AGRICULTURAL EXPORTS AND ECONOMIC GROWTH IN ZIMBABWE

By

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DECLARATION

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ABSTRACT

The main objective of the study is to establish the relationship between agricultural exports and GDP, a proxy for economic growth. The other objective is to establish the relationship between the non-agricultural export sectors with GDP. The study will provide a roadmap for policy making towards the economic growth of Zimbabwe. Secondary data was used in the analysis for a period from 1990 to 2016. The Johansen cointegration results confirmed a long run relationship between the variables. The regression results show that agricultural raw exports have a negative relationship with economic growth, whereas food exports and non-agricultural exports have a positive relationship with GDP. The Granger causality test shows the direction of causation of the variables. The agricultural raw exports and food exports do not Granger cause GDP growth but non-agricultural exports cause GDP growth. The food exports require agricultural produce for raw materials, the growth of the food exports boosts a demand in the agricultural sectors which leads to a surplus for the export market thus stimulating agricultural exports. Food exports include processed high value products which earn more foreign currency on the international market. The non-agricultural sector capital is invested into the food subsector. The non-agricultural exports in Zimbabwe influence productivity in the agricultural sector, boosting food exports which rely on the availability of agricultural raw products. The Zivot-Andrews unit root test with structural breaks shows that dollarization had an impact on GDP and capital. Although the government came up with policies to boost agricultural productivity, such as the Command Agriculture initiative, literature shows that focus should also be on the quality of produce since it has a positive impact on the agricultural export earnings and other export sector earnings.

Key words: Agriculture, Exports, Economic growth, Zimbabwe

OPSOMMING

Die hoofdoel van die studie is om die verwantskap tussen landbou-uitvoer en BBP te bepaal, waar BBP 'n aanduider is vir ekonomiese groei. Die ander doelwit is om die verhouding tussen die nie-landbou uitvoersektore met die BBP te bepaal. Die studie bied 'n padkaart vir beleidmaking rakende die ekonomiese groei van Zimbabwe. Sekondêre data vir die periode 1990 tot 2016 is in die analise gebruik. Die Johansen kointegrasie toets bevestig ‘n langtermyn verwantskap tussen veranderlikes. Die regressive resultate toon dat landbou-rou uitvoere ‘n negatiewe verwantsap het met ekonomiese groei, terwyl voedseluitvoere en nie-landbou uitvoere 'n positiewe verwantskap met BBP het. Die Granger-oorsaaklikheidstoets toon die rigting van oorsaaklikheid van die veranderlikes. Landbou-uitvoere en voedsel-uitvoere veroorsaak nie groei in BBP nie, maar nie-landbou uitvoere veroorsaak wel groei in BBP. Die resultate toon egter dat daar 'n indirekte verband tussen landbou uitvoere en BBP bestaan. Die voedseluitvoere benodig landbouprodukte vir grondstowwe; die groei van voedseluitvoere verhoog die vraag in die landbousektore wat lei tot 'n oorskot vir die uitvoermark, wat die landbou uitvoere stimuleer. Voedseluitvoere bevat verwerkte produkte met 'n hoë waarde wat meer buitelandse valuta op die internasionale mark verdien. Die kapitaal wat uit die uitvoer van nie-landbousektor akkumuleer, word onder andere in die landbousektor en voedselsubsektor belê. Die nie-landbou uitvoere in Zimbabwe beïnvloed produktiwiteit in die landbousektor, wat voedseluitvoere verhoog wat van die beskikbaarheid van landbou produkte afhang. Die voedseluitvoere akkumuleer kapitaal wat verder herbelê word in die nie-landbou uitvoersektor. Die studie wys ook uit die Zivot-Andrews se eenheidworteltoets met strukturele onderbrekings, dat inflasie en dollarisering 'n groot impak op BBP en kapitaal gehad het. Alhoewel die regering met die beleid uitgevaardig is om landbouproduktiwiteit te bevorder, soos die Command Agriculture-inisiatief, moet daar ook gefokus word op die kwaliteit van die produkte, aangesien dit 'n positiewe invloed op die verdienste uit landbou en ander uitvoersektore het.

Sleutelwoorde: Landbou, Uitvoere, Ekonomiese groei, Zimbabwe

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LIST OF ABBREVIATIONS

ADB	African Development Bank
AMA	Agricultural Marketing Authority
CFUZ	Commercial Farmers' Union of Zimbabwe
CZI	Confederation of Zimbabwe Industries
ELG	Export-led growth
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross domestic product
ICAZ	Institute of Chartered Accountants of Zimbabwe
ILO	International Labour Organization
IMF	International Monetary Fund
ISS	Import substitution strategy
ITC	International Trade Centre
LRP	Land Reform and Resettlement Programme
MLARS	Ministry of Lands, Agriculture & Rural Resettlement
OEC	Observatory of Economic Complexity
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary least squares
RBZ	Reserve Bank of Zimbabwe
SADC	Southern African Development Community
UNCTAD	United Nations Conference on Trade and Development
USD	United States Dollar
WDI	World Development Indicators

WTO	World Trade Organization
ZIA	Zimbabwe Investment Authority
ZIM-ASSET	Zimbabwe Agenda for Sustainable Socio-Economic Transformation
ZIMRA	Zimbabwe Revenue Authority
ZIMSTAT	Zimbabwe National Statistics Agency
ZMIC	Zimbabwe Mining Investment Conference

CHAPTER ONE : INTRODUCTION

1.0 Background

Agriculture contributes approximately 11-14% between 2013 and 2016 to the gross domestic product (GDP) of the economy. Most developing countries are agro-based relying mostly on agriculture for economic growth. In Zimbabwe, 70% of the population is employed in the agricultural sector with 45% of the country's export origin being from agriculture (ZimTrade, 2016). Approximately 40% of foreign currency earnings come from the agricultural exports. Employment in Zimbabwe is mostly informal with approximately 95% of the labour force informally employed. The informal employment does not yield as much returns towards the livelihoods and growth of the economy as would be expected (ZIMSTAT, 2014). According to the World Bank (2018), agriculture together with other sectors can lead to faster economic growth, poverty reduction and environmental sustainability.

The impact of agriculture on the economy of Zimbabwe extends beyond reducing poverty and contributing to the improvement of the farmers' income growth, it creates a surplus for exporting. Agricultural exports contribute to the overall growth of the country, through creating employment, foreign currency generation and reducing balance of payments. However, the extent of agriculture's impact on economic growth depends on what stage of growth a country is at (World Bank, 2005). Zimbabwe's growth is driven by agricultural progress because 60% of the raw materials goes to other sectors e.g. food subsector and manufacturing sector comes from the agricultural sector therefore it becomes an indirect driver of the other sectors as well (European Union Zimbabwe, 2017).

The export-led growth (ELG) hypothesis is a development strategy with the aim of boosting productive capacity of a country by focusing on foreign markets. The country develops the industries to produce goods for which it has comparative advantage so that they export to other countries (Carbaugh, 2005). The agricultural sector's export contribution to the country's export sector is expected to grow due to focus towards food processing and infrastructure development (ZimTrade, 2018).

The agricultural sector contributes to the economy significantly together with other non-agricultural sectors which are services, manufacturing and mining export sectors. The manufacturing sector contributes approximately 40% to the total exports and mining contributes 17%. The structure of the economic sectors show that the country has not gone

through structural transformation with the employment in agriculture increasing whilst employment in the industrial sector decreased (ADB, 2017).

Zimbabwe's major agricultural exports include cotton and tobacco with Zimbabwe's highest agriculture export earner as tobacco accounting for 12.17% of the total exports. South Africa with a total of USD1.01 bn in exports by 2017 and China with a total of USD170 m are two of the top export destinations for Zimbabwe. The other agricultural export leading sectors are the sugar industry and cotton industry, which contribute 1.2% and 0.77% respectively to the total exports (OEC, 2018). However, the export-led hypothesis for countries such as Zimbabwe is criticised due the volatile nature of the prices for the agricultural primary produce exported thus affecting gains for economic growth.

The land reform policy in 2000 led to the change in the agrarian structure of the sector with most farmers are now small-holder farmers producing for subsistence purposes. The land reform policy led to the reallocation of land in 2000, the low yields experienced from the major crops led to the decline in export earnings and furthermore the lack of confidence in the government and the economy of Zimbabwe by investors. The majority of the population in rural areas is now relying on food aid (World Bank, 2018).

Approximately 85% of the land area in Zimbabwe is used for agricultural purposes. The characteristic of Zimbabwe's agriculture is dualistic in nature. The larger group of farmers are mainly smallholder and communal farmers occupying 21 million hectares of the 39 million hectares of total agricultural land. The areas they occupy are considered lower potential for agriculture in terms of rainfall, soil type and irrigation. The other group of farmers are large scale with better production systems and occupying 11 million hectares. The large-scale farmers are mostly actively and directly involved in exporting their produce (FAO, 2003).

Zimbabwe went through a period of hyperinflation in 2008, which was followed by the dollarization policy in 2009 (Hanke, 2008). The growth rate of the economy started improving at approximately 10% after dollarization in 2009 but declined from 2012 as investment to GDP ratio fell. According to the World Bank (2018), the country's recovery from its economic downfall is attributed to agricultural growth and the investment patterns that are taking place.

The economic growth of the country increased from 0.6% in 2016 to 3.4% in 2017. The growth has been projected to slow down in 2018 due to liquidity crisis that led to closure of major agricultural and non-agricultural companies. The government has made efforts to boost agricultural exports and other export subsectors through putting in place policies such as the

national trade policy and the industrial policy which focus on increasing and diversifying exports through value-addition. The study will test the ELG hypothesis and conclude for the agricultural and non-agricultural export sectors and discuss the results in comparison with other empirical literature that supported and opposed the hypothesis.

1.1 Problem statement

Agriculture continues to play an essential role in poverty alleviation and development of the emerging countries. Due to the harsh economic conditions in Zimbabwe, the agricultural sector has experienced constraints such as low productivity, limited market access and lack of finance. The export sector has suffered greatly due to low productivity and quality of produce, with the country resorting to imports. Agricultural exports boost the economy generation of foreign currency that may be channelled to other relevant sectors for overall growth. The agricultural sector contributes 60% raw materials to the other sectors for production and 70% of the total population employed in the sector (FAO, 2016). The study looks at whether agricultural exports and non-agricultural sector contribute positively or negatively to the economic growth of Zimbabwe.

1.2 Objectives of the study

The main objective of the study is to find whether agricultural exports positively contribute to economic growth. In order to achieve the objective, the study will:

- Establish the relationship between agricultural exports and economic growth in Zimbabwe.
- Establish the relationship of non-agricultural industry sectors with economic growth in Zimbabwe.

1.3 Significance of the study

Agriculture is a foreign currency earner and in turn, a source of income for almost 70% of Zimbabweans employed in the sector. The economy of Zimbabwe has gone through some periods of hyperinflation (RBZ, 2018). The fall in agricultural exports is due to the agricultural sector productivity for some crops having fallen in some years. The study is specific to Zimbabwe, which has experienced a unique political and economic environment from other emerging countries. In the journey to recovery with the government policy makers spreading the slogan of Zimbabwe being open for new reforms, it becomes relevant to carry out research that will determine specific sectors that need policy focus in order to boost export contribution

to economic growth. In order to formulate sound policies relevant to the growth of the agricultural sector and the whole economy, it is essential to carry out research focusing on the export sectors to be able to make sound policy and investment changes.

1.4 Research methodology

The analysis will use secondary time series data obtained from World Development Indicators (WDI). The study period is from 1990-2016. The model used to analyse the data is the Cobb Douglas production function. The method used to analyse the data is the Johansen test and the Granger causality test.

1.5 Limitations of the study

Studies that require quantitative assessments in time series usually require sizeable data. In Zimbabwe, such type of data for this study is not readily available due to incomplete data sources. The data gap did not allow using other sectoral exports such as services sector. However, this study only focused on the other major sectors of the economy contributing to the economic growth.

1.6 Outline of the thesis

The first chapter is the introductory chapter that shows the brief background of the study. The problem statement, objectives of the study, relevance of the study, research methodology and limitations of the study are covered. Chapter 2 reviews export-led growth theory, theories of economic growth and the research methods that other studies used on export-led growth. Chapter 3 will look at different sectors of the Zimbabwean economy to discuss the challenges to production, and export growth in each sector. The chapter will review the major policy that affected the agricultural sector, land reform policy. Chapter 4 will discuss the theoretical approaches used to reach the conclusions of the study. Chapter 5 will discuss the model outcomes and possible reasons for the results in relation to the Zimbabwean economy. Chapter 6 will give the summary, recommendations and conclusion of the study.

CHAPTER TWO : LITERATURE REVIEW

2.0 Introduction

This chapter will look at the theoretical and empirical literature. The brief discussion of economic growth theories provides an understanding of what stimulates growth in economies. Agriculture plays a role in the development of an economy towards economic growth. The chapter will discuss agriculture's role in structural transformation of an economy towards growth. The export-led growth theory explains the nature of open and closed economies by highlighting the advantages and disadvantages of an export-driven economy. The empirical studies on export-led hypothesis are reviewed to establish the changes in trends of export-led growth in developing and developed countries.

2.1 Theories of economic growth

Economic growth is the increase in the amount of the goods and services produced by an economy over time and it is mostly measured as a percentage increase in GDP. Economic growth and economic development arise from different factors in an economy. Economic development is the change in a set of factors that lead to economic growth. Economic growth is the combined quantitative and qualitative changes in the economy. It arises from the unrelenting and determined actions of government, policy makers and citizens in improving the standards of living of the country (DFID, 2008).

The economic growth models can be classified as classical growth models, neoclassical growth models and the new growth models. The classical growth models are mainly focused on free market scenarios. The origins of the classical growth models are from theorists such as Adam Smith, whose theory focused on absolute advantage which is a scenario when a country can produce a good at a lower cost compared to another country. David Ricardo introduced the theory of comparative advantage which stated that, a country concentrates most of its resources towards what it is mostly endowed in instead of producing everything. He believed that there has to be a free market in order for the different markets to trade in goods (Ucak, 2015).

Thomas Malthus as referenced by Brander (2007) and Lanza (2012) came up with the theory of population growth where population grows in a geometric movement and the production of food grows at a constant progression because land is fixed. The theory stated the concept of diminishing marginal returns which states that as more people produce from a fixed piece of land, each worker will not have enough land to work on which will lead to the amount produced

being less than the input invested in the land. However, the theory failed to foresee how the food output would grow faster than population and allow the per capita real output to grow due to factors such as improved technology.

David Ricardo identified the main problem in an economy as income inequality, his theory believed that all the sectors in an economy could be profitable. The first assumption is that when the wages increase, prices do not necessarily increase because the reduction in profit received does not affect prices, as the prices do not rely on wage rates. However, in the case of agriculture he agreed with Thomas Malthus that, due to decreasing returns, the prices in agriculture would increase. The wages would increase in the agricultural sector, which leads to improved economic growth and economic development through better living standards for the farmers.

The theory states that capital accumulation leads to an increase in the labour/employment. If the labour demand grows, then the wages increase and the country would move towards the steady state. Ricardo also described the stationary state of an economy whereby the land will be less fertile leading to a point where it is not yielding any profit anymore. Both Ricardo and Malthus did not consider the contribution of technology in the economies (Lanza, 2012). The neo-classical theories state that the growth rate of output depends on the use of technology in labour.

The Solow theory reveals that in the long run, increasing savings does not cause an increase in the rate of growth in per capita income. The model states that permanent economic growth could be achieved if we increase the technology that enhances labour and if the rate of population growth decreases. The Solow model factors in technological change and effectiveness of labour as a prerequisite for long-run economic growth. The model was also able to explain how economic development can be sustained with limited resources.

The Solow-Swan neoclassical growth model explains the long-run growth rate of output based on capital accumulation, labour, population growth and technology. The theory states that capital and labour can be limited in an economy. Romer's model is closely linked to developing economies; it postulates that high growth rate is attained if the effect of the industrial activity associated with investment could be incorporated in calculating the costs that come with the industrial activity (capital stock). The theory deviated from the Solow growth model since it assumes that the stock of capital in an economy influences the level of output positively at

industry level. Harod Domar's theory is based on a simple assumption, which stated that GDP growth would be proportional to the share of investment spending in GDP (Easterly, 1997).

The endogenous growth models focus on long-run economic growth that comes from internal forces of the economic system. Technology is considered as an internal factor that influences how markets operate in growth models unlike the exogenous growth models that did not consider technology as a given in a market set up. The second new growth model states that knowledge/human capital is the driver of the process of economic growth. New growth theory emphasises on the decreasing returns to scale, when there are diminishing returns, the marginal costs increase, which leads an economy to unique equilibrium (Chirwa and Odhiambo, 2018).

Arrow's model on learning-by-doing states that human capital is acquired through learning by doing. For example, he refers to the airframe industry where a strong correlation between productivity growth and experience seems to exist. The increase in productivity would lead to economic growth. Arrow's work is similar to what Romer's model stated which is that high growth rate is attained if the externality associated with investment could be internalised and new ideas depend on the previous knowledge. Arrow agrees with the neoclassical production model, which includes technology, but he states that knowledge changes over time and therefore it should be incorporated in the model (Arrow, 1971).

Uzawa (1965) states that the efficiency of labour is based on the knowledge of public goods as opposed to capital/investment. The influence of the educational sector will then move to the whole economy. However, Kaldor's circular model gives emphasise to the need for investment/capital for an economy to take off. It states that the growth in productivity in the manufacturing sector stimulates faster growth of productivity in the non-manufacturing sector. The theory believes that growth is demand driven and not limited to neoclassical factors such as labour (Setterfield, 2010; Millin, 2003). The different types of growth models show that there is a continuity from the classical to the new models. In fact, the growth models represent how mainstream economics apply formal and practical analyses that lead to an increase in productivity.

2.2 Agriculture and growth

The relationship between agriculture and economic growth has been discussed extensively over the years. It is debated whether the growth of the agricultural sector determines the growth of the economy in developed and developing countries. Agriculture provides raw materials for the industrial sector and food for the country. The level of productivity in the agricultural sector

is assumed to be the reason for the income status of countries which are moving towards economic growth (Alston and Pardey, 2014).

Lewis as referenced by Vollrath (1994) states that agriculture transfers labour and capital to the rest of the sectors but an industrial revolution only occurs when the agricultural sector becomes directly linked to all the sectors. He further stated that an agrarian revolution is essential for productivity that would lead to the sufficient food supply for economic growth because insufficient supply would raise the prices leading to high wages and a fall in economic growth. Vogel (1994) stated the need for backward and forward linkages in the agricultural sector for development to occur. Kuznets as referenced by Vogel (1994) states that there is need for technological innovations to occur to boost the economic development.

Arthur Lewis came up with one of the common theories on structural transformation; the Lewis model on structural transformation postulates that an economy starts with two sectors, the agricultural sector and the industrial sector. Since the agricultural sector has lower marginal productivity of labour, transferring surplus labour to the industrial sector will increase productivity in the sector and will not have any effect on the overall productivity of the economy. The production in the industrial sector increases which then causes accumulation of capital in the economy as well as the investment in other sectors. The structural transformation also involves rural workers migrating to the urban centres and changes in the demographic set-up that leads to a higher population growth (Timmer, 1990).

In the two-sector model, the wages in the industrial sector are assumed constant and the supply curve of rural/agricultural labour to the industrial sector is perfectly elastic. The two diagrams on the right side of Fig 2.1 illustrate the traditional/agricultural sector. The upper right diagram shows how the production levels increase with an increase in the labour input. The production function shows total agricultural production is determined by varying labour, fixed capital and unchanging technology. The lower-right diagram is derived from the previous production function and it shows that the marginal product of labour (MP_{LA}) is zero, which means the rural workers share the output equally such that the real wages are determined by the average product as opposed to the marginal product of labour.

The left diagrams show the industrial sector with a production function determined by labour (L_M), fixed capital stock (K_M) and technology. The profits reinvested into the sector move the capital stock from K_{M1} to K_{M3}. The investment leads to the total production curve moving upwards from TP_{M1} to TP_{M3}. In order for the growth and reinvestment to occur, there is the

assumption of perfect competition. The left lower diagram shows that, if W_A, which is the wages in the agricultural/rural sector, is less than W_M (wages in industrial sector), then the differences in the wage rates will allow for the industrial sector to take in more labour from the agricultural sector without increasing wage costs.

In the diagram F is the point where the industrial capitalists hire workers. At this point, the marginal physical product is equal to the real wage. Total profits are represented by W_MD_1F and reinvestments lead to an increase in the profits from K_{M1} to $K_{M3.}$ New equilibrium point G with labour (L_2) shows an increase in the total output and the wages and profits increase for a reinvestment. At the equilibrium level H the total productivity curve has moved upwards due to increased capital (K_{M3}) and therefore labour will increase to $L_{3.}$

The quantity of labour in the rural sector is in millions and the quantity in the industrial sector is in thousands to show the assumption that there is more population in the rural than the urban sectors. The process of surplus labour moving to the industrial sector will continue. The cost of labour from the agricultural sector will increase when the labour-land ratio declines. The marginal product of labour is no longer zero which becomes the 'Lewis turning point' and structural transformation would have taken place (Todaro and Smith, 2011).

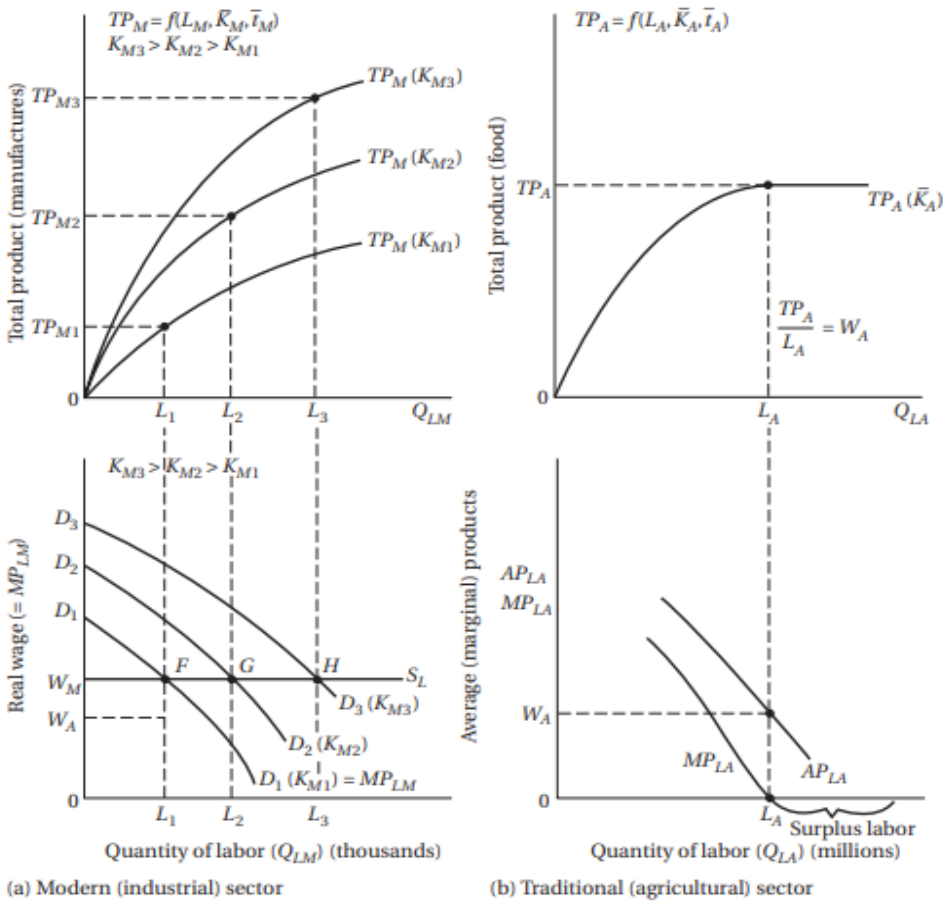

Figure 2-1: Lewis model in *Todaro and Smith (2011)*

Although the model shows the growth process of the Western countries, it is not a good representation of developing economies. The critiques of the theory state that diminishing returns do not occur in the industrial sector as assumed by the model yet increasing returns are experienced in that sector. Lewis model states that the rate of capital accumulation is proportional to the labour created into the modern sector, it ignores the fact that capital can be invested in other areas rather than it accumulating.

The assumption that there are constant wage rates until labour is transferred to the industrial sector is also unrealistic. Surplus labour is not true for all the African economies such as South Africa (Todaro and Smith, 2003, and Ranis, 2004). Chenery stated in his book that the process of structural transformation is unique for each country unlike what the traditional theories assume. Economic development in a country is a set of interrelated structural changes (Berhman, 1982).

Johnston and Mellor (1961) classified the role of agriculture in economic growth into five classes, which are foreign exchange earnings through exports; supply labour for industrial

development; provide capital for other sectors; food supply for domestic consumption and a market for industrial output. In the paper, they stress the importance of a balance in development between the industrial and the agricultural sector. Jorgenson (1961) as referenced by Winters et al. (1998) assumed two sectors for the economy that are the agricultural sector and the industrial sector, where agricultural sector depends on labour and fixed land.

The industrial sector depends on labour and capital, whilst the population growth depends linearly on the food output. Thus, for agriculture to provide enough for the economy the per capita food output should exceed the per capita output required by the population. Johnston and Mellor (1961) further reviewed the study and concluded that for the success of the roles of agriculture to occur, there has to be proper infrastructure and investment towards the agricultural and industrial sector.

Timmer (1990) in consistency with Johnston and Mellor (1961) stated that in order for agriculture to play its rightful role in an economy for transformation to occur, the first stage towards that is getting the agricultural sector fully functioning through sound institutions, technological development and developing the infrastructure. The same paper stated that, the second stage towards development is to ensure that the agricultural sector is directly linked to other sectors through providing raw materials and employment. Integrating agriculture into the macro-economy ensures that agriculture is a secure supplier of raw materials to the other sectors e.g. manufacturing and mining sector.

Van Zyl et al. (2001) then stated that a country's economy is boosted if there is surplus food production to export that makes it less prone to the effects of unfavourable trade terms which include unreasonable tariffs. The production in agriculture has to be consistent such that it sustains the food manufacturing industry through the supply of raw materials. In sub-Saharan Africa, the amount of people who are food insecure continues to rise over the years. Although factors such as political unrest and the changing climatic conditions and the falling prices can be attributed to the food insecurity, the role that agriculture plays in the growth of these economies should not be underestimated (FAO, 2017). The patterns of a deficit in food supply sparks the debate of whether agriculture is the saviour of African countries' economies as they have constantly produced less than what the country requires for growth (Diao et al., 2009).

The contributions of agriculture to the economy's development are direct and indirect. Agriculture has spill over effects, if the country establishes environmental stability and good policies towards the agricultural sector, productivity increases and the export sector expands.

The surplus production generates a broad export market, which leads to the development of the economy through increased foreign currency. The growth of the agricultural export sector, leads to the transfer of labour to other sectors e.g. manufacturing sector, which then boosts the growth of the country's overall sectors leading to positive overall economic growth.

2.3 The export-led growth hypothesis

The export-led growth concept is a development strategy with the aim of boosting productive capacity of a country by focusing on foreign markets. The country develops the industries to produce goods for which it has comparative advantage so that they export to other countries (Carbaugh, 2005). The export-led growth hypothesis originated in the 1970s when it replaced the import substitution paradigm after the second World War. It then became prominent and part of a general agreement among economists on the benefits and effects of economic openness (Palley, 2001).

According to Palley (2012), the agreement was based on three strains, the first one originated from the theory of comparative advantage by David Ricardo which is the Heckscher-Ohlin-Samuelson model. The theory established the role of factor endowments as a basis of trade. It stated that a country with a relative abundance of labour will trade in a good which is labour intensive and a country which is capital abundant will have a comparative advantage in a good which is capital intensive (Mikić, 1998). The second strain was on controlling rent seeking as a benefit of trade openness, rent seeking was mostly prominent due to development through import substitution. The third strain developed later and was on the benefits of trade openness for growth. Economists such as Grosman and Helpman (1991) stated that trade leads to productivity growth through technology diffusion and knowledge spill overs.

Balassa (1978) points out that most developing countries that followed inward focused policies under the import substitution strategy (ISS), had poor economic achievements. Export growth leads to a healthy competition to produce quality produce to meet the export requirements. It leads to innovation for export diversification thus speeding up sectoral growth. The more diverse the exports, the more demand for the different products leading to the expansion of a country's export sector and improvement of trade balance (Mahmood and Munir, 2017).

The export-led growth theory aims for developing countries to make policies that expose their firms to competition through improving their productive capacities. The developing countries gain an external market hence foreign currency among other benefits. Industrialized countries gain if developing countries decide to subsidize their exports to secure more exports. However,

this rests on the assumption that there is no long-term dynamic cost to industries displaced by such subsidies (UNCTAD, 2001). Palley (2012) states that the countries which subsidizes exports benefit the countries receiving the exports based on two assumptions. The first assumption, consistent with UNCTAD (2001) is that there are no dynamic costs to the industries displaced by the subsidies, the second assumption is that there is scarcity of resources and full employment.

Most recent authors such as The World Bank (1993) agree that promoting and expanding the export sector is beneficial for both developed and developing countries. The benefits of the export-led growth policies include:

- It introduces new technology thus technological innovation.
- It creates employment and increased labour productivity.
- It maximises economies of scale.
- It generates capacity utilization.
- It reduces the balance of payments through increased foreign currency earnings and attract foreign investment.
- It increases total factor productivity and general welfare of the country.

Dreger and Herzer (2010) also states that export markets have an indirect growth effect which is beyond the change in export volume, an effect of the output through productivity. The study states that there are several ways that exports can affect productivity. The exports can provide foreign currency to finance imports that will promote new technology and thus leading to knowledge spill overs that can benefit productivity. The second growth effect, states that exports can increase productivity by focusing investments in the sectors a country has comparative advantage. The third growth effect is that countries that are involved in trade benefit from economies of scale since they produce for the export and local market. Lastly, the export sectors may generate some positive externalities on the non-export sectors.

However, some authors such as Herzer (2007) argue that the mentioned growth benefits mostly apply to developed countries since developing countries are mostly dependant on primary commodities. The countries will shift focus on exporting the primary produce and not manufacturing sector growth which has positive externalities for growth compared to the primary commodity sector. Harvey et al. (2010) and Bloch and Sapsford (1997) also state that developing countries gain less from exporting primary commodities due to the deteriorating terms of trade over time. The World Bank (2015) also states that developing countries face

regulations in business and labour that could affect the movement of knowledge and technology between sectors.

Metzger and Koreen (2003) believe that trade and investment liberalisation coupled with good economic policies by the government lead to economic growth and stability, improved welfare, sustainable development and poverty reduction. The achievement is ensured through minimising the cost of liberalisation and regulation of markets and firms to suit public interests. Cuddington (1992) focused on how export-led growth affects supply and price. The study identifies that the fluctuations in commodity exports may cause setbacks for countries that rely on exports for growth, which are mostly the emerging countries. The other author states that export-led growth promotes economic structures that are based on externally focused development, which may not lead to sustainable long term benefits. The reason being countries start racing for competitive advantage, which can result in wage suppression, relaxed environmental standards and weak regulation with the main aim of increasing capital gains (Palley 2002, 2004).

Carbaugh (2005) believes the countries that are outwards oriented have more growth gains than the ones that have import-substitution policies. The advantages of an export-oriented economy include growth of manufacturing industries that produce labour-intensive goods, a larger market encourages the domestic manufacturers to exploit economies of scale and the less stringent import restrictions for an open economy encourages firms to be more competitive thus increasing efficiency. The export-led hypothesis encourages competition and the more efficient firms and discourages the less efficient firms. Melitz (2003) supports openness to trade as it leads to competitive firms that are more productive. The firms enter the export market whilst the less efficient ones exit. The completion leads to an improvement in the quality of products for exporting. The increased quality productivity caused by the competition leads to more capital gains from trade and lead to the economic growth of a country.

Palley (2001) states that countries that adopt the export-led policy face competition among each other, which can affect the weaker performing countries such that their products are no longer on demand. She suggests that with time, developing countries may crowd out one another's exports. It raises a need for replacing the policy with demand that is domestic driven leading to growth. The other critiques of the export-led theory such as Palley (2012) classified them into four which are, the comparative advantage critique, Keynesian critique, the 'kicking away the ladder' and the export-led growth which has three other elements.

The comparative advantage critique includes authors such as Johnston in World Trade (2009) analysed a situation where countries set up trade policy to improve the terms of trade. He states that this results in Nash equilibrium which is inefficient as the unilateral actions of the countries affect one another. The restrictive trade policies lead to a contraction of trade volumes which reduces the overall welfare of an economy.

The Keynesian critique states that the level of economic growth is determined by the rate of demand growth. The export growth represents demand growth which is expected to raise the economic growth. However, if export growth comes at the expense of foreign demand growth, the country will experience growth but it will not shift its overall world growth (Palley, 2002).

The 'kicking away the ladder' critique by Chan (2002) states that developing countries cannot experience growth without trade protection, industrialization and ability to conduct macroeconomic policies. He argued that countries such as U.S.A and Britain only started practicing free trade after developing infant industries in their countries which was a ladder to get at the top of which the policies were 'kicked away' after attaining certain level of growth.

The export-led growth critique has three elements, the beggar thy neighbour critique, the Prebisch-Singer hypothesis and the structural Keynesian critique.

The beggar thy neighbour critique developed by Joan Robinson in 1947 (Palley, 2012) states that developing countries may end up crowding each other's exports. The idea is that a country puts in place policies that restrict imports and promotes exports. The aim of the policies is to promote domestic consumption therefore protectionist policies such as tariffs and quotas are implemented in a country to limit imports. The countries focus on exporting their way out of demand shortage which leads to harm on their neighbouring countries due to poaching employment and demand (Palley, 2012).

The Prebisch-Singer hypothesis believes a country should produce and trade more of a good for which it has comparative advantage over other countries to experience gains in the terms of trade. Prebisch and Singer state that the gains from trade are not the same for developing and developed countries. The gains from trade are greater for the industrialised countries than the developed countries that focus on the production of primary commodities that is mostly agriculture (Harvey et al., 2010).

The Prebisch and Singer hypothesis states that the prices of the primary commodities follow a downward trend and the difference owes to the notable income per capita difference between

the industrialised countries and the developing countries. The author concluded that developing countries should move towards industrialization for economic growth to occur. The argument has been whether commodity prices are equivalent to the terms of trade given that even the industrial based countries export other primary commodities and the agricultural based countries also export manufacturing products (Cuddington et al., 2002). Palley (2002) states that developing countries borrow in currencies that do not depreciate as easily, such as the USD, but a declining terms of trade makes it harder for the countries to earn currency to pay off debts. However, Sakar and Singer (1991) state that the declining terms of trade has also shifted towards manufacturing goods due to increased global supply.

However, it is reasonable to conclude that not much can be done to eliminate volatility of prices on the international and local markets but measures can be put in place to minimize the negative impact that can occur due to price volatility which slows down economic growth. The type of policies depends on political support and the further effects they have on the other sectors (World Bank, 2015). Although policies can be put in place, it is almost impossible to make policies that are not politically inspired, even if they can be a disadvantage to the consumers and producers. International institutions can be a pillar in providing financial support as well to mitigate the effects of price fluctuations. In conclusion, agricultural market volatility is like a volcano, it cannot be avoided, but its negative effects can be prepared for (Tangermann, 2011).

The Keynesian critique argues that countries that are focused on export-led growth promote economies that have weak structures that have low quality growth and avoids deep prosperity which is enduring because development is not internally focused. Countries involved in trade are competitive and focus on gaining competitive advantage and they end up disregarding the quality of production through ignoring environmental standards and regulations at the expense of increasing capital gains from exporting (Palley, 2012).

Despite the relevance of the export-led growth policy on developing countries, authors such as Palley (2012) state that a developing country which embarks on the process of industrialization now will not benefit from the export-led policy as much as thirty years ago when developing countries such as the U.S.A. were willing to consume the developing country's products. The reason is that other developing countries have adopted the same policies and the competition has increased on the market. Despite that, developed countries such as China have brought

cheap goods on the export market thus slowing the growth of some developing countries on the international market.

The developing countries have evolved over time and they have a larger share on the export market. The growth of the share of developing countries leads to a gap for the industrialized countries that have deteriorating economies. However, the developing countries still rely on exports for growth. The study concludes that countries should not only rely on the export-led growth policy for the continuous growth of their economies. However, no country can act as its overall driver for economic growth, rather, it is due to the diversity of economic activities of different countries that propel them towards growth.

2.4 Empirical literature on export-led growth hypothesis

The section will review similar studies done on the export-led growth hypothesis and the methods used by previous authors and use the results as a guideline for this study. Authors such as Balassa (1978) and Feder (1983) are popular for supporting the export-led growth hypothesis using cross-sectional data analysis. The other studies that used cross sectional data include Yaghmaian and Ghorashi (1995), Dodaro (1991) and Fosu (1996). Due to the weaknesses of the cross sectional studies which did not factor in country specific factors due to the nature of data, the other studies used time series data analysis to establish the relationship between exports and economic growth.

However, the studies did not establish the direction of causation of the variables which led to the introduction of the Granger causality test, which led to authors focusing the tests towards whether exports cause economic growth or vice versa (Bahmani-Oskooee and Economidou, 2009). However, some of the studies did not manage to provide strong conclusions of the ELG hypothesis as they did not include the cointegrating tests which show whether the variables have a long run relationship or not (Bahmani-Oskooee and Alse, 1993).

The relationship between exports and economic growth is a long-run relationship which cannot be merely concluded from implementing only short-run analysis. Testing the Johansen cointegration test on a multivariate model provides results on the long-run relationship of the variables in a study. The test also provides the endogeinity and exogeneity of the variables. Therefore, this study will implement the Johansen cointegration test and the Granger causality test. Table 2-1 gives a brief summary of some of the studies carried out on export-led growth hypothesis.

Table 2-1: Export-led growth studies

Author(s)	Countries studied	Period	Methodology	Findings
Panel data studies				
Bodman (1996)	Australia and Canada	1960 - 1995	Cointegration and Vector error correction modelling	Export sector is positively and significantly linked to the productivity performance of Australia and Canada.
Dreger and Heerzer (2013)	45 developing countries	1971 – 2005	Cointegration and Granger causality test	Exports have a bidirectional relationship with non-export GDP
Sahoo and Chandra Parida (2007)	India, Pakistan, Bangladesh and Sri Lanka	1980 – 2002	Pedroni's panel Cointegration	Total exports and manufacturing exports support ELG
Reppas and Christopoulos (2005)	22 developed countries	1969 – 1999	Cointegration and Granger causality test	Output growth causes exports but exports do not cause output growth
Jun (2007)	81 countries	1960 – 2003	Cointegration and Granger causality test	Exports have a bidirectional relationship with output
Ee (2016)	Botswana, Equatorial Guinea and Mauritius	1985 - 2014	Fully Modified OLS (FMOLS) and Dynamic Ordinary Least Square (DOLS)	Supports ELG in the three countries
Tekin (2012)	Least developed countries	1970 - 2009	Granger causality test	Unidirectional causality from exports to GDP in Haiti, Rwanda and Sierra Leone, and from

				GDP to exports in Angola, Chad and Zambia
Zahonogo (2016)	42 sub-Saharan countries	1980 - 2012	Pooled Mean Group estimation technique	Trade openness has positive effect on economic growth but relationship is non linear
Sharma and Dhakal (1994)	30 developing countries	1960 - 1988	Granger causality	Exports cause output growth in 6 countries, no causal relationship between export growth and output growth in 11 countries
Time series studies				
Giles et al. (1992)	New Zealand	1963 - 1991	Granger causality	GDP cause manufactured and metal exports.
Al-Yousif (1999)	Malaysia	-	Johansen cointegration and Granger Causality	Supports the ELG in the short run and supports the internally generated growth in the long run
Khalafalla and Webb (2001)	Malaysia	1965 - 1996	Granger causality tests and vector error-correction model	Primary exports have a greater effect on the economy than manufactured exports
Anwar (2014)	Pakistan	1980 - 2010	Generalized Method of Moments	Exports led to agricultural growth and in turn economic growth

Paul and Das (2012)	India	1960 - 2009	Cointegration and Granger Causality test	ELG is supported by the results
Kalaitzi and Cleeve (2018)	UAE	1981 - 2012	Cointegration and Granger causality test	Manufacturing exports contribute to economic growth more than primary exports
Shafiullah et al. (2017)	Australia	1990 - 2013	Cointegration and Granger causality test	Agriculture, mining and other export sectors support ELG
Gokmenoglu et al. (2015)	Costa Rica	1980 - 2013	Johansen cointegration and Granger Causality	Unidirectional causality from economic growth to export growth
Sunde (2017)	South Africa	1990 - 2014	ARDL and Granger causality	Bidirectional causality between economic growth and exports
Bonga et al. (2015)	Zimbabwe	1975 - 2013	Granger Causality and VECM	Export growth does not lead to growth in GDP, but, the growth of GDP causes growth in exports
Muñoz (2006)	Zimbabwe	1984 - 2004	Imperfect substitutes model	Overvaluation of the exchange rate affected the export performance. Ethnic tensions relating to land affect the export performance.
Cross sectional studies				
Balassa (1978)	Pooled 11 developing countries	1960 – 1966, 1966 – 1973	Rank correlation and OLS	Supports ELG hypothesis

Feder (1983)	32 developing countries	1964 - 1973	OLS	Supports ELG hypothesis
Dodaro (1991)	Pooled 84 developing countries	1965 - 1970, 1970 - 1981	OLS	Supports ELG but extent of growth depends on the level of processing in a country
Yaghmaian and Ghorashi (1995)	Pooled 30 developing countries	1980 - 1990	OLS	Supports ELG hypothesis
Fosu (1996)	Pooled 76 developing countries	1967 - 73 1973 - 78 1980 - 86 1967 - 86	OLS	Supports the ELG hypothesis

Stevens (2013) shows that the Granger causality results depend on the time period selected thus providing precise direction of causation within the period of study. The multivariate model in this study will include different export sectors in the country that allow for more clear and accurate results compared to the analysis in some previous studies which used bivariate models for the whole export sector. The Granger causality test also allows for the directional influences of the export sectors to be determined without any *a prior* hypothesis regarding which export sectors influences economic growth (Beharelle and Small, 2016).

The reviewed studies show that the results differ due to the time period used, the method of analysis, the combination of the variables and the presence of structural breaks (Stern, 2000). The agricultural export-led growth theory is supported and criticised in both developing and developed countries. The different reviews by other authors create an ambiguity as to the impact of agricultural exports on the developing economies.

The previous studies on Zimbabwe have mainly focused on the general export sectors as done by Bonga et al. (2015) without focus on the agricultural sector. Muñoz (2006) looked at the Zimbabwean export sectors in relation to issues of governance and the parallel market to promote export growth. The studies on ELG have not been extensively carried out before for the specific export sectors found in this study for Zimbabwe. The other studies mentioned

above have focused on the overall export sector and this study will focus on the different export sectors.

2.5 Conclusion

The chapter discussed the export-led growth theory and the economic growth models. The economic growth theories have paved a way for the new theories such as the export-led growth hypothesis. An economy that relies on foreign market gain is an export-led economy. Agriculture productivity is essential for growth of the sector, however, structural transformation has to take place for an economy to grow. The authors of the export-led hypothesis have different schools of thought on whether the hypothesis is relevant for developing economies due to the nature of products traded. Developing economies trade mostly primary produce which have volatile prices capable of fluctuating and affecting the gains from trade. The empirical studies on the export-led growth theory are reviewed showing the trends of studies from cross-sectional and time series data estimation to panel data estimation. The literature provided a roadmap for the study on Zimbabwe in a theoretical and empirical perspective.

CHAPTER THREE : OVERVIEW OF ZIMBABWE'S ECONOMIC SECTORS

3.0 Introduction

This chapter will look at the different Zimbabwean economic sectors that contribute to the economy. Zimbabwe has gone through economic challenges that have affected the growth of the economic sectors. The chapter will review the contribution of the sectors on a production and export level to the economy. The structural transformation of Zimbabwe has an influence on the level of growth of Zimbabwe, the chapter will discuss the structural transformation of the country. Zimbabwe's export sector has experienced challenges that have hindered the growth of the export sector and the economy. Policies have been put in place to deal with the challenges affecting the sectors for growth, the chapter will review these policies and the focus areas for growth.

3.1 Background of Zimbabwean economy

The Zimbabwean economy has undergone economic and political changes over the years. The country experienced a period of hyperinflation in the year 2008 and a low interest rate putting pressure on the exchange rate. The country adopted a multicurrency system early 2009, which started the period of dollarization. Zimbabwe became susceptible to economic shocks because it had given up its exchange rate (Jefferis et al., 2013). The GDP growth fluctuated during the years with downward peaks in 2003 and 2008. The downward trend can be attributed to the land reform policy effects in 2003 and hyperinflation in 2008. In 2009, the GDP growth increased sharply, which is the year the dollarization policy was introduced. In 2011, GDP growth fell continuously up until 2016 where there is an increase in growth up to 2018.

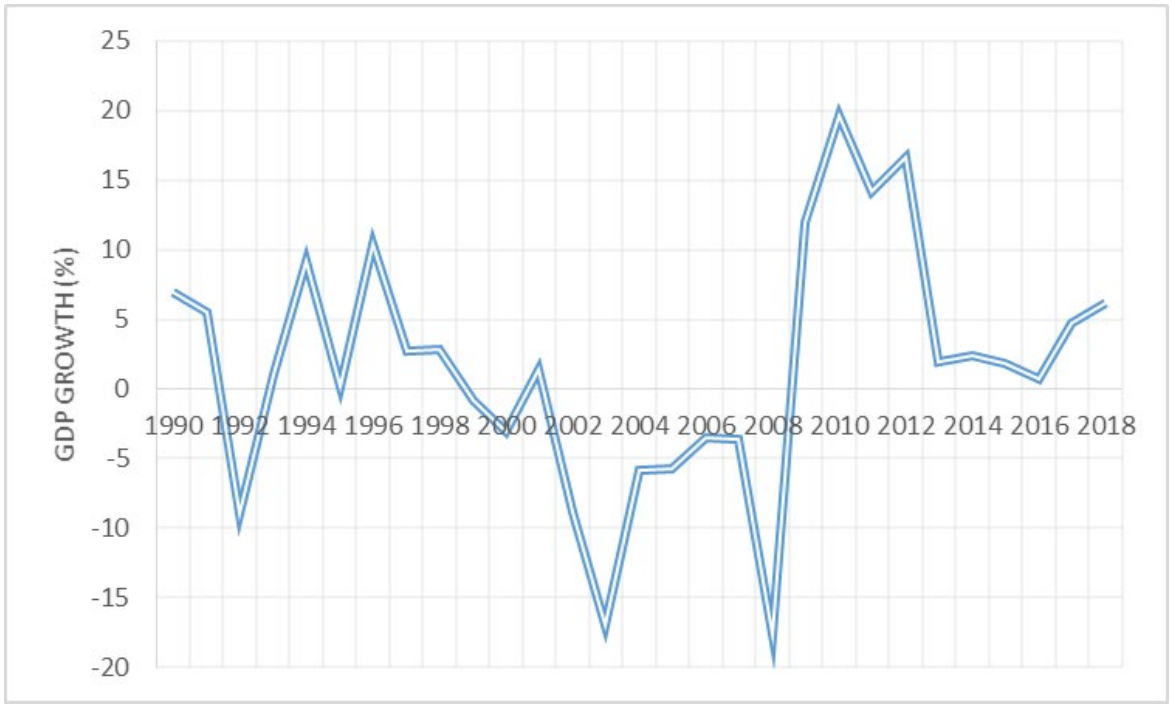

Figure 3-1: GDP growth rates

Source: Own compilation based on data from World Bank (2019)

Due to the economic climate,with a fluctuating GDP growth, Zimbabwe has had negative trade balance meaning it will be importing goods more than it is exporting. The trade balance for Zimbabwe recovered to 0.16 billion U. S dollars in 2017 from a trend of deficits in the years 2007-2016. Zimbabwe has had a negative trade balance from 2007 up to 2016. The trade balance is the exported goods minus the imported goods over a period of time (Statista, 2019).

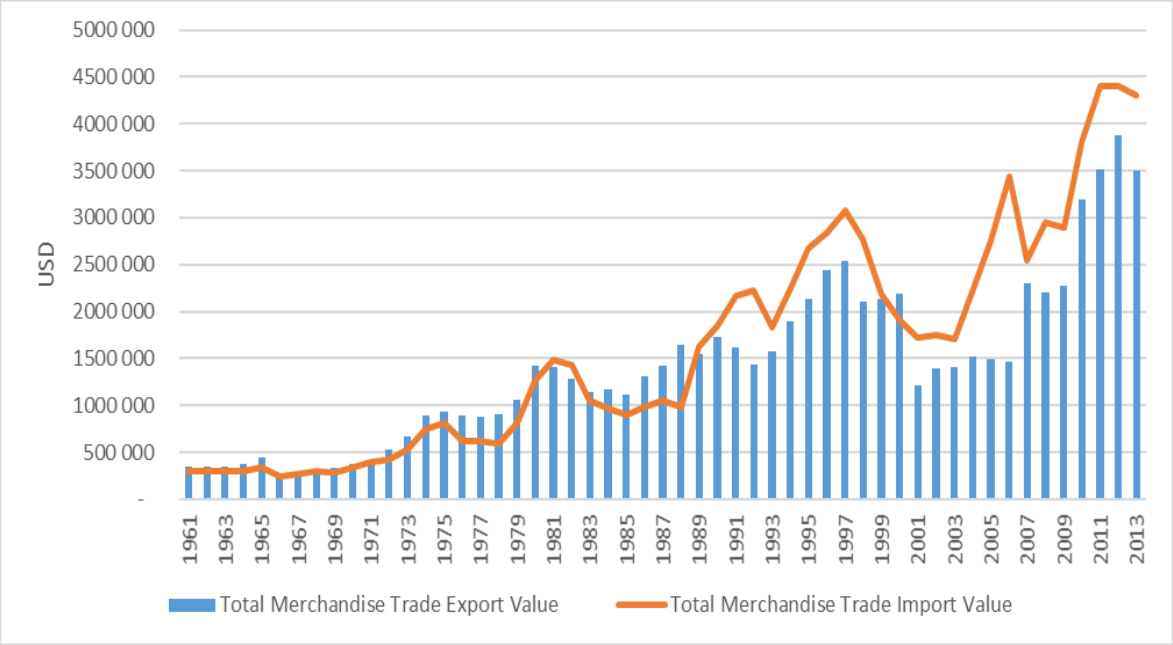

Figure 3-2: Zimbabwean merchandise trade trend

Source: Own compilation based on data from World Bank (2017)

The merchandise trade shows that the imports have been above the exports in most of the years since 1990. The trend shows that Zimbabwe imports more than it exports (World Bank, 2017). Zimbabwe exports and imports a variety of products, the table 3.1 shows the top 5 products exported and imported by Zimbabwe. The agricultural sector and the mining sector are the top export origins of the products. The overall exports have decreased at a rate of -11.8% annually from 2012 to 2017, 3.57 billion U.S dollars to 1.93 billion U.S dollars respectively.

Table 3-1: Top 5 exported and imported products

Top 5 exported products	Top 5 imported products
Raw tobacco (51%)	Broadcasting equipment (4.4%)
Ferroalloys (8.9%)	Packaged medicaments (3.8%)
Diamonds (7.4%)	Delivery trucks (2.9%)
Chromium ore (6.3%)	Corn (2.3%)
Raw sugar (2.8%)	Refined petroleum (2.3%)

Source: OEC, 2019

The tobacco exports have a value of 277 million U. S dollars representing 51% of the total exports in Zimbabwe as of 2019. A strategy to increase the export value of the products is value addition, since the top exports are exported mostly in their raw form, which means they are mostly low value which do not derive maximum profits. However, funding for the necessary processing equipment and resources is required for both the mining and the agricultural industry. The minerals face extinction therefore there is need to focus more on the development of the agricultural sector (MoIC, 2014).

The top trading countries with Zimbabwe are China and South Africa. South Africa accounts for 2.1 billion U.S dollars of imports to Zimbabwe (OEC, 2019). South Africa and Zimbabwe have a bilateral trade agreement, established in 1964, that gives preferential treatment to specific items in the form of rebates and duty-free market access. There are also 33 treaties between Zimbabwe and South Africa. The treaties are for investment promotion, roads, infrastructure development, and market access for textile industry in Zimbabwe among other areas (DIRCO, 2019).

Table 3-2: Top 5 export destinations and and import origins

Top 5 destinations	Top 5 origins
China	South Africa
South Africa	China
United Kingdom	India
Netherlands	Zambia
Germany	Hong Kong

Source: OEC, 2019

3. 2 Overview of the economic sectors

Zimbabwe's economic sectors can be classified as agriculture, mining, manufacturing and services sector. The sectors contribute to the GDP with approximately 11%, 10%, 9% and 70% respectively.

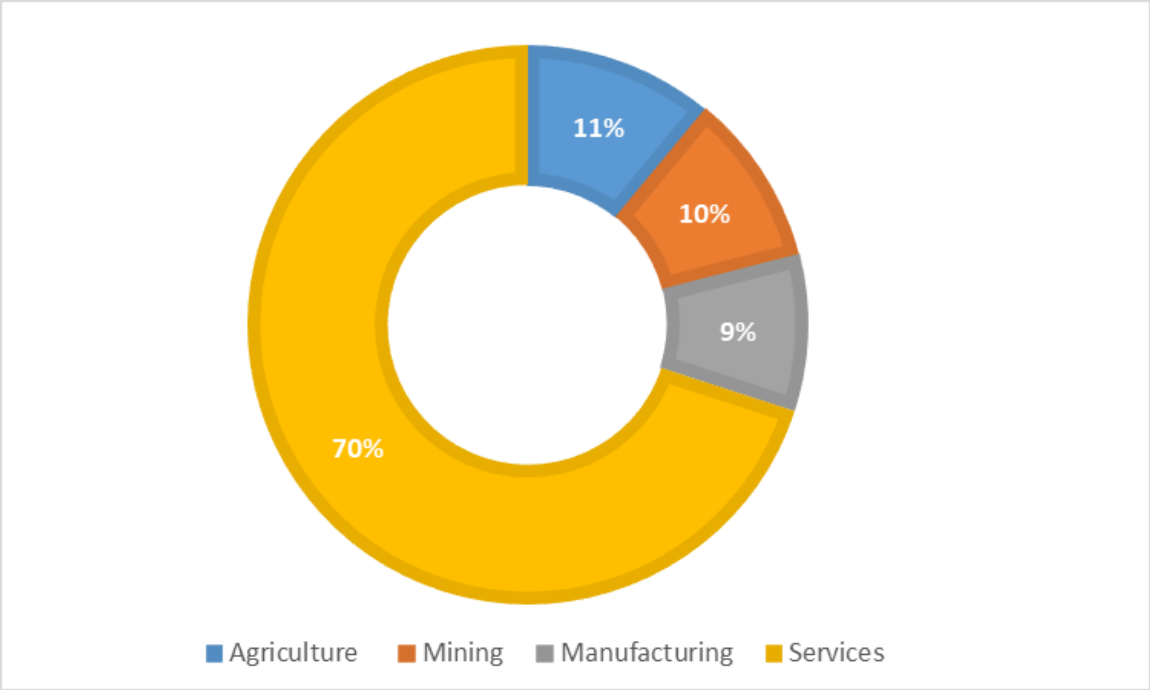

Figure 3-3: Sector contribution to GDP

Source: Compiled by African Development Bank, 2018

3.2.1 Agricultural sector

Zimbabwe's agricultural sector contributed between 11% and 15% to the gross domestic product of the economy over the past 5 years (2013-2017). Approximately 70% of the population is employed in the agricultural sector. The year 2000 marked one of the major agricultural land policies passed by the government, the land reform policy. The agricultural sector contributes 40% of Zimbabwe's foreign exchange with the foreign currency earnings coming from exports of crops such as tobacco, sugar, tea, coffee, cotton and vegetables (ZimTrade, 2018). The figure 3.3 shows the top five exported agricultural produce to the world from 2001 to 2018.

Table 3-3: Top 5 agricultural exports

Crop	**Value exported (USD)**
Tobacco	8,959,851
Cotton	1,848,042
Live trees and cut flowers	1,573,686
Sugar	1,050,452
Vegetables and tubers	684,350

Source: ITC trademap, 2019

The land reform programme came with a radical change in the agrarian structure for the country. The policy led to a decrease in the productivity of particular crops by the reallocated farmers because of lack of skills and resources to sustain agricultural production. Approximately 20% of the total land area in the country was reallocated. Crops such as coffee and tea decreased in exports. The major crop, tobacco fell in production but has since maintained its value to the economy through export earnings. However, the production for small grains such as soya beans show that although the agricultural productivity collapsed, some survived the consequences of the policy. The major crops maize and wheat decreased in production but despite the resettled farmers concentrating more on small grains, production of soybean and sorghum increased over time but not to the extent of the major grains maize and wheat (MLARS, 2012).

The Zimbabwean agricultural policy set an objective of making the agricultural sector profitable, diverse and competitive. The policies for agriculture are based on four major elements which are: productivity and growth oriented; proactive; practical, feasible and attainable; and finally participatory and responsive. The first policy objective for the crops and livestock sector is to ensure that there are increased yields in the agricultural sector to generate surplus for the export market. In executing this, the government set up funds for agricultural inputs (MoA, 2012).

The Command Agriculture initiative introduced in 2016 is one of the ways the farmers have received inputs for major grains and crops such as maize, cotton and tobacco. This scheme is a major private sector-backed subsidy programme in which farmers are provided with seeds, fertiliser, fuel and chemicals on a loan basis, with repayment made with a profit from a portion of the harvest the following season. It is a scheme to promote food security through domestic agricultural production. The programme is an import substitution-led industrialisation concept deliberately meant to reduce foreign dependency through local production. The USD500 million programme saw more than 2000 farmers getting into contracts for three consecutive growing seasons of 2016/2017 onwards (Share, 2016).

The programme is also part of the Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZimASSET) cluster for food security and nutrition seeking to bring sustainable local supply of food and thereby reducing Zimbabwe's trade deficit. Although the government recorded the programme as a success, issuing orders for import permits to be

suspended for the season after the 2016/2017 season, grain imports were still received into the country with most imports coming from Zambia and South Africa and mostly importing maize and wheat (Nyoni, 2018).

The programme is expected to boost the livestock exports as it has been extended to include livestock and fisheries (Muleya, 2018). The farmers access loans with a period of 3-5 years tenure and an all-inclusive interest rate of 4%. Since agriculture has multiplier effects, the scheme is expected to boost the non-food industries, create more jobs, income streams and further improve the current state of the economy. There has been criticism towards the Command Agriculture programme with the International Monetary Fund (IMF) showing concern over the funding model used by the government to resuscitate the agricultural sector.

The critiques of the government's subsidy programme have highlighted that the cost of the programme is only worsening the balance of payments of the country. Bratton (1989) stated that the crisis of food security in African countries could be solved through sound agricultural policies that shift their focus from allocating resources to maintain political power to setting up a number of measures that ensure long-term development in the targeted sector.

3.2.2 Mining sector

According to Malinga (2018), Zimbabwe has been undergoing a shift from being an agro-based economy to a mineral-based country with gold and diamonds dominating the industry. Zimbabwe has an abundance of minerals and the mining sector contributes approximately 10% to the overall GDP of the country (ADB, 2018). The exports mainly consist of gold, platinum and diamonds. Gold contributes 32%, diamonds 7.4% and platinum contributes 1.8% to the overall mining exports (RBZ, 2017). In 2008, the mining industry exports almost doubled from 24% to 49%. There are more than 40 minerals in Zimbabwe with a diverse mining sector that has more than 800 mines, which are classified under small scale and large scale mines. The sector has been very dynamic and has been going back to its past growth rates over the years especially the 2009-2011 periods (ZIA, 2018).

The years 2002-2008 brought drastic changes to the mining sector with the prices of metals doubling during the price boom. Zimbabwe also introduced the nationalisation policy, which led to 51% of company ownership to the government. The lack of accountability for the diamond sector has led to USD15 billion worth of diamonds revenue losses (Zimbabwe Chamber of Mines, 2018). The sector still requires more policies that ensure transparency and

accountability towards development in value adding for greater returns on the export market (Parliament of Zimbabwe, 2016).

Apart from the minerals, Zimbabwe is abundant in fuels such as coal and methane gas. The supply of coal, which is found in the Zambezi basin and Save Limpopo basin, has an estimated reserve of 26 billion tonnes. The coal is used for cooking and thermal power generation in the agricultural sector. Zimbabwe also has natural gas found in the Zambezi basin, however, its exploration is yet to be confirmed (MoMMD, 2018). The trend for coal exports has fluctuated over the years with the peak years being 1980 and 1995, thereafter, there has been a decrease in the coal exports. The decrease in the coal exports can be due to the depletion of the coal reserves over the years, which is typical of most natural resources.

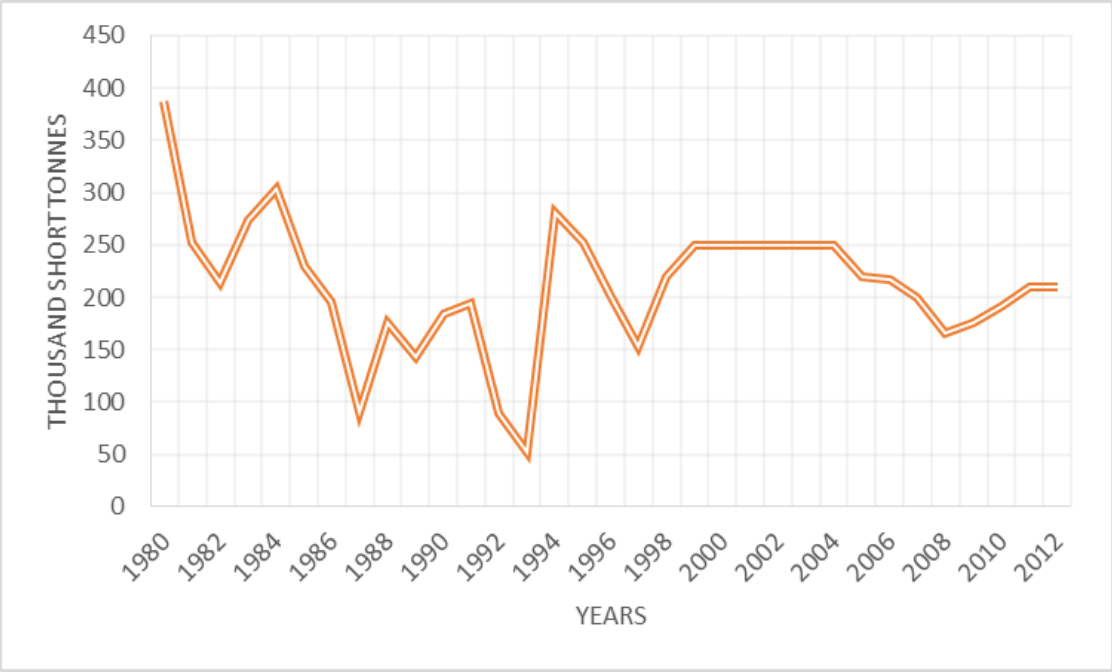

Figure 3-4: Coal exports

Source: ZIMSTAT, 2015

3.2.3 Manufacturing sector

Zimbabwe's manufacturing sector contributes approximately 10% to the GDP of the country (ADB, 2018). The manufacturing sector of Zimbabwe produces about 6000 different products that include food, chemicals, machinery and metals. The sector is directly linked to the agricultural sector with about 60% of the manufacturing value added being linked to the agricultural sector or the supply of inputs to the sector. Zimbabwe has managed to build a lucrative manufacturing sector during the past years but due to the economic conditions, much

of it has collapsed. The de-industrialization that has taken place has led to the closing of most manufacturing companies that are in the production of secondary goods (ICAZ, 2013).

The Zimbabwean textile industry used to be profitable but has been affected by cheap imports influxes from Europe and Asian countries, particularly China. The depreciation of the Zimbabwean dollar led to the textile firms being less competitive on the export market and instead of focusing on expansion they focused on survival mechanisms as the high interest rates affected the overall economy. The 2000s were a difficult period for most textile industries leading to closure of many stakeholders due the high inflation rate during that time. The companies faced a liquidity crisis and they did not have foreign currency to continue operating as usual (Yarns and Fibres, 2018).

The agro-food industry of Zimbabwe evolved in two stages over the past years that are the pre-globalisation stages with the first stage involving public sector control of the food transformation and a shift from a traditional small-scale agro-industry to a large-scale industry. The shift involved investments into parastatals. Globalisation of the food industry led to the doubling of international trade and improved logistics with the different trading countries. The food industry is expected to keep evolving over the next years through advanced methods of production and increased use of technology throughout the production chain. A shift towards more processed food is expected and more inclusion of small-scale farmers in the transformation of the agricultural industry (Reardon et al., 2009).

The food subsector is part of the main priority sectors consisting of grains and oilseed, vegetable and meat production and processing. The sector dominates the manufacturing sector, owing to 60% of manufacturing value added and 30% of employment in the manufacturing sector. The agricultural sector contributes most of the raw materials used in the food subsector thus the sector is linked to more other subsectors such as the fertilizer, chemical and seed industry therefore it has a significant contribution to the GDP (MoIC, 2012).

However, the production of food has been affected by the hyperinflation, political instability and natural disasters such as the El Nino weather phenomenon in the 2016 season contribute to the performance of the industries. According to Confederation of Zimbabwe Industries (CZI) (2018), about USD2 billion worth of goods are smuggled into the country yearly. The locally produced goods are threatened, as they become relatively more expensive than the imported goods, which affects the food industry.

Corruption has affected the manufacturing sector, with many policy procedures being politically motivate. In some of the industrial factories, there is out-dated machinery, which leads to lower efficiency and poor quality products that are not able to compete on the international market. The constant political unrest in the country has shunned away investors who would have otherwise led to the further development of the industrial sector (Masamha, 2018).

3.2.4 Services sector

The services sector accounts for almost 70% of the total contribution to the GDP of the economy. The sector comprises some economic activities, which include real estate, electricity, transport and communications. The services sector requires proper infrastructure and strong backward linkages with the agricultural and manufacturing sector to ensure its growth.

3.3 Export sectors

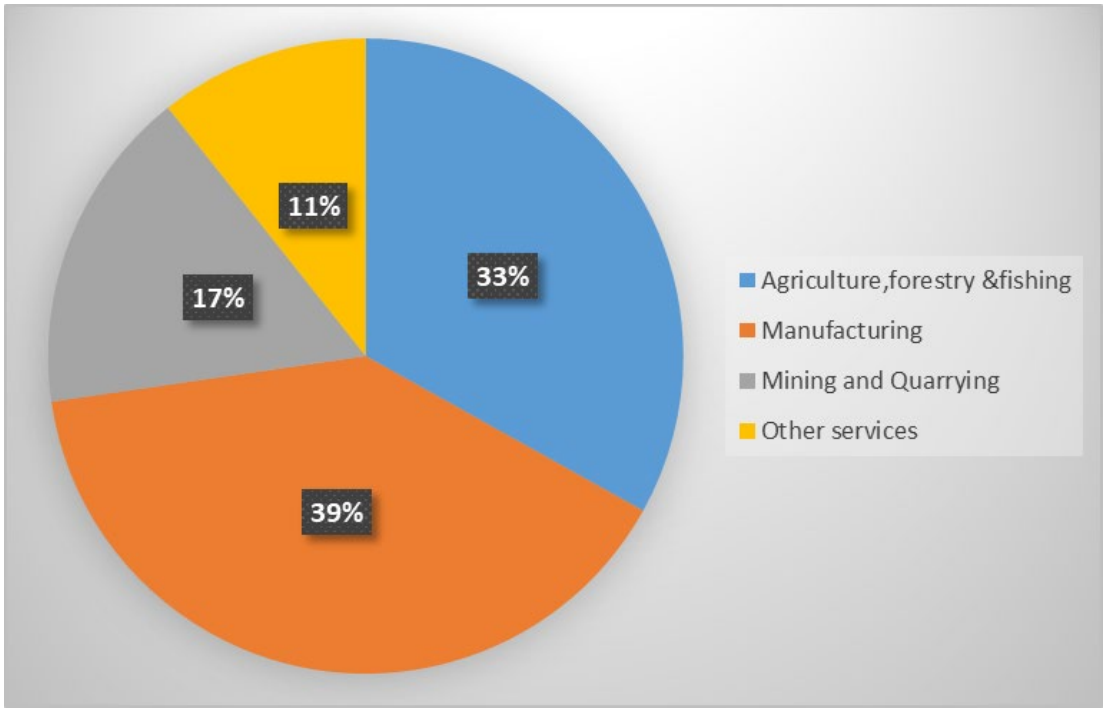

Figure 3-5: Export contribution to GDP

Source: Own compilation based on data from African Development Bank (2018)

The agricultural sector contributes 11% to the GDP. Zimbabwe's top agricultural crop exported is tobacco, which mostly goes to countries such as China and South Africa (OEC, 2018). The top export destinations for selected agricultural goods include South Africa, China and

Netherlands, which require specific standards which the farmers are struggling to meet (ITC, 2018). Zimbabwe has moved towards an industrial based policy structure where the economy is focused on industrialization to boost export performance. The manufacturing sector contributes approximately 33% to the total exports of the country.

The mining industry is the third largest export sector as Zimbabwe is a mineral rich nation. The mining industry contributes 17% to the export sector. The statistics show that the sector is not performing well in the current economic climate. Other services exported contribute 11% to the overall exports (ADB, 2018). The government came up with the Zimbabwe Industrial development policy and the Zimbabwe National trade policy from 2012-2016 to boost export performance of all the economic sectors.

3.4 Structural changes in Zimbabwe

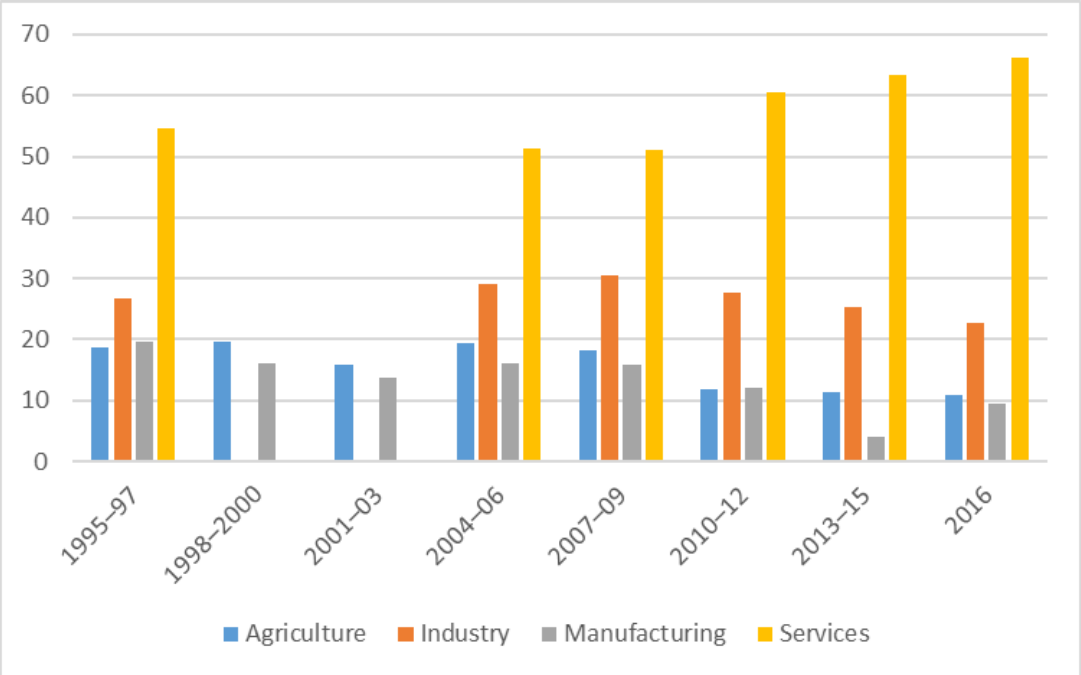

Figure 3-6: Percentage change of economic sector contribution to GDP

Source: Own compilation based on data from African Development Bank (2017)

Structural transformation involves the shift of the economic structure from low productive and labour intensive activities to capital-intensive high productivity activities. The shift occurs over a period of years and determines the stage of economic growth of a country. In Zimbabwe, the services sector has grown over the years, with 2016 having the highest percentage contribution

of 66% to the economy. The manufacturing industry growth has decreased over the years with the highest contribution of 19.3% between 1995 and 1997.

The years from 2013 to 2016 have seen a major decrease with the lowest contribution at 4.02% between 2013 and 2015. The industry has been almost consistent with a peak between 2007 and 2009, a period when the dollarization policy was implemented. The agricultural sector growth has decreased gradually but not significantly with the highest contribution of 19.48% between 2004 and 2006. The lowest contribution was 10.98% in 2016. The trend among the sectors shows that the services sector has been the dominant sectors followed by the industrial sector. The industrial sector and manufacturing sector growth is higher compared to the agricultural sector. The services sector is increasing. However, the manufacturing sector growth has a downward trend over the years.

According to Oyelaran-Oyeyinka and Lal (2013), development occurs through the reallocation of labour toward sectors with the greatest growth potential and the highest productivity. The graph shows that the employment in agriculture is higher than that in the industrial sector, meaning the agricultural sector is still labour intensive and the services and industrial sectors are capital intensive. As the GDP has increased, industrial sector employment has been rather consistent with a slight decrease over the years whilst the agricultural sector employment has had a consistent increase from 2003 and 2010. The graph shows that not much agricultural employment has migrated to other sectors over the years. The government has put in place industrial development driven policies to boost economic transformation.

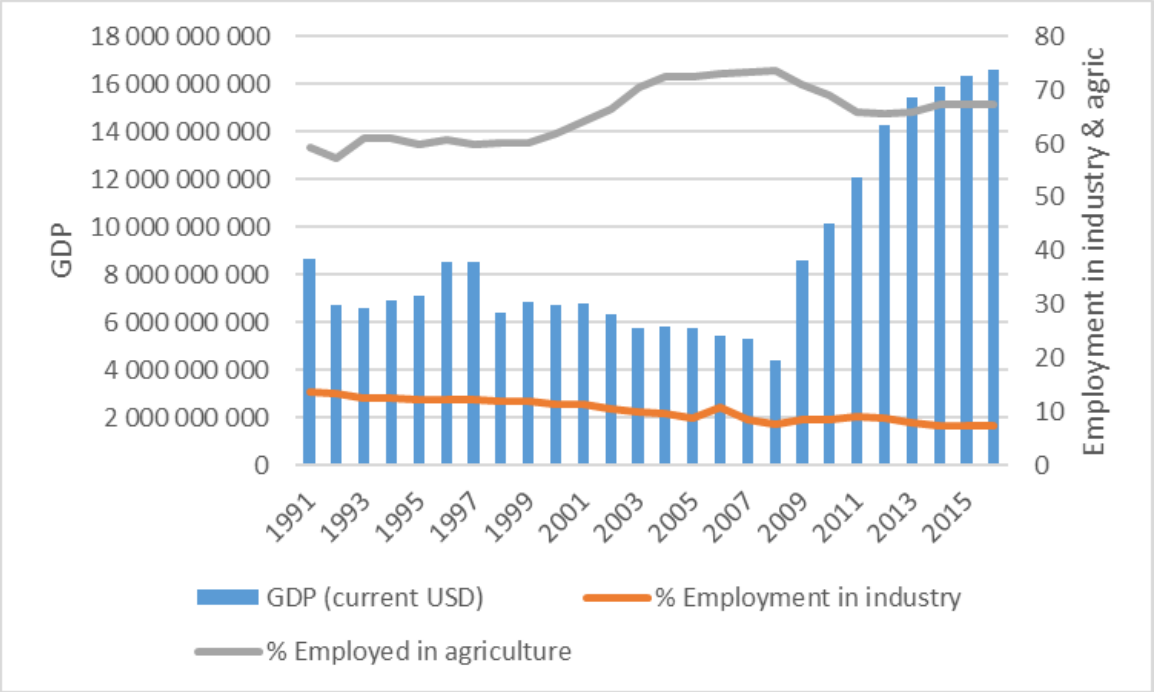

Figure 3-7: GDP and employment trend

Source: Own compilation based on data from The World Bank (2019)

The trend that Zimbabwe shows in the sector analysis is a clear reflection of the economic challenges faced by the country. The manufacturing industry has collapsed over the years with companies closing down as mentioned in the previous sections. Agriculture contributes to the employment of most of the Zimbabwean population (70%) but with the growth of the sector rather decreasing over the course of the years. Although the GDP has improved from 2010 up to 2016, the individual sectors have not significantly improved. Agriculture, which is labor intensive, continues to decline together with the manufacturing sector.

The other indicators of structural transformation include a decrease in population growth rate and presence of rural to urban migration. The population growth rate has decreased over the years with the urban population growth higher than the rural population growth. The dynamics changed in 2003 where the rural population growth is now more than the urban population growth rate. The trend shows that urban migration growth is lesser than rural migration from 2003. The different trends shown by Zimbabwe show that:

- GDP is increasing.

- Services sector growth is increasing, industrial sector is decreasing, manufacturing sector is decreasing and agricultural sector growth is decreasing over a period from 1995 to 2016.
- Population growth rate is increasing from around 2003.
- Rural growth rate is greater than urban population growth since 2003.
- Agricultural sector employment is increasing whilst services sector employment has slight fluctuations over the years.

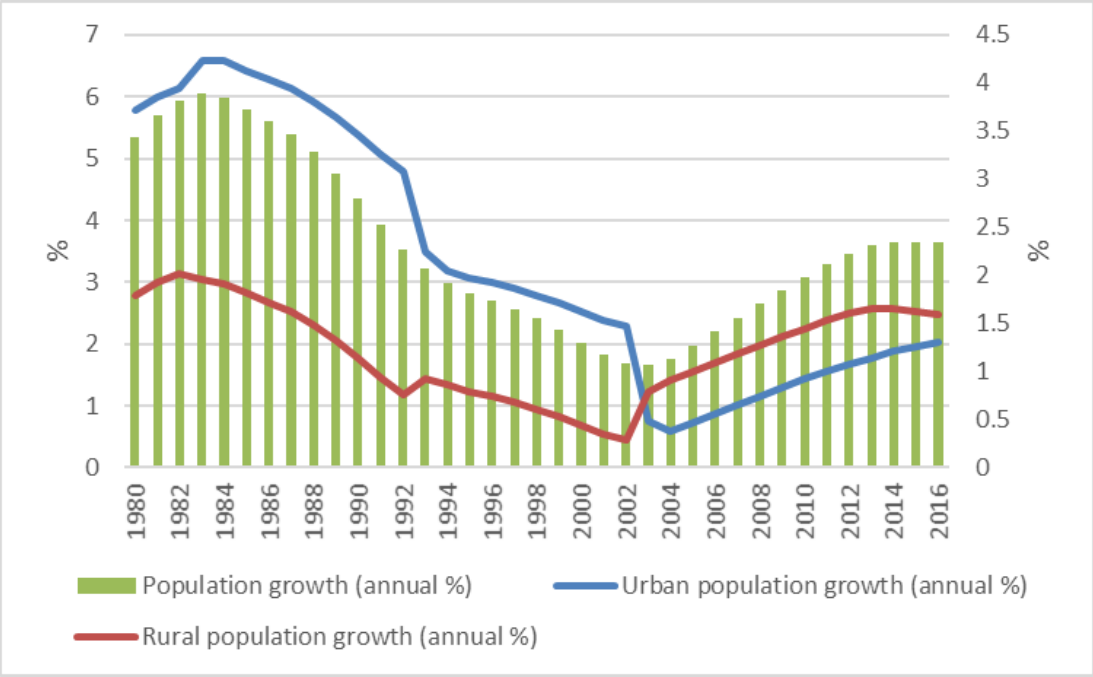

Figure 3-8: Population growth

Source: Own compilation based on data from World Bank (2017)

The trends show that structural transformation has not taken place in Zimbabwe. However, government has put in place policies that promote structural transformation. Structural transformation in the agricultural sector has to take place concurrently with structural transformation of the whole economy for more efficient allocation of resources. Szirmai (2009) states that if the productivity in the manufacturing sector is higher than in the agricultural sector, structural change has to occur. However, if the service sector productivity increases beyond the manufacturing sector productivity, GDP per capita begins to slow down. The World Bank (2016) states that structural transformation has to be supported by technological enhancement, market access, provision and regulation of public goods.

3.5 Trade policies in agriculture

The national trade policy of Zimbabwe is driven by the principles of export-led industrialisation; development and promotion of exports; regional and multilateral trade agreements; strategic trade policy instruments and institutional capacity development. The government seeks to create an enabling trade environment that ensures simple agricultural trade regulations, negotiation of bilateral and multilateral trade agreements and the maintenance of liberal exports, foreign exchange policies and the promotion of exports of high value products. The government set up different parastatals that deal with the regulation of imports and exports into the country. The Agricultural Marketing Authority is a statutory body with the mandate of regulating the participation in international and local buying and selling of agricultural products. It ensures fairness in the sector by controlling exports and imports that exit and enter the country.

The Agricultural Marketing Authority sets up statutory instruments that control the quality of goods that are imported into the country, for example statutory instrument 122 of 2014 (AMA, 2014). The other trade regulations set by the government include the statutory instrument 64 of 2016 which is in line with the Southern African Development Community (SADC) industrialization strategy to enable African countries to transition from depending on imported commodities to value-adding their own products and ensuring growth of their manufacturing sectors. The statutory instrument 64 of 2016 restricted importation of 43 products. The products included fertilizer and some agricultural products. The companies or individuals interested in importing the goods would require an import permit (AMA, 2016).

The regulation came with the justification of protecting the local manufacturers, protecting start-up firms from foreign firms that have lower cost of production due to better infrastructure, better technology and as an anti-dumping measure of products from other trading countries. It is important to position value-chains for greater value and competiveness. The trade balance for Zimbabwe is negative and similar to other Sub-Saharan countries' balance as they produce more relativley low-value products that require low skills. In an agricultural context, more profit can be attained by linking farmers to cost-effective markets. The changes in the global markets such as reduction of transaction costs through trade agreements and technology innovations bring the need for agricultural expertise and competitive products and services (Webber and Labaste, 2007).

The importation of some agricultural machinery, products and livestock especially cattle is free under the Customs and Excise Tariff and Value Added Tax (VAT) regulations to ensure easy access to new technology in production (ZIMRA, 2018). South Africa is one of the top destinations for Zimbabwe's agricultural products. The countries are both members of SADC and of the SADC Free Trade Area, and they also have a bilateral trade agreement dating from 1964 (Tshuma, 2016). Zimbabwe imports a very broad range of goods from South Africa, including fuel, agricultural produce and many other consumer products.

In order to achieve the expected results from the trade policy instruments, institutional and implementation frameworks should be put in place. Policies are to be amended to fit the current economic situations at the time of implementation. Citizens are an integral part of the economy and thus strategies to move away from the foreign produced goods towards the local products have been put in place. The initiative encourages citizens to purchase more of the local products than the foreign products on the market to motivate production in the manufacturing industry as well as to generate more revenue for the respective industries (ZimTrade, 2018).

However, even if regulations are to be favourable for emerging countries, trade on its own cannot ensure economic development. International trade policies have to complement local policies that lead to economic development. Trade reforms need to be accompanied by foreign direct investment and development of labour markets. Governments in emerging countries may not have enough resources to put formal safety nets in place to ensure their producers get the expected gains on the international trade market. However, they can put some measures in place to protect the producers from unexpected losses due to international regulations (OECD, 2008).

3.6 Major challenges to Zimbabwe agricultural export growth

3.6.1 Economic instability

Zimbabwe has experienced some constraints on the international export market. The current shortage of foreign currency led to the adoption of the South African rand and the United States dollar in 2008 after the economy went through a period of hyperinflation. The Reserve Bank of Zimbabwe introduced the bond to support the multiple currency system that had been introduced. The first batch was of USD10 million worth of bond coins constituting 2% of bank deposits as opposed to the usual 20% - 25% of total bank deposits (RBZ, 2014). The demonetisation of the Zimbabwean dollar according to Sections 41(2) and 44(3) of the Reserve

Bank of Zimbabwe Act was done in 2015 to enhance consumer and business confidence (RBZ, 2015).

However, the shortage of foreign currency led to price hikes and shortages of basic commodities in the country. The introduction of the bond notes was anticipated to cause an economic turnaround. The lack of foreign currency led to a shortage of raw materials in the agricultural sector that are imported from neighbouring countries. Major agricultural companies have faced closure after the government announced a 2% tax incentive on the money transfer transactions, which has further led to price hikes and panic amongst the consumers. The agricultural sector requires foreign direct investment, however, the inconsistencies in the policymaking process and corruption has led to low levels of investment in the sector.

3.6.2 Foreign market access

In 2005, UNCTAD did a study on the determinants of export performance in a set of countries including Zimbabwe. Foreign market access, which was identified as one of the constraints, includes issues such as local and international transport costs, size of the market, tariff barriers and the prices of the produce. The study shows that the countries that have more product diversity, mainly emerging countries that add value to their products, have more opportunities on the foreign market and are not subject to stricter trade barriers due to improved quality of their goods. The Zimbabwean agricultural sector has been working towards adding value to their agricultural produce in order to earn more on the foreign market, to increase shock absorption from the foreign market due to price volatility, as well as to increase revenue for the government (MoIC, 2012).

3.6.3 Volatility

The supply side constraint of most African countries shows a decline in the production levels of the exporting firms. The production of commodities is affected by natural factors such as the weather patterns unsuitable for certain crops and the macro-economic factors in the country. The prices of agricultural produce respond to the supply of the produce. Emerging countries tend to export most of their primary goods and in turn import manufacturing goods, which exposes them to instability of the supply and demand features of primary products on the world market. The export earnings from the products are easily affected. A country can introduce ways to reduce the effects of the volatile nature of the primary products prices by diversification. Export diversification is the change in the composition of a country's existing

export products or destination (Seetanah et al., 2012). Ehrhart and Guérineau (2011) states that a country should diversify its products to avoid the effects of price volatility.

Diversifying entails the move from trading of traditional to non-traditional goods. Horizontal diversification takes place within the same sector and involves addition of new export products in order to minimise price shocks and macro-economic risks. Vertical diversification assumes a move from primary to the tertiary sector by means of value addition through processing. Vertical diversification tends to lead to stability of products since processed goods cost more than raw produce (Samen, 2010).

Zimbabwe's current trade policies focus on diversifying exports through value-addition since most of the products are primary exports, which can be exposed to frequent shocks such as price volatility. An example of the benefits of value-adding raw agricultural produce is of cotton. A kilogram of cotton fibre costs USD1.85, when processed to yarn, the 0.75kg of yarn costs USD2.45. Yarn is weaved together to form a fabric which will give 3meters of fabric costing USD6.50. The final stage is to tailor make the fabric to e.g. a cotton t-shirt which costs USD12.00. In this case, value-addition led to USD10.60 from the initial raw cotton throughout the value-chain (MoIC, 2014).

The national trade policy seeks to focus on the processing of products particularly in the agricultural sector so that they can yield more profit on the export market. The diversification of products requires the government to focus on the more competitive sectors, for Zimbabwe, the priority sectors include food agro-processing industry. The current value-chain in the country is still incomplete with industries such as cotton still requiring more investment into up to date machinery e.g. de-linters for further processing of the crop into by-products such as inks and special papers (MoIC, 2012).

3.6.4 Land property rights

The presence of sound institutions ensures that there is security of property rights. Institutions are directly linked to the macro-economic environment and thus the level of foreign direct investment that flows into a country (UNCTAD, 2005). In Zimbabwe, farmers have 99-year lease agreements that is a legally binding agreement between the lessee and the government. Although the land can be used to borrow funds from financial institutions, it remains as state property and will not be sold or held for speculative purposes (MLRS, 2018). The lease arrangement has led to lack of development on the land that was acquired through the land reform period and that has weakened foreign investor confidence.

3.6.5 Poor infrastructure

The agricultural export market requires produce to meet international standards. If there is no proper infrastructure, such as roads to transport fruits and vegetables on time in refrigerated containers, the production and export quality level will decrease and the produce might end up not meeting the European Union (EU) standards on the export market (NECF, 2015). The efficiency of supply depends on the domestic infrastructure, which determines the export performance of farmers especially in the initial stages of exporting. UNCTAD (2005) found that poor infrastructure led to poor export performance among the African countries. Zimbabwe's power and transport system has deteriorated over the years and it has resulted in high production costs, which make a country less competitive, compared to its trading partners. The country requires capital for the roads and railway to be resuscitated, this may be a challenge as mobilizing foreign finance is a challenge in the current economic and political climate of Zimbabwe (ADB, 2019).

3.7 Conclusion

Zimbabwe has gone through a series of economic changes over the years. The country has been experiencing a negative trade balance due to the collapsing industries leading to more imports than exports. The land reform policy and dollarization is one of the policies that led to the transformation of the agricultural sector and the economy. The manufacturing sector has deteriorated over the years leading to companies closing down due to high cost of production.

Zimbabwe is rich in minerals and receives most of its foreign currency earnings from the mining industry. The sector has been politicised over the years and corruption has slowed down the full contribution of the sector to the economy. Despite much exports coming from the mining sector, agriculture remains one of the top contributors of the Zimbabwean economy contributing approximately 11% - 15% to the overall GDP.

The services sector has the highest contribution to the GDP of approximately 70%. Zimbabwe has not gone through structural transformation over the years, with the agricultural sector employment increasing instead of shifting to the industrial sector. The services sector employment has slight fluctuations over the years.

Zimbabwe trades most with South Africa and China. The countries have trade agreements that ensure the effectiveness of trade. The country has put in place some agriculture and trade policies that focus on export diversification and value-addition to boost export performance. The role of the government is not to be under-estimated in working towards enforcing policies

that will lead to a lucrative export market for all sectors in the country to improve economic growth.

CHAPTER FOUR : METHODOLOGY

4.0 Introduction

The chapter discusses the nature and sources of data relevant to the econometric model. The methods that are going to be used for diagnostic tests will use the time series data in Stata software. The study will test the variables for normality using the kernel density test, afterwards, model specification test will be carried out using the Ramsey Reset test. The stationarity of the variables will be established using three different unit root tests, which are the Augmented Dickey Fuller test and the Philips-Perron test, as well as the Zivot-Andrews test which takes into account structural breaks in the times series. The Johansen cointegration test will be implemented depending on the stationarity results. The Granger causality test will then test the direction of causation among the variables.

4.1 Variables and data sources

The data used comes from The World Bank Development indicators. The period of study is from 1990 to 2016. The figure 4.1 shows the trends in the data of the varibales over the years. All the varibales had slight fluctuations from 1990 up to 2000. Manufacturing exports and agricultural exports had a slight decrease around 2000, a period of land reform policy. Metal and ore exports had slight fluctuations from 1990 up to around 2006 and a sharp increase in the year 2012. The food exports have gradually increased from 2008, a period of dollarization up to 2016.

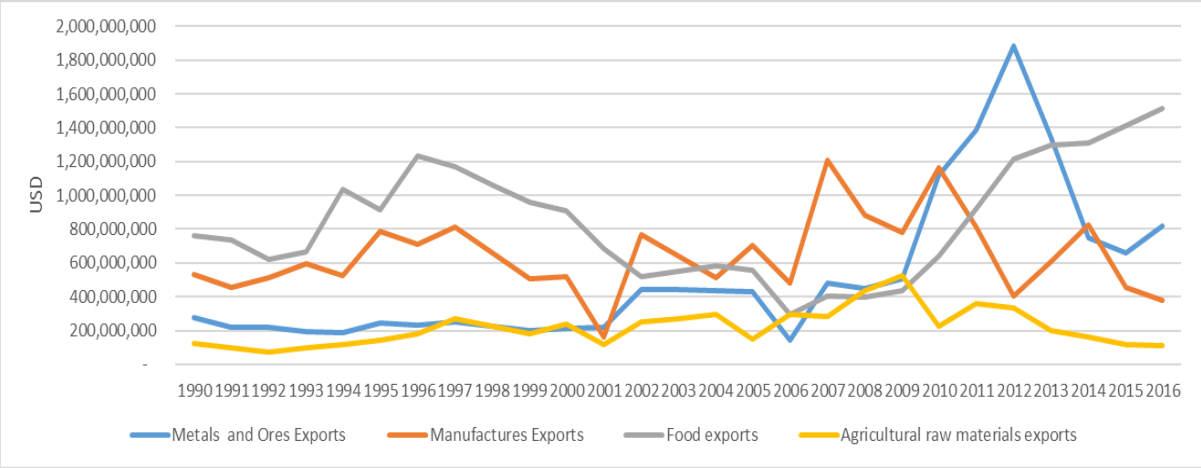

Fig 4-1: Export trends

Source: Own compilation of data from World Bank (2017)

GDP

Gross domestic product (GDP) at current United States dollars is used as a proxy for economic growth and is the dependent variable. The data reported at current prices are in the exact value of the currency for that particular year and take into account the effects of price inflation (World Bank, 2018).

Agricultural raw exports

The agricultural raw exports data from World Development Indicators. The agricultural sector plays a significant role in the economy. The manufacturing sector relies on the raw materials from the agricultural sector for it to function effectively. Agricultural raw exports is the variable of interest in this study.

Food exports: The food exports data is from World Development Indicators. Food exports include the processed agricultural produce that has been value added. If the agricultural sector produces more, there will be more food and agricultural exports. The food exports will lead to growth of the economy by improving the trade balance.

Non-agricultural exports

The non-agricultural exports comprise of the manufacturing exports, food exports, metal and ore exports and fuel exports. Most studies have focused on individual export sectors, combining the subsector exports gives a much clearer observation of the results in line with the objectives of the study mentioned in the first chapter.

- ***Manufacturing exports:*** The data is from World Development Indicators and excludes food exports. The industrial driven policies implemented seek to boost the overall economic growth through improvement of the manufacturing sector. It is relevant to test whether these policies are sound for Zimbabwe given the economic conditions during the period of study.
- ***Metal and ore exports:*** The data comes from World Development Indicators. Zimbabwe is a mineral rich country, which exports minerals such as diamonds and gold, the natural resource exports have a huge positive bearing on the economy. Zimbabwe exports most of the minerals that they extract.
- ***Fuel exports:*** The data for fuel exports comes from World Development Indicators. In 2008, least developed countries' import of fuel increased by 50% as a percentage of

merchandise exports. Fuel has an impact on the fluctuation of prices of commodities in developing/emerging countries (UNCTAD, 2013).

Capital

Gross capital formation data is from World Development Indicators. Capital include investment towards the growth of output. The capital accumulated by a country or firm leads to increased productivity.

Employment

The employment data is from the unemployment rate data expressed as a percentage of labour force in Zimbabwe. The following definitions are for the variables used in calculating the employment of Zimbabwe over the years by ZIMSTAT. Challenges in the employment data include the incomplete data in the ZIMSTAT database. However, the definitions for data collection are consistent with the International Labour Organization (ILO) hence the trend is expected to be the same. The unemployment rate ranges as low as 5% in some years, this is due to how employment includes the informal employment in Zimbabwe. The following are the definitions from ZIMSTAT (2014):

- ***Employed Persons*:** These are persons aged 15 years and above who worked for pay, profit or family gain for at least one hour during the reference period. People who did not work during that period but had a job or business are also considered.
- ***Labour Force*:** Persons who are available for the production of goods and services for cash during a specified time reference period. It includes the employed (paid employees, employers, own account workers, contributing family workers) and the unemployed.
- ***Employment Rate*:** Number of employed persons aged 15 years and above divided by the labour force, expressed as a percentage.

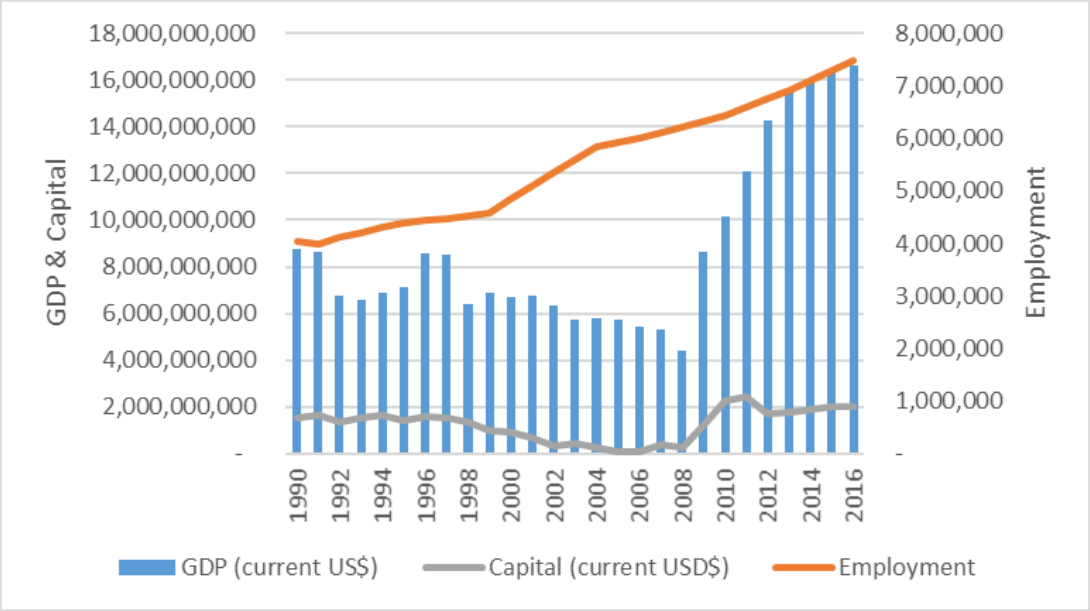

Fig 4-2: GDP, Capital and Employment trend

Source: Own compilation of data from World Bank (2017)

The diagram shows the trend of the GDP, capital and employment. The GDP increased over the years with notable spikes in 2009, a period of dollarization. The capital had a slight increase in 2009 likewise. However, the employment data is linear, increasing over the years.

Dollarization policy: The variable was introduced as a dummy variable. The dollarization policy was introduced in 2009 as a replacement of the Zimbabwean dollar after a period of hyper-inflation in 2008. The policy was expected to resuscitate the economy from the inflationary period.

Land-reform policy: Land reform policy was introduced as a dummy variable. The land reform policy was introduced in 2000, a period where there was reallocation of land from the white resettled farmers to the black farmers. The policy led to a change in the agrarian structure of the country.

Table 4-1: A priori sign expectation

Variable	Expected sign
Agricultural raw exports	+
Non-agricultural exports	+
Food exports	+

Capital	+
Employment	+
Dollarization	+
Land Reform	-

Initially, the study considered the dummy variables for land reform policy in 2000 and the dollarization policy in 2009. The land reform policy led to a change in the agrarian structure with most export crops decreasing in productivity, however, some food security crops were not significantly affected. The dollarization policy was the introduction of a multicurrency system of the rand and the USD to revive the economy from the hyperinflation. The policy led to an improvement to the economy as was discussed in the previous chapter. However, after testing the model with the dummy variables, the land reform dummy variable had a positive sign which is contrary to expectation and this can be explained by the positive effect of dollarization from 2009 (which is also included as the post land-reform period). Even when controlling for the post dollarization period by making the land-reform dummy equal 1 only for the period 2000 till 2008, the land-reform dummy variable coefficient was not statistically significant even though the coefficient of the revised land reform dummy variable had a negative sign as expected. The dollarization policy caused multicollinearity. Therefore, the dummies were not included in the final model of the study (refer to appendix for models with dummy variables).

4.2 Data analysis

4.2.1 Empirical specification

The model assumes marginal changes in output and factor inputs, with the following functional form according to Gujarati (2004):

$$Q = AL^{\alpha}K^{\beta}X^{\delta} \dots \mu_t \qquad 4(1)$$

Where Q is the dependant variable (GDP), L is labour (employment as per this study), K is capital stock and X represents the other export variables that are included in the study.

The econometric model for the study is as follows:

$$lnGDP = lnA \quad + \beta_1 lnL + \beta_2 lnK + \beta_3 lnX + \cdots + \mu_t \qquad 4(2)$$

β_1 is the partial elasticity of GDP in relation to employment (labour). β_2 is the elasticity in relation to capital, β_3 is the elasticity of GDP in relation to the export variables, μ_t is the error term. ln signifies the log form of the variables.

4.2.2 Normality test

Normality tests are carried out to ensure that the variables used in the model are normally distributed. The kernel density estimator test is used to test for normality. The study employs the method for normality to ensure the accuracy of the results.

Kernel Density estimation

According to Stata (2015), Rosenblatt (1956) and Gujarati (1995), kernel density estimation is a method to estimate the probability density function of a random variable. Based on the observed sample, kernel density estimation allows making inference about the variable distribution in the population. The method is rooted in the histogram methodology. It measures the density at point *x* as the centre of the bin of width *2h* in relation to the rest of the observations.

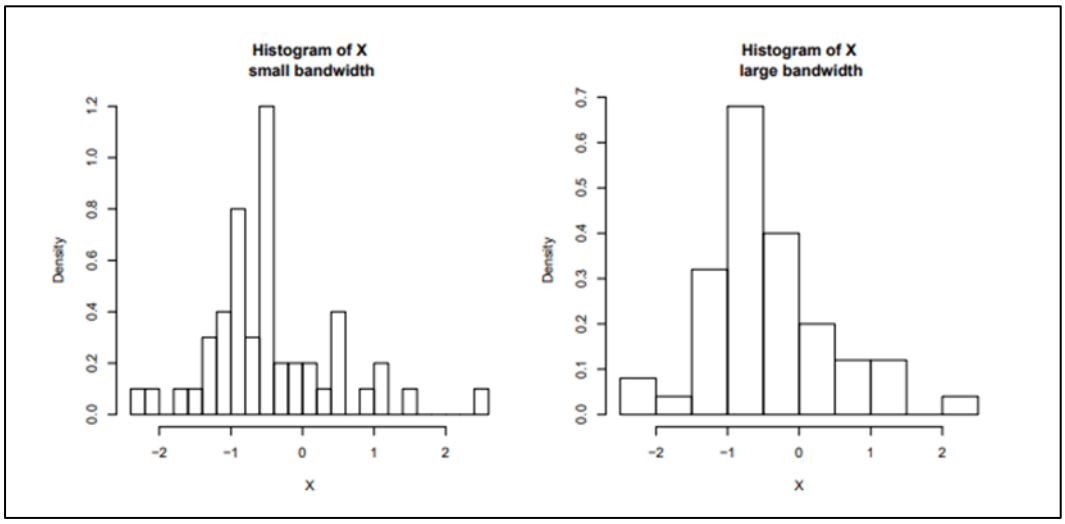

Figure 4-3: Histogram

$$K(x) = \begin{cases} \frac{1}{2} & if\ |x| < 1 \\ 0 & \text{Otherwise} \end{cases} \qquad 4(3)$$

Expressed as the kernel weight. The kernel estimate is interpreted as follows:

$$\hat{f}_x = \frac{1}{nh} \sum_{i=1}^{n} K\left(\frac{x - X_1}{n}\right) \qquad 4(4)$$

Where h is the bandwidth and K is the chosen kernel (weight function).

The second equation is an additive function of the first one, thus, it has functions such as continuity and differentiability. If the function is discontinuous such as first equation, it can give results that are misleading because a few data points would have been observed.

The bandwidth of the plot will determine the outcome, if the bandwidth is too large important parts of the observations may be lost due to over smoothing. If the bandwidth is too small, spurious noise appears in the tails of the estimates. The selection of the bandwidth for a kernel density estimator can be chosen by paying attention to the density estimates produced by a range of bandwidths. The kernel density estimation is further done on the residuals to establish the estimation for all the variables. Muhsal and Neumeyer (2010) did residual based density estimation and concluded that residual-based kernel estimator changes in first and second order which is a better estimation in simulations. The residuals are estimated by first computing an estimator, in this study, the regression estimation. The second step is to predict residuals for the estimated regression model. The third step is to calculate the kernel density using the residuals to test the asymptotic normality of the distribution (Liebscher, 1999).

4.2.3 Model specification test

The Ramsey Reset test

Maddala (1992) pointed out that a regression model should be used in the analysis of data if it is correctly specified and is coherent with economic theory. The Ramsey's regression test was used to check whether the model has omitted variables. The assumption of a classical linear regression is that no variable has been omitted which implies that:

- The model includes all the necessary variables.
- The model does not contain unnecessary variables.
- The regressors are non-stochastic.
- The functional form of the model is chosen appropriately.

In the case that we omit relevant variables due to inadequate data, the model can be under - fitted. There is also the possibility of overfitting the model by including unnecessary variables in the model. The steps involved in the Ramsey Reset test by Gujarati (1995) are as follows:

Estimate $\hat{Y}_i$ from the equation:

$$Y_i = \lambda_1 + \lambda_2 X_i + \mu_i \quad 4(5)$$

Then test the augmented model after introducing $\hat{Y}_i^2 \; and \; \hat{Y}_i^3$ as follows:

$$Y_i = \beta_1 + \beta_2 X_i + \beta_3 \hat{Y}_i^2 + \beta_4 \hat{Y}_i^3 + \mu_i \quad 4(6)$$

If the computed F statistic is significant at the 5% level, then we accept that the model is misspecified, the hypothesis is as follows:

H_0: model has no omitted variables

H_1: model has omitted variables

4.2.4 Heteroscedasticity test

The assumption of a linear regression is that the variance of the disturbance term (μ_i) is some constant number equal to δ^2 which is the assumption of homoscedasticity ($Variance(\mu_t) = \delta_t^2$). The major consequence of using testing procedures despite the presence of heteroscedasticity is getting misleading conclusions from the inferences. The study employed the Breusch-Pagan-Godfrey (BPG) test since it is sensitive to normality assumptions and has the advantage of detecting any linear form of heteroscedasticity.

It also has the advantage of enabling the residual to be modelled as a function of its non-stochastic residuals. In the presence of heteroscedasticity, the test checks for robust standard errors in the model. If the standard errors are identically distributed with the first regression which is not robust, then we proceed to use the model despite the presence of heteroscedasticity. The robust standard errors do not change the coefficients of the OLS (Gujarati, 2004).

Breusch-Pagan-Godfrey test

The actual test procedure requires obtaining the residuals $(\hat{\mu}_1, \hat{\mu}_2 \ldots \hat{\mu}_n)$ by estimating the ordinary least squares (OLS). The next stage is to obtain $\tilde{\sigma}^2 = \sum \frac{\hat{\mu}_i}{n}$ 4(7)

which is the maximum likelihood estimator of σ^2. Construct $p_i = \hat{\mu}_i^2 / \tilde{\sigma}^2$ 4(8)

Where the residuals are squared and divided by $\tilde{\sigma}^2$. The fourth step is to regress p_i on Z as:

$$p_i = \alpha_1 + \alpha_2 Z_{2i} + \cdots + \alpha_m Z_{mi} + v_i \quad 4(9)$$

Where v_i is the residual term. Obtain the explained sum of squares (ESS) and define

$\Theta = \frac{1}{2}(ESS)$. The rejection criteria is such that if the computed Θ, which is the chi-squared computed, is greater than the chi-squared value at 5% level of significance then we reject the hypothesis of homoscedasticity (Gujarati, 1995). The hypothesis is as follows:

H_0: constant variance (no heteroscedasticity)

H_1: variance is not constant (there is heteroscedasticity)

4.2.5 Multicollinearity test

One of the assumptions of linear regression model is that the regressors do not have the presence of multicollinearity. There are different reasons why a model can have the presence of multicollinearity, these include, method of data collection, model specification overdetermined model. The common cause of multicollinearity to time series data is whereby the variables (regressors) have a common trend e.g. increasing or decreasing over the years. The consequences of multicollinearity are over estimation of the confidence intervals, inflated R^2 and the variables can be too sensitive to small changes in the data (Gujarati, 1995). The variance inflation factor (VIF) will be used to check for linear relationship of the independent variables.

4.2.6 Autocorrelation test

According to Gujarati (2004) autocorrelation is defined as the correlation within members of a series of observations ordered in time (time series data). In regression analysis when:

$$E(\mu_j \, \mu_i) = 0 \qquad i \neq j \qquad 4(10)$$

then there is no autocorrelation which means that the disturbance term in a given observation is not influenced by the disturbance term in the previous observation. However, in the case that there is dependence in the factors that have been affected then we expect an effect to overlap to the next year of the observation therefore:

$$E = \mu_j \qquad \mu_i \neq 0 \; and \; i \neq j \qquad 4(11)$$

Autocorrelation is expected in data that comes from the same source and have a relationship.

Durbin-Watson *d* test

The test is used for testing serial correlation among the variables. According Brooks (2008) to the Durbin Watson statistic can be approximated as:

$$d = \frac{\sum_{t=2}^{t=n}(\hat{\mu}_t - \hat{\mu}_{t-1})^2}{\sum_{t=1}^{t=n}\hat{\mu}_t} \quad \text{where} \quad d \approx 2(1-\hat{p}) \qquad 4(12)$$

$$\text{And } \hat{p} = \frac{\sum \hat{\mu}_t \hat{\mu}_{t-1}}{\sum \mu_t^2} \qquad 4(13)$$

The estimator, p, is the first order autocorrelation coefficient of the selected data. The rejection criteria of the test are determined by the value of d relative to the upper critical level (d_U) and the lower critical (d_L) such that $0 \leq d \leq 4$.

Following Figure 4-2, if d lies between 0 and d_L there is evidence of positive autocorrelation; between d_L and d_U the results are inconclusive; between d_U and $4\text{-}d_U$ there is no evidence of autocorrelation; between $4\text{-}d_U$ and $4\text{-}d_L$ results are inconclusive; and between $4\text{-}d_L$ and 4 there is evidence of negative autocorrelation.

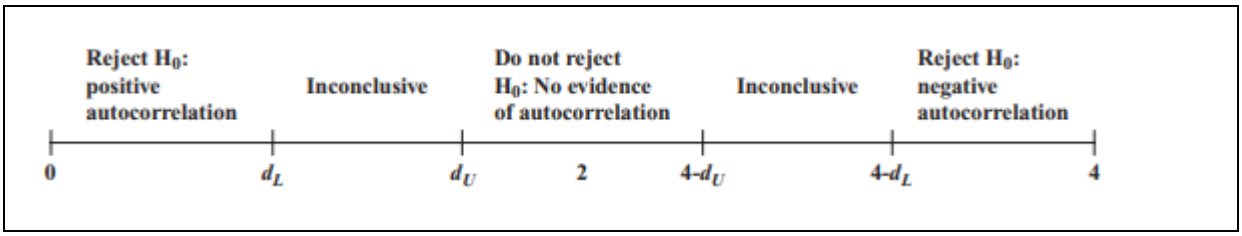

Figure 4-4: Durbin Watson (DW) d statistic

4.2.7 Stationarity test

A unit root test was used to determine the level of integration. The study employed the most commonly used methods, the Augmented Dickey Fuller test and the Philips Perron test, as well as the Zivot-Andrews test which takes into account one structural break per variable. The unit root test is used to test for stationarity whether the variables are integrated at order I(0) or not. If unit root is present, it can lead to spurious regression whereby the regression provides misleading statistical evidence of the relationship between the independent and dependent variable.

4.2.7.1 Augmented Dickey Fuller (DF) test

According to Gujarati (2004) and Said and Dickey (1984) the test is represented by the following regression equation, containing time trend and drift:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + \varepsilon_t \qquad 4(14)$$

Where ΔY_t is the first difference for Y_t, β_1 is a constant and represents a drift and β_2 is a coefficient of a linear trend t, δ is the parameter of interest, Y_{t-1} is the first lagged value of

order one for Y_t, m is the number of lags to be included in the model, α_i is the coefficient of the ΔY_{t-i}, ε_t is the white noise error term.

The test was based on the following hypothesis:

H_0: $\delta = 0$ there is unit root

H_1: $\delta < 0$ there is no unit root

4.2.7.2 Philips-Perron (PP) test

The advantage of the PP test over ADF is that it is robust to general forms of heteroscedasticity in the error term μ_t . The PP test does not require specifying the lag length when running the test (Gujarati, 2004). However, both the ADF test and PP test give similar results.

4.2.7.3 Zivot-Andrews tests

The Zivot-Andrews test is a unit root test that accounts for one endogenous structural break in the data. The model follows the regression equation given by Darné (2009):

$$\Delta y_t = \mu + \theta DU_t(\lambda) + \beta_t + \alpha \Delta y_{t-1} + \sum_{j-1}^{k} c_j \, \Delta y_{t-j} + \varepsilon_t \qquad 4(15)$$

The time break is when the time trend changes in the variable tested. For each break point, lags k are selected for each variable tested.

The test assumes one unknown break on the time trend that follows the equation:

$$y_t = \mu + \beta_t + (\mu_2 + \mu_1) DU_t + \varepsilon_t \qquad 4(16)$$

$(\mu_2 + \mu_1)$ represents the level of change of the break point. DU_t represents the time intercept dummy where $DU_t(\lambda)$=1 if t >$T\lambda$, and 0 otherwise, $T\lambda$ is the time break.

Structural breaks are a change in the time series due to a unique economic event. Harvey et al. (2012) states that including a time break in unit root tests improves reliability in the sample results. The ADF and PP are often criticized for not allowing for structural breaks which can lead to reduced ability to reject a false unit root hypothesis (Perron, 1989). Zimbabwe went through periods of major policy changes that could cause economic shocks. It is relevant to consider these shocks in understanding the effect of export subsectors on the economy and for policy recommendations.

4.2.8 Johansen Cointegration Test

The cointegration test is done after the variables show the presence of unit root at first difference. However, Johansen (1995) states that if one variable is not stationary at first difference the test can still be used. The test determines if there is a long run relationship between the variables. According Österholm and Hjalmarsson (2007) the Johansen cointegration test is given by testing the model for cointegrated variables at first difference as follows:

$$y_t = \mu + A_1 Y_{t-1} + \cdots + A_p y_{t-p} + \varepsilon_t \qquad 4(17)$$

Where y_t is an n by 1vector of variables that are integrated at first difference.

It is also written as:

$$\Delta Y_t = \mu + \pi Y_{t-1} + \sum_{i=1}^{p-1} \mathrm{r}_i \Delta Y_{t-i} + \varepsilon_t \qquad 4(18)$$

Where: $\pi = \sum_{i=1}^{p} A_i - \mathrm{I}$ and $\mathrm{r}_i = -\sum_{j=i+1}^{p} A_j$

If the coefficient matrix π has reduced rank $r < n$ there exists n by r matrices α and β with a rank r such that $\pi = \alpha\beta'$ and $\beta' y_t$ will be stationary. Where r is the number of cointegrated relationships where α is the adjustment parameters in the vector error correction model and each column of β is a cointegrating one.

For a given number of cointegrating relationships, the maximum likelihood estimator of β defines the combination of Y_{t-1}that yields the r largest canonical correlations[1] of ΔY_t with Y_{t-1} after correcting for lagged differences. A matrix π rank of one and above, signals the presence of cointegration in the components of Y_t. Johansen and Juselius (1990) proposed the two test statistics to determine the number of cointegrating vectors (rank) as estimated by the trace statistic calculated as:

$$\lambda_{\mathrm{trace}}(\mathrm{r}) = -\mathrm{T}\sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i) \qquad 4(19)$$

The maximum Eigen statistic is calculated by:

$$\lambda_{max}(r, r+1) = -\mathrm{T}\ln(1 - \hat{\lambda}_{r+1}) \qquad 4(20)$$

The trace test tests the null hypothesis of $r = r* < n$ cointegrating vectors against the alternative hypothesis of $r = n$ cointegrating vectors, where n is the number of I(1) time series

[1] Canonical correlation is a multivariate (involving two or more variables) analysis of correlation.

and $r* = 1,2,3$ .... The maximum eigenvalue tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of $r + 1$ cointegrating vectors. In both equations, *r* is the number of cointegrating vectors, T is the number of observations, $\hat{\lambda}_i$ is the estimated value for the ordered eigenvalue from the matrix. In this study, the null hypothesis states that $Y_t \leq r$ cointegrating vectors whereas the alternative hypothesis states that number of cointegrating vectors are more than *r*. If $r = 0$ it means that there are no cointegrating equations (Brooks, 2008).

4.2.9 Granger Causality test

After examining the cointegration test, the next step is to test for causality using the Granger causality test. The test provides the short run causal relationships between for example, agricultural exports and GDP. A variable Z_t Granger causes X_t if the previous values of X_t are useful in predicting Z_t. The Granger causality test regresses a variable on its lagged values and on the lagged values of the other variables. The study implemented the Granger causality test by testing whether one time series of say, Z_t is useful for forecasting say, X_t. This is done on each variable by estimating the following equations by Granger (1969):

$$Z_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} Z_{t-i} + \sum_{i=1}^{k} \alpha_{2i} X_{t-i} + \varepsilon_t \qquad 4(21)$$

$$X_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} X_{t-i} + \sum_{i=1}^{k} \beta_{2i} Z_{t-i} + \mu_t \qquad 4(22)$$

Where ε_t and μ_t represent white noise. The coefficients α_{2i} and β_{2i} determine whether the null hypothesis is accepted or rejected. For example, the null hypothesis of the Granger causality test is that X_t does not cause variation in Z_t if coefficients are jointly significant.

4.3 Conclusion

The chapter described the sources of data and methods used to analyse the relationship of the variables which are GDP, agricultural raw exports, food exports, non-agricultural exports, capital and employment. Chapter 5 will discuss the results obtained from the methods used in this chapter.

CHAPTER FIVE : RESULTS AND DISCUSSION

5.0 Introduction

This chapter provides a presentation and interpretation of the results. The paper adopted the Granger causality and cointegration test for the relationship between agricultural exports and GDP, which is the dependent variable. The other independent variables are food exports and nonagricultural exports, capital and employment. The test results of tests for normality, model specification, heteroscedasticity, multicollinearity and serial correlation will be discussed. Zimbabwe has experienced major policy changes that have influenced the economic growth. The Zivot-Andrews unit root test was used to detect the period of the structural breaks in the individual variables.

5.1 Descriptive analysis

The statistics show the results based on 27 observations. The variables under study are GDP, which is a proxy of economic growth, agricultural raw material exports, food exports, non-agricultural exports, capital and employment.

5.2 Empirical results

5.2.1 Normality test results

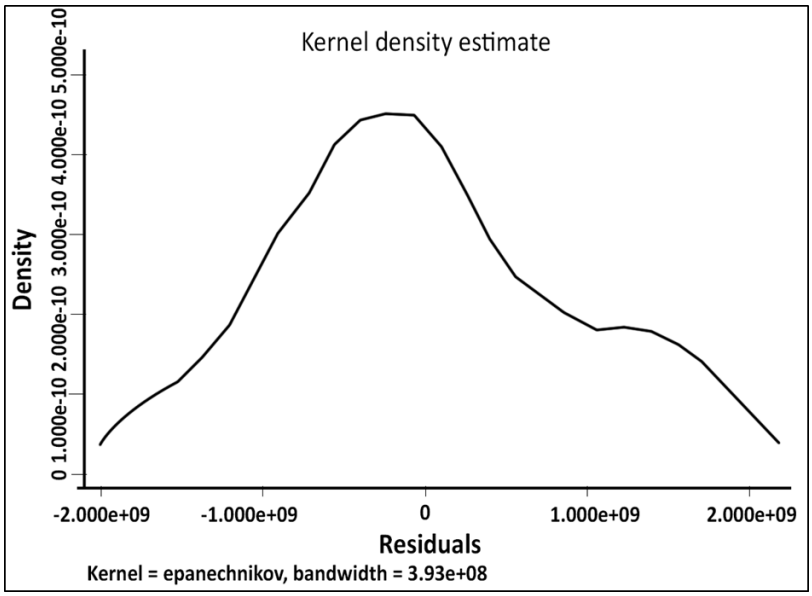

Figure 5-1: Kernel Density Estimate graph

Source: own study

The normality test using the kernel density shows that the residuals are normally distributed, they are Gaussian in shape. According to Kilian and Demiroglu (2000), if there is normality,

the regression tests has a firm basis. If the residuals are normally distributed it means that the p value is large and if the p value is large, the data can have more accurate regression results from the coefficients.

5.2.2 Model specification

```
Ramsey RESET test using powers of the fitted values of l_gdp
       Ho:  model has no omitted variables
                  F(3, 18) =      1.27
                  Prob > F =      0.3160
```

Figure 5-2: Ramsey Reset results

Source: own study

If the estimated probability is greater than 0.05 we accept the null hypothesis that there are no omitted variables. 0.3160 > 0.05, therefore, the model is correctly specified.

5.2.3 Heteroscedasticity

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of l_gdp

         chi2(1)      =     1.02
         Prob > chi2  =   0.3134
```

Figure 5-3: Breusch-Pagan results

Source: own study

If the test statistic has a p-value of less than 0.05 then the null hypothesis of homoscedasticity is rejected and heteroscedasticity is assumed. The results show that 0.3134 > 0.05 meaning the variance is assumed to be constant. However, the study tested for robust standard errors and it showed that there is no significant difference between the robust standard errors and the standard errors of the first regression model therefore using the first model will not affect the accuracy of the results due to heteroscedasticity.

5.2.4 Multicollinearity

Variable	VIF	1/VIF
l_foodexpo~s	2.56	0.390445
l_Capital	2.39	0.418032
l_agricult~s	1.77	0.563684
l_nonagfexp	1.51	0.660289
l_employment	1.41	0.711314
Mean VIF	1.93	

Figure 5-4: Multicollinearity results

Source: own study

VIF quantifies the severity of multicollinearity. A VIF less than 5 shows there is little, if no presence of multicollinearity. The results show that VIF for all the variables is less than 5, assuming little to no presence of multicollinearity.

5.2.5 Autocorrelation

```
Durbin-Watson d-statistic(  6,    27) =  1.522272
```

Figure 5-5: Durbin Watson results

Source: own study

The Durbin Watson value is 1.52, which is in the zone of indecision, which is between d_L and d_U on the Durbin Watson significance table in chapter 4.

5.2.6 Unit root test results

The results of the Augmented Dickey Fuller and the Phillips Perron tests are consistent and show that all the variables are stationary at first differencing except nonagricultural exports.

Augmented Dickey Fuller test results

Table 5-1: Augmented Dickey Fuller results

Variable	**P-value at I(0)**	**Conclusion**	**P-value at I(1)**	**Conclusion**
Ln GDP	0.9150	Non-stationary	0.0002	Stationary
Ln Agricultural exports	0.2411	Non-stationary	0.0000	Stationary
Ln Food exports	0.7834	Non stationary	0.0003	Stationary

Variable	P-value at I(0)	Conclusion	P-value at I(1)	Conclusion
Ln Non-agric exports	0.0001	Stationary	-	-
Ln Capital	0.5484	Non-stationary	0.0000	Stationary
Ln Employment	0.9873	Non-stationary	0.0054	Stationary

Source: own study

Phillips-Perron test results

Table 5-2: Phillips Perron test results

Variable	P-value at I(0)	Conclusion	P-value at I(1)	Conclusion
Ln GDP	0.8800	Non-stationary	0.0002	Stationary
Ln Agricultural exports	0.2802	Non-stationary	0.0000	Stationary
Ln Food exports	0.6856	Non stationary	0.0003	Stationary
Ln Non-agric exports	0.001	Stationary	-	-
Ln Capital	0.4928	Non-stationary	0.0000	Stationary
Ln Employment	0.9788	Non-stationary	0.0045	Stationary

Source: own study

Zivot-Andrews test results

The Zivot-Andrews unit root test considers structural breaks in the variables. The Zivot-Andrews test results also indicate the year of break for each variable. The critical values for the unit root test at 1%, 5% and 10% are -5.57, -5.08 and -4.82, respectively. The test results show that GDP, agricultural exports, food exports and capital are not stationary at all levels of significance, whereas non-agricultural exports is stationary, all of which is consistent with the ADF and PP tests. Employment shows stationarity at all levels of significance, which is contrary to the ADF and PP tests.

The Zivot-Andrews test gives different results from the Augmented Dickey Fuller and the Phillips Perron test due to structural breaks. Unit root tests have been a subject of controversy as they at times yield different results for each test depending on the type of test used. The

Zivot-Andrews test endogenously determines the breaking time and this might lead to different results from the ADF and Philips Perron test (Zivot, 1992). The null hypothesis for the test assumes 'no structural break under unit root' and an alternative hypothesis of 'presence of structural break under unit root' therefore rejecting the null hypothesis does not merely mean rejecting the presence of unit root but rather structural breaks (Lee and Strazicich, 2003). The failure to introduce two breaks may allow for a non-rejection of the unit root by tests that use one structural break such as the Zivot-Andrews test, therefore caution must be taken when concluding unit root using the test in a study (Ben-David et al., 2003). Although the Zivot-Andrews unit root test is not consistent with the ADF and PP test results, the study will focus the unit root results from ADF and PP due to reasons mentioned.

Table 5-3: Zivot-Andrews test results

Variable	**t-statistic**	**Break year**	**Corresponding break time**
Ln GDP	-4.434	2009	Dollarization policy
Ln Agricultural exports	-4.751	2008	Hyper-inflation
Ln Food exports	-3.114	2006	Inflation rises
Ln Non-agricultural exports	-7.172*	2006	Inflation rises
Ln Capital	-4.061	2009	Dollarization policy
Ln Employment	-6.623*	2000	Land reform policy

* Stationary variables at 1%,5% and 10% level of significance.

Source: own study

Employment has a break in 2000, Zimbabwe experienced the fast track land reform program in 2000 which led to the reallocation of farms to black citizens. The food exports and non-agricultural exports have a break in 2006. In 2006, Zimbabwe went through a period of economic decline whereby the annual growth rate of GDP was falling due to inflation. In 2008, agricultural exports show a break, there was hyperinflation in Zimbabwe. GDP and Capital show breaks at 2009. The economy rebounded in 2009 when a multicurrency was introduced, a period known as dollarization (Nyarota et al., 2015).

The breaking points indicate that inflation and dollarization, in 2008 and 2009 respectively, had an impact on the economy as half of the variables have a break point within that time

period. A dummy variable for dollarization showed a positive relation with GDP but it was insignificant. The land reform dummy variable was considered for the study but was not significant – see the appendix. The variable employment showed a break in 2000 and capital in 2009, the year 2000 corresponds with the land reform policy and 2009 corresponds with the dollarization policy. Therefore, the break points show that the two policies had an impact on the economy.

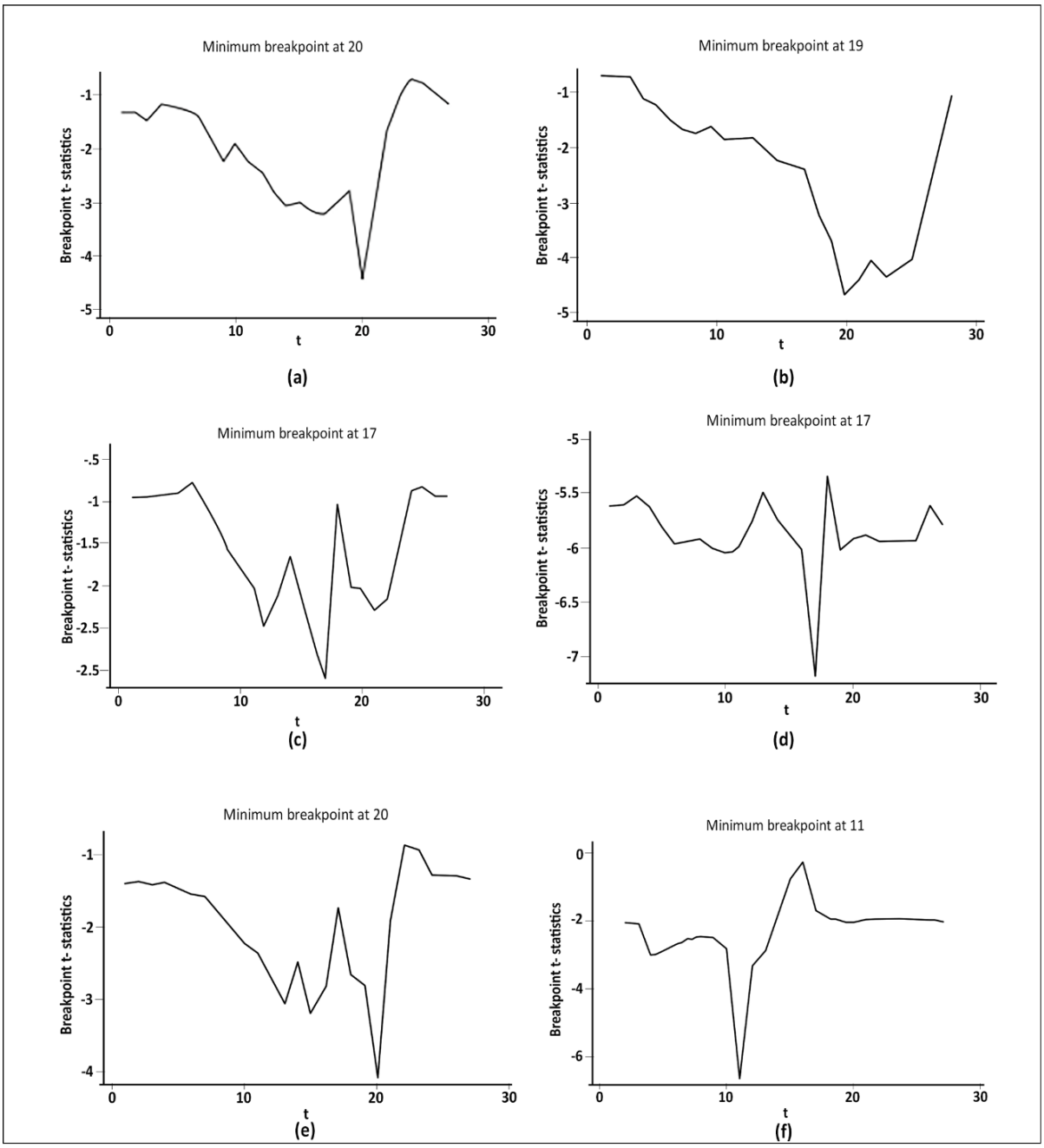

Figure 5-6: Zivot-Andrews test results

Panels in figure: a) GDP b) agricultural exports c) food exports d) non-agricultural exports e) capital f) employment

Source: own study

5.2.7 Cointegration test results

After showing that the variables are integrated at level I(1) and I(0) the cointegration test using Johansen test was done to check whether there is a stable and non-spurious relationship among the variables. The Johansen cointegration test can be implemented if the majority of the variables are in first difference (Johansen, 1995: Amoah, 2017). In this study only the non-agricultural exports variable was originally stationary, whereas all the other variables were stationary after first differencing.

Table 5-4: Johansen cointegration test results

Maximum rank	**Eigenvalue**	**Trace statistic**	**5% critical value**
0	-	114.9356	94.15
1	0.82457	71.4233	68.52
2	0.68956	42.1791*	47.21
3	0.61005	18.6356	29.68
4	0.32954	8.6408	15.41
5	0.29176	0.0165	3.76
6	0.00066	-	-

Source: own study

The Johansen test results has the maximum rank, the eigenvalue and the trace statistic. The maximum rank represents the number of equations that are cointegrated in the regression estimation. The lag selection test selects the number of lags that should be applied to the test. The number of lags in the test is 2. The results of the cointegration test show that there are two cointegrating equations at the 5% level of significance. The presence of cointegration shows that there is a long-term relationship between the variables.

5.2.8 Regression results

Source	SS	df	MS	Number of obs	=	27
				F(5, 21)	=	38.03
Model	3.4346869	5	.68693738	Prob > F	=	0.0000
Residual	.379333816	21	.018063515	R-squared	=	0.9005
				Adj R-squared	=	0.8769
Total	3.81402072	26	.146693104	Root MSE	=	.1344

l_gdp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
l_agriculturalexports	-.1809583	.069752	-2.59	0.017	-.3260156	-.035901
l_foodexports	.2527136	.0967075	2.61	0.016	.0515994	.4538278
l_nonagfexp	.0698194	.040423	1.73	0.099	-.0142449	.1538836
l_Capital	.2028622	.0426193	4.76	0.000	.1142305	.2914938
l_employment	1.071669	.1521135	7.05	0.000	.7553317	1.388007
_cons	-1.238903	2.413398	-0.51	0.613	-6.257839	3.780033

Figure 5-7: Regression results

Source: own study

The regression test is done after the pre-diagnostic tests to ensure the accuracy of the results of the regression model. The regression analysis establishes the relationship between the dependant variable and independent variables or explanatory variables (Gujarati and Porter, 2010). The R-squared is 0.9005 which means that 90% of the variation of the dependent variable is explained by the independent variables. The p-value of the F-statistic shows the significance of the model which is 0.00 meaning the model is highly significant.

Agricultural raw exports have a negative coefficient which means agricultural exports have a negative significant relationship with GDP. The results are contrary to the expected hypothesis that agricultural exports have a positive effect on the GDP of Zimbabwe, given it is agricultural abundant. The top agricultural exports in Zimbabwe include raw tobacco, vegetables and cut flowers. Raw agricultural exports do not yield as much profit as processed or value-added agricultural produce due to the volatile nature of agricultural prices on the local and international market.

Arezki et al. (2014) found that the primary commodity prices are highly volatile over time. The study used 25 relative primary commodity prices observed over more than three-and-half centuries. A study by Leon and Soto (1997) used annual data for the period 1900-1992, they found that 17 out of 24 of the primary commodity prices showed a downward long run trend and thus not supporting the ELG hypothesis for the agricultural raw exports. Zimbabwe exports mostly raw agricultural exports, with most of it produced by small-holder farmers, who might

not be able to produce quality produce for the export market due to costs and at times market knowledge.

The agricultural exports results are inconsistent with authors such as Khalafalla and Webb (2001) who did a study that showed that primary exports have a greater effect on the economy than manufacturing exports in Malaysia; and Shafiullah et al. (2017) whose study was on Australia. The studies found that agricultural exports have a direct positive relationship with economic growth. However, Khalafalla and Webb (2001) mentioned that the structural changes in a country change the source of economic growth for that country. Structural transformation is still taking place in Zimbabwe and the country has had most policy focus on industrialization, with a focus on increasing industry productivity and growth. Zimbabwe put in place the trade policy framework for 2012-2016 that focus on export development and promotion and export-led industrialization with the expectation to fully maximise the country's comparative advantage.

The Industrial development policy framework for 2012-2016 had the vision of transforming Zimbabwe from a primary product producer to a producer of value-added goods for local and export markets. The policies have shifted from merely focusing on agricultural productivity growth but rather on value adding the agricultural raw exports. The majority of the small holder farmers in Zimbabwe are subsistence farmers who rely on agriculture for their livelihood therefore, they do not produce as much quantity and quality as would be expected due to some challenges (FAO, 2019). The challenges faced by export farmers affect the quality of produce for trading on the international market as most of the produce such as fruits and vegetables are for the European Union market. The lack of proper infrastructure, finance and the economic instability leads to low quality yields that might lead to lower export returns.

The food exports have a positive significant coefficient meaning food exports have a positive relationship with GDP. The food exports are processed agricultural raw produce which proves the success of the industrial and trade policies that aimed to boost overall export contribution through value addition and export diversification. The policies mainly focused on the agricultural and mining sectors, with an objective to introduce better technologies for efficient value-addition and import substitution to promote industrialization. The increase in production of processed agricultural produce led to an increase in the international market share for food exports boosting the economic growth. However, Zimbabwe still has room to improve the food

subsector as most companies have left the industry due to economic instabilities, affecting productivity.

The non-agricultural exports have a positive coefficient meaning non-agricultural exports have a positive relationship with GDP. The results support the hypothesis of the study which states that non-agricultural exports positively impact on economic growth. The non-agricultural exports comprise of the (non-food) manufacturing exports, mining exports and fuel exports. The results are consistent with Kalaitzi and Cleeve (2018) who stated that manufacturing exports contribute more to the economic growth of the United Arab Emirates than primary commodities and Shafiullah et al. (2017) who found that mining exports have a positive impact on the economic growth in Australia. The industrial development policy in Zimbabwe has the objective of restoring the manufacturing sector and the mining sectors to boost the economic growth.

The policy focus was towards industrialization with the aim of boosting the economy through increased exports. The mining sector is one of the top contributors to the GDP in Zimbabwe with 17% contribution to the overall export sector. The manufacturing sector contributes approximately 39% to the total exports therefore the level of productivity in these sectors lead to significant growth of the economy. However, the sectors have faced challenges just like the rest of the other sectors due to the economic climate such as inflation and dollarization which led to a closure of major manufacturing companies in Zimbabwe.

Capital and employment have positive significant coefficients, meaning they have a positive relationship with GDP. Although employment contributes positively to the GDP, technology intensive policies should be made as opposed to labour intensive policies, this is in support of the endogenous growth theories that state the importance of technology for the effectiveness of capital and labour. The results on employment are consistent with Mahonye and Mandishara (2015) and Atkinson and Hamilton (2003) who stated that human capital development leads to a positive economic growth. Capital accumulation leads to economic growth through investment in priority sectors and allows for more research and innovation for development.

In chapter three, the economic structure of the sectors shows that the agricultural sector has had increasing employment over the years compared to the industrial employment. According to Junankar (2013) productivity is negatively related to the employment given that it is the ratio of total production to employment. If employment increases, productivity falls. The agricultural sector in Zimbabwe, although employing 70% of the population has low

productivity returns. The results have shown that the non-agricultural sector have a positive effect to the GDP despite the level of employment in the sector.

The industrial policy in Zimbabwe aimed to improve the machinery used to increase productivity. Assuming the employment has decreased due to technological advancements in the sector, the cost of production will fall leading to an increase in demand that increases productivity. The productivity increase will lead to more capital that can be invested and thus boosting the non-agricultural export sectors which will impact the economic growth positively.

5.2.9 Granger causality test results

The Granger causality test establishes the direction of causation among the variables.

Table 5-5: Granger causality test for all variables with GDP

Expected outcome	**P-value**	**Achieved outcome**
Agricultural exports cause GDP	0.419	No
Food exports cause GDP	0.186	No
Non-agricultural exports cause GDP	0.036	Yes
Capital causes GDP	0.000	Yes
Employment causes GDP	0.000	Yes

Source: own study

The results show that, among the export sectors, non-agricultural exports directly causes GDP growth. The non-agricultural exports comprise of manufacturing exports, metal and ore exports and fuel exports. The mining sector contributes 17% and manufacturing contributes 33% to the total exports. Zimbabwe is abundant in minerals and fuels therefore the mining, manufacturing and fuel export subsectors contribute to a trade market share that brings in foreign currency. Non-agricultural exports lead to accumulation of more capital, it then causes economic growth in the country.

The accumulation of capital can be injected back into the non-agricultural sector, since agriculture provides raw materials in the non-agricultural sector, the growth of the sector ignites a demand in the agricultural sector. The agricultural sector then produces more surplus which will boost the agricultural export sector. Agricultural export sector growth leads to growth of the food export sector which relies on the agricultural raw materials. The scenario

occurs from agricultural productivity increasing to a point of producing a surplus for exporting. The food sector value adds agricultural raw produce therefore as the agricultural exports increase due to a surplus production in the agricultural sector, the food sector increases productivity for the export market.

The indirect relationship of the sectors can be seen from the results as the agricultural exports directly cause food exports and GDP growth causes food exports. A scenarios assumed by Stovitz et al. (2017) and Frone et al. (1994) states that if both variables cause a common third variable then there is no direct causal relationship but due to the third variable, a relationship exists between the variables tested for causality (agricultural exports and GDP). The results show that the non-agricultural sector can stimulate productivity in the agricultural sector for exports and thus boosting the growth of the other export subsectors such as the food export sector. The full set of Granger causality results are attached in the appendix section.

Table 5-6: Granger causality test results on food exports

Expected outcome	**P-value**	**Achieved outcome**
GDP causes food exports	0.044	Yes
Agricultural exports cause food exports	0.001	Yes

Source: own study

The hypothesis for the study expected the agricultural raw exports to have a positive effect on GDP but contrary to the results, agricultural raw exports does not cause GDP growth directly. The volatile nature of the primary produce led the government to implement industrial led policies that have a focus on growing productivity and exports through export-led growth policies that focus on value addition. The economic instability effects should not be underestimated. Zimbabwe went through policy changes such as the land reform program that altered the agrarian structure of Zimbabwe. Most commercial exporting farms became small holder low yielding farms leaving the agricultural sector dominated by small holder farmers producing low value crops which can influence the productivity of the sector and thus the export sub-sector. However, the ELG hypothesis is supported for the non-agricultural export sector. Capital and employment also cause GDP growth.

5.3 Conclusion

The chapter presented the results of the analysis on the nature of the relationship between agricultural exports and economic growth in Zimbabwe. The analysis included GDP as dependent variable and agricultural exports, non-agricultural exports, food exports, capital and employment as explanatory variables with data from 1990 to 2016. The results show that there is no causal relationship between agricultural exports and economic growth in Zimbabwe. However, the non-agricultural export sector causes GDP growth. The study supports the ELG hypothesis for the non-agricultural sector in Zimbabwe. The structural breaks test showed that the dollarization policy had an effect on GDP and capital and that land reform had an impact on employment.

CHAPTER SIX : SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

The objective of this study was to establish whether agricultural raw exports and non-agricultural exports have a positive or negative relationship with the GDP, a proxy for economic growth. The other variables in the study are food exports, capital and employment. The objectives were addressed by empirical analysis of the secondary data by the World Bank from 1990 to 2016. To examine the data, the study ran regression analysis and Johansen cointegration to establish if there are long run relationships among the variables. The Granger causality test was used to test the direction of causation of the variables.

Zimbabwe has gone through periods of major economic changes over the years. The country has had a negative trade balance from 2000 to 2016 until the trade balance became positive in 2017. The country has not experienced structural transformation, the employment in agriculture has increased over the years compared to the industrial sector. The structural transformation of a country determines the level of growth that a country will experience. The land reform policy and the dollarization policy are one of the major policies that led to the change in the agrarian structure in Zimbabwe. The results show that agricultural exports have a negative relationship with GDP which is contrary to the ELG hypothesis.

Zimbabwe mostly exports raw agricultural exports which are classified as low-value exports which means they do not earn as much foreign currency as expected. Primary commodities are also prone to price volatility on the local and international market, this can be due to a change in weather patterns that can influence quantity and quality of supply. However, Zimbabwe introduced the industrial development policy and the national trade policy from 2012 to 2017. The policies are on industrialisation with a focus on value-addition, export diversification and boosting export performance. The results show that the non-agricultural exports have a positive effect on the GDP.

Food exports show a positive relationship with the GDP. The food sector in Zimbabwe contributes approximately 60% to the manufacturing sector of Zimbabwe. The agricultural produce is value added in the food subsector industry. The exports occupy more foreign market share for Zimbabwe due to the high value products on the export market. The industrialization policy set by the government can be attributed to the success of the food exports contribution to the GDP. However, Zimbabwe has faced the closure of major food companies due to the

economic and political instability over the years of study. The non-agricultural sector comprises of the manufacturing sector, mining sector and the fuel subsector for this study. The manufacturing sector contributes approximately 39% and the mining sector contributes 17% to total exports. The non-agricultural exports show a positive relationship with GDP. Zimbabwe has an abundance of minerals such as diamonds and gold with Zimbabwe being one of the top diamond producers in Africa. Despite economic downfalls such as hyperinflation, the manufacturing sector is the top contributing export sector in Zimbabwe.

The study implemented the Granger causality test to establish the direction of causation of the variables. The results show that agricultural raw exports does not cause GDP growth but non-agricultural exports cause GDP growth. Although the results for agricultural exports are inconsistent with the initial hypothesis of the study, the results are consistent with the regression results which showed that agricultural exports have a negative relationship with the GDP. The fact that agricultural exports does not cause GDP growth directly does not mean it does not contribute to the economy positively. Rather, it means that there is an indirect causation between the sectors. The agricultural raw exports, as stated before, are price volatile and earn less foreign currency than processed produce.

The food exports include processed agricultural produce which are value-added products. The high value products contribute more to the GDP through foreign market share growth which leads to capital accumulation. The agricultural sector contributes raw materials for the food export sector and the non-agricultural sector. The growth of the two sectors stimulate a demand in the agricultural sector which then boosts production of quality produce for the two sectors. The demand leads to a surplus production in agricultural produce, boosting the agricultural raw exports. The results of the study support this viewpoint as they show that GDP causes food exports and agricultural exports cause food exports. The results for Zimbabwe show that, policy formulation should focus not only on boosting agricultural productivity and exports but improving on the quality of the produce as this has a significant effect on the other export sectors.

The study observes that the non-agricultural exports cause GDP and from the regression results they also have a positive relationship with GDP. The accumulation of capital from the non-agricultural sector is invested in the agricultural sector, causing agricultural production and in turn increasing exports in the sector. The food export sector relies on the agricultural produce and exports and since it has a positive impact on GDP, it causes capital accumulation which is

further invested into the non-agricultural export sector. The results show a clear direction of how growth occurs due to the export sectors under study. The study recommends that the government focuses on improving accountability and productivity strategies of further boosting the export performance of the non-agricultural sectors for increased economic growth.

The study implemented the Zivot-Andrews unit root test that showed the structural breaks in the time series. The results show that GDP and capital had a break in 2009, a period of dollarization. Dollarization in 2009 improved the economy as it led to GDP growth starting around the 2009 period. Land reform took place in 2000 and only employment shows a break in 2000. However, the dummy variables for dollarization and land reform were not included in the final model. The dollarization dummy variable caused multicollinearity and the land reform dummy variable was not significant.

Capital and employment showed a positive relationship with GDP. Employment and capital are essential for economic growth. Capital accumulation boosts the economy through reinvestments. Growth theorists such as Solow-Swan support the results for contribution of employment and capital, however, technology is an important factor for productivity. The study shows that policies play a huge role to the growth of the economy as it directly impacts the different export subsectors. Therefore, it is important that when the government makes policies for one sector, it considers all the other country's subsectors to achieve sustainable economic growth.

Further recommendations from this study are provided below:

The study recommends availability of data on the ZIMSTAT website as most of the data is not up to date. The study considered Zimbabwe only, it would be relevant to implement a study on Zimbabwe's most important trading partners to establish the impact of export sectors on countries with different levels of development. The comparison will assist the government in making policy changes while considering performance of the major trading partners such as South Africa which is Zimbabwe's top trading partner. Data availability limited the number of years for the study. Future studies can consider increasing the number of years of study as this study used data from 1990 to 2016.

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APPENDIX

Granger causality results

Equation	Excluded	chi2	df	Prob > chi2
l_gdp	l_foodexports	3.3622	2	0.186
l_gdp	l_agriculturale~s	1.7392	2	0.419
l_gdp	l_employment	48.811	2	0.000
l_gdp	l_Capital	36.012	2	0.000
l_gdp	l_nonagfexp	6.6608	2	0.036
l_gdp	ALL	94.953	10	0.000
l_foodexports	l_gdp	6.2587	2	0.044
l_foodexports	l_agriculturale~s	14.685	2	0.001
l_foodexports	l_employment	12.848	2	0.002
l_foodexports	l_Capital	51.865	2	0.000
l_foodexports	l_nonagfexp	17.288	2	0.000
l_foodexports	ALL	138.38	10	0.000
l_agriculturale~s	l_gdp	5.5922	2	0.061
l_agriculturale~s	l_foodexports	.41684	2	0.812
l_agriculturale~s	l_employment	2.439	2	0.295
l_agriculturale~s	l_Capital	4.2898	2	0.117
l_agriculturale~s	l_nonagfexp	4.6135	2	0.100
l_agriculturale~s	ALL	20.732	10	0.023
l_employment	l_gdp	1.6455	2	0.439
l_employment	l_foodexports	4.5942	2	0.101
l_employment	l_agriculturale~s	.57851	2	0.749
l_employment	l_Capital	1.2235	2	0.542
l_employment	l_nonagfexp	2.1176	2	0.347
l_employment	ALL	7.0596	10	0.720
l_Capital	l_gdp	4.1473	2	0.126
l_Capital	l_foodexports	3.6323	2	0.163
l_Capital	l_agriculturale~s	5.1388	2	0.077
l_Capital	l_employment	18.533	2	0.000
l_Capital	l_nonagfexp	6.9636	2	0.031
l_Capital	ALL	50.289	10	0.000
l_nonagfexp	l_gdp	2.3695	2	0.306
l_nonagfexp	l_foodexports	1.6636	2	0.435
l_nonagfexp	l_agriculturale~s	.88916	2	0.641
l_nonagfexp	l_employment	4.4168	2	0.110
l_nonagfexp	l_Capital	5.0629	2	0.080
l_nonagfexp	ALL	26.825	10	0.003

Source: own study

Dollarization policy model

Source	SS	df	MS	Number of obs	=	27
				F(6, 20)	=	32.30
Model	3.45721566	6	.57620261	Prob > F	=	0.0000
Residual	.356805059	20	.017840253	R-squared	=	0.9064
				Adj R-squared	=	0.8784
Total	3.81402072	26	.146693104	Root MSE	=	.13357

l_gdp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
l_agriculturalexports	-.1301548	.0827591	-1.57	0.131	-.3027873	.0424777
l_foodexports	.2284577	.098502	2.32	0.031	.0229861	.4339294
l_nonagfexp	.0455761	.0455987	1.00	0.329	-.0495412	.1406934
l_Capital	.1523327	.0617724	2.47	0.023	.0234778	.2811876
l_employment	.6689023	.3889904	1.72	0.101	-.1425174	1.480322
dollarization	.2297063	.2044112	1.12	0.274	-.1966881	.6561007
_cons	6.049297	6.914904	0.87	0.392	-8.37494	20.47353

The model shows that dollarization has a positive relationship with GDP, consistent with the expected hypothesis. The coefficient is however not statistically significant. The dollarization policy came as a means to stabilize the economy after the period of hyperinflation in 2008.

VIF with dollarization policy

Variable	VIF	1/VIF
dollarizat~n	12.14	0.082343
l_employment	9.31	0.107428
l_Capital	5.09	0.196532
l_foodexpo~s	2.69	0.371696
l_agricult~s	2.53	0.395472
l_nonagfexp	1.95	0.512489
Mean VIF	5.62	

However, the variance inflation factor(vif), a measure of the severeity of multicollinearity, 12.14 is greater than 10 which shows the variable has high multicollinearity. The study dropped the dummy variable from the model due to multicollinearity.

Land reform policy model

Source	SS	df	MS	Number of obs	=	27
				F(6, 20)	=	32.43
Model	3.45849807	6	.576416345	Prob > F	=	0.0000
Residual	.355522649	20	.017776132	R-squared	=	0.9068
				Adj R-squared	=	0.8788
Total	3.81402072	26	.146693104	Root MSE	=	.13333

l_gdp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
l_agriculturalexports	-.1771847	.0692717	-2.56	0.019	-.3216829	-.0326864
l_foodexports	.3185668	.1115394	2.86	0.010	.0858996	.5512339
l_nonagfexp	.0862766	.0425467	2.03	0.056	-.0024742	.1750273
l_Capital	.2137919	.0433207	4.94	0.000	.1234264	.3041574
l_employment	.5783629	.4521539	1.28	0.215	-.3648137	1.521539
land_reform	.2118727	.1830641	1.16	0.261	-.1699924	.5937378
_cons	4.275857	5.332562	0.80	0.432	-6.847672	15.39939

When including land reform as a dummy variable assigned a 0 till 2000 and 1 from 2001 onwards, the land reform policy has a positive relationship with GDP, which is contrary to the hypothesis of the study. The coefficients for employment and land reform were not statistically significant in the model.

VIF with land reform policy

Variable	VIF	1/VIF
l_employment	12.62	0.079224
land_reform	12.29	0.081373
l_foodexpo~s	3.46	0.288840
l_Capital	2.51	0.398167
l_agricult~s	1.78	0.562435
l_nonagfexp	1.70	0.586537
Mean VIF	5.73	

The VIF for land reform is greater than 10 which shows high multicollinearity.

Land reform considering dollarization period model

Source	SS	df	MS	Number of obs	=	27
				F(6, 20)	=	32.35
Model	3.45776878	6	.576294797	Prob > F	=	0.0000
Residual	.356251932	20	.017812597	R-squared	=	0.9066
				Adj R-squared	=	0.8786
Total	3.81402072	26	.146693104	Root MSE	=	.13346

l_gdp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
l_agriculturalexports	-.1757639	.069416	-2.53	0.020	-.3205632	-.0309647
l_foodexports	.227996	.0984577	2.32	0.031	.0226169	.4333751
l_nonagfexp	.0506702	.0435236	1.16	0.258	-.0401185	.1414588
l_Capital	.140465	.0692515	2.03	0.056	-.0039911	.284921
l_employment	1.140566	.1627276	7.01	0.000	.8011223	1.48001
land_reform	-.1597185	.1403082	-1.14	0.268	-.4523963	.1329594
_cons	-.1438635	2.582432	-0.06	0.956	-5.530721	5.242994

Since the period after 2001 also captures the dollarization period from 2009 onwards, a second version of the land reform dummy was considered when factoring the effects of dollarization in. The land reform dummy variable for the period before 2000 and the period after 2009 was represented by 0 and the period between 2000 and 2008 represented by 1.

This second version of the model wth the land reform dummy now has a negative relationship with GDP, consistent with the expected hypothesis. However, the coefficients of the land reform and non-agricultural exports are not statistically significant. The variance inflation factor for the land reform is less than 10 which shows the absence of severe multicollinearity.

VIF with Land reform policy

Variable	VIF	1/VIF
l_Capital	6.40	0.156131
land_reform	6.22	0.160724
l_foodexpo~s	2.69	0.371454
l_agricult~s	1.78	0.561248
l_nonagfexp	1.78	0.561651
l_employment	1.63	0.612914
Mean VIF	3.42	

The final model did not include the land reform dummy variable due to the fact that its coefficient was not statistically significant.