	827
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-7.35489	0.00000	45	827
ADF - Fisher Chi-square	378.358	0.00000	45	827
PP - Fisher Chi-square	638.037	0.00000	45	855

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(CTOT_VOL) i.e at first difference
Date: 01/29/21 Time: 21:44
Sample: 1999 2018
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on AIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-14.9636	0.0000	43	757
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-12.4843	0.0000	43	757
ADF - Fisher Chi-square	309.568	0.0000	43	757
PP - Fisher Chi-square	280.564	0.0000	43	774

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(REER_VOL)
Date: 01/29/21 Time: 21:48
Sample: 1999 2018
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on AIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-15.1934	0.0000	45	778
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-12.7117	0.0000	45	778
ADF - Fisher Chi-square	328.421	0.0000	45	778
PP - Fisher Chi-square	302.199	0.0000	45	810

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(FD_INDEX)
Date: 01/29/21 Time: 21:50
Sample: 1999 2018
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on AIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-21.9184	0.0000	45	770
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-21.6822	0.0000	45	770
ADF - Fisher Chi-square	563.221	0.0000	45	770
PP - Fisher Chi-square	1426.39	0.0000	45	810

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: WG_INDEX
Date: 01/29/21 Time: 21:52
Sample: 1999 2018
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on AIC: 0 to 4
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-6.58232	0.0000	45	770
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-16.0094	0.0000	45	770
ADF - Fisher Chi-square	1065.57	0.0000	45	770
PP - Fisher Chi-square	558.781	0.0000	45	855

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

APPENDIX IV: PANEL LEAST SQUARES

Dependent Variable: HDI				
Method: Panel Least Squares				
Date: 01/29/21 Time: 22:03				
Sample: 1999 2018				
Periods included: 20				
Cross-sections included: 45				
Total panel (balanced) observations: 900				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.124723	0.039915	3.124743	0.0018
CTOT_INDEX	0.000191	0.000391	0.489958	0.6243
CTOT_VOL	0.00044	0.000482	0.912126	0.3620
REER_VOL	0.000585	0.000112	5.239484	0.0000
FD_INDEX	1.265237	0.107063	11.81766	0.0000
WG_INDEX	-0.08909	0.008247	-10.80294	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
Root MSE	0.068957	R-squared		0.720478
Mean dependent var	0.472924	Adjusted R-squared		0.704365
S.D. dependent var	0.130501	S.E. of regression		0.070956
Akaike info criterion	-2.39955	Sum squared resid		4.27959
Schwarz criterion	-2.13275	Log likelihood		1129.797
Hannan-Quinn criter.	-2.29763	F-statistic		44.71245
Durbin-Watson stat	0.752911	Prob(F-statistic)		0.000000

Correlated Random Effects - Hausman Test				
Equation: Untitled				
Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		60.110031	5	0.00000
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
CTOT_INDEX	0.000191	0.000196	0.000000	0.8324
CTOT_VOL	0.000440	0.000431	0.000000	0.9288
REER_VOL	0.000585	0.000583	0.000000	0.9059
FD_INDEX	1.265237	1.122380	0.005685	0.0581
WG_INDEX	-0.089087	-0.077424	0.000010	0.0002

APPENDIX V: QUANTILE REGRESSION