

**TRADE LIBERALISATION AND ECONOMIC GROWTH IN  
ZIMBABWE**

By

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## **DECLARATION**

I, **Primus Maturure**, declare that “Trade Liberalisation and Economic Growth in Zimbabwe. An Empirical Analysis (1980-2017),” is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references. This dissertation has not, either in whole or in part, been submitted for a degree or diploma to any other universities.

**Signature of Candidate**    ....*P Maturure*....

**Date:**    ....23-01-2019 ....

## **DEDICATION**

This dissertation is dedicated to the memory of my late father, Elias. T. Maturure. May his soul rest in eternal peace.

## **ACKNOWLEDGEMENTS**

I thank the almighty God for guidance, protection and inspiration. My heartfelt gratitude goes to Prof. T. L. Leshoro, my supervisor, for being an excellent and committed mentor. Her assistance, tolerance and encouragement helped me to be where I am today.

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## **ABSTRACT**

Liberalisation of trade is deepening, and so have the incentive schemes put in place by a number of countries to promote it. International trade promotion agencies in developing countries are actively promoting their countries as the best, with which to trade. With international trade emerging as a favourite source of revenue and technology transfer for most countries, profound questions about the impact of trade liberalisation to economic growth are addressed in this study. The main purpose of this study is to empirically assess the relationship between trade liberalisation and economic growth in Zimbabwe using annual time series data from 1980 to 2017. Autoregressive distributed lag (ARDL) bounds testing approach to cointegration and Error Correction Mechanism (ECM) are applied in order to investigate the long run and short run impact of trade liberalisation on economic growth. The results proved the existence of a positive long-run relationship between trade liberalisation and economic growth. The study therefore concludes that policy makers and government negotiators in Zimbabwe should introduce policies that promote openness through the removal of barriers to trade and export promotion in order to promote overall growth of the economy.

## **Key terms**

Autoregressive Distributed Lag (ARDL), Economic Growth, Error Correction Mechanism (ECM), International Trade, Trade Liberalisation, Zimbabwe.

## ABBREVIATIONS AND ACRONYMS

ADF	Augmented Dickey Fuller
AEC	African Economic Community
AIC	Akaike Information Criteria
ARCH	Autoregressive Conditional Heteroscedasticity
ARDL	Autoregressive Distributed Lag
BG	Breusch Godfrey
BLUE	Blue Linear Unbiased Estimator
CEE	Central and Eastern Europe
COMESA	Common Market for Eastern and Southern Africa
CPI	Consumer Price Index
DF	Dickey Fuller
DQAF	Data Quality Assessment Framework
DSGE	Dynamic Stochastic General Equilibrium
EAC	East African Communities
ECM	Error Correction Model
EPZ	Export Processing Zone
ETS	Export Retention Schemes
FDI	Foreign Direct Investment
FTA	Free Trade Area
GARCH	Generalized Autoregressive Conditional Heteroscedasticity
GATT	General Agreement on Tariffs and Trade
GDDS	General Data Dissemination System
GDP	Gross Domestic Product
GNU	Government of National Unity
GoZ	Government of Zimbabwe
HO	Hecksher-Ohlin
ILO	International Labour Organisation
IMF	International Monetary Fund
LDC	Less Developed Countries
LM	Lagrange Multiplier

MA	Moving average
NIC	Newly Industrialised Countries
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Square
PP	Phillips Peron
R&D	Research and Development
RBZ	Reserve Bank of Zimbabwe
RESET	Regression specification error test
RGDP	Real Gross Domestic Product
SADC	Southern African Development Community
SAL	Structural Adjustment Loan
SEE	South East Europe
SIC	Swartz Information Criteria
SSA	Sub Saharan Africa
TFTA	Tripartite Free Trade Area
UDI	Unilateral Declaration of Independence
UECM	Unrestricted Error Correction Model
UN	United Nation
UNSD	United Nations Statistics Division
USA	United States of America
VAT	Value Added Tax
WDI	World Bank Indicators
WITS	World Integrated Trade Solutions
WTO	World Trade Organisation
ZIMPREST	Zimbabwe Programme of Economic and Social Transformation
ZIMSTAT	Zimbabwe National Statistical Agency

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

The relationship between trade liberalisation and economic growth has always stimulated intense debate by both economists and policymakers around the world (Nyarota et al., 2015). The scholarly debate about the set of international trade policies that are needed to promote sustainable long run economic growth is of particular importance for developing countries and countries in transition (Nyarota et al., 2015). This is because international trade is regarded as an engine of growth, which leads to steady improvement in human status by expanding the range of people's standard and preferences (Nyarota et al., 2015). Many economists and policy makers believe that growth in trade driven by trade liberalisation can be a powerful engine to promote economic growth and development of a country (Dritsakis & Stamatiou, 2016).

In addition, trade liberalisation can boost productivity through greater competition. Gries & Redlin (2012) suggests that trade combined with countries' competitive advantage allows more effective allocation of resources. Trade openness and capital movement liberalisation can trigger new ideas for greater incentives for innovation and more inward investments (Gries & Redlin, 2012). Various studies have been carried out to identify the effect of trade liberalisation or openness on economic growth in developing countries but a few studies was carried out in Zimbabwe.

The history of Zimbabwean economy dates back to 1965 when economic and political international sanctions were imposed against the Unilateral Declaration of Independence (UDI) (Renwick, 1981). During that period until 1980, Ian smith's government instituted policies that promote self-sufficiency and economic dependence (Renwick, 1981; Hatendi, 1987). Real Gross Domestic Product (RGDP) grew at an annual average rate of 7 percent between 1965 and 1974, but latter the escalating war of independence disrupted economic activity (Davies & Rattso, 1999). After independence in 1980, the Zimbabwe government instituted responses to deal with the linkages between import capacity and economic growth (Davies & Rattso, 1999; Nyarota et al., 2015). The linkages basically aimed at export promotion resulted in growth in trade as a percentage of GDP by an average of 38 percent and GDP grew at an average of 4.5 percent per year during the period 1980 to 1989.

To improve conditions in the economy the Zimbabwean government with the assistance of Bretton woods institutions adopted Economic Structural Adjustment Programme (ESAP) in 1990, Zimbabwe Programme of Economic, and Social Transformation (ZIMPREST) in 1997. Under these programmes trade liberalisation and reduction of government expenditure were the major plank in the government's efforts to revitalise the economy (GoZ, 1991; Davies & Rattso, 1999). Accelerated implementation of trade and economic reforms such as export retention schemes (ETS) and relaxation of exchange controls among others resulted in GDP growth rate falling from 6.98 percent in 1990 to 0.20 percent in 1995. The GDP growth rate later increased to an average of 2, 25 percent between 1996 and 2001 due to an increase in exports and reduction in government expenditure. Total trade as a percentage of GDP accelerated from 35 percent in 1990 to 68 percent in 2001 (World Bank, 2016). Free trading of ETS entitlements, opening of foreign accounts by individuals and corporates, external borrowing and unification of exchange rate leaves the Zimbabwe economy extremely open during that period.

Zimbabwe experienced hyperinflation during the period 2002 to 2008. During that period Zimbabwe experienced a surge in total trade as a percentage of GDP from 66, 8 percent in 2002 to as high as 109.52 percent in 2008 (ZIMSTAT, 2016). GDP growth rate fell sharply to a negative 17.7 percent in 2008. The economy was revived in 2009 by the formation of the Government of National Unity (GNU) and the introduction of multi-currency system with the United States (US) Dollar as the main currency. Although exports remained below imports the average GDP growth rate of 6 percent was recorded during the period from 2009 to 2016 (ZIMSTAT, 2016).

Zimbabwe has been a member of General Agreements on Tariffs and Trade (GATT) since 1948 and become a member of World Trade Organization (WTO) in 1995 when WTO replaced GATT. The role of WTO is negotiations of trade liberalisation and enforcement of agreements and dispute settlement (Bacchetta & Janse, 2003). Apart from WTO, Zimbabwe is also a member of Southern African Development Community (SADC) and Common Market for Eastern and Southern Africa (COMESA) free trade area aiming to further liberalise intra-regional trade in goods and services in the region (Khandelwal, 2004; SADC, 2012). In order to further open, its borders Zimbabwe also signed bilateral trade agreements with Namibia, Malawi, Botswana, South Africa and Mozambique. The primary aim of the bilateral trade agreements being the reduction and removal of tariffs on selected goods traded between Zimbabwe and member state (SADC, 2012).

Notwithstanding this shift towards trade openness, recent experience and evidence suggests that trade reforms may not have been as successful as many anticipated (Nyarota et al., 2015). Zimbabwe is a good example. This paper hence seeks to establish empirically the long run relationship between trade liberalisation and economic growth in Zimbabwe using co-integration techniques. The policy issues on income growth and trade liberalisation are particularly important to Zimbabwe given its recent history of sluggish economic growth, diminishing exports and foreign direct investment, increasing imports and a series of conflicting trade policies imposed by Zimbabwe policy makers.

The most prominent fact about the existing volume of studies is that, despite the fact that both exports and imports are equally important in promoting economic growth most researchers have focused on exports because they view imports as leakage of revenue which lead to unemployment rather than economic growth (Jonsson & Subramanian, 2001; Sinha & Sinha, 2003; Chen, 2009). A developing country like Zimbabwe is import-dependent therefore the effects of its imports on growth process should not be ignored or assumed away without any empirical basis. This study will contribute to the existing studies by including a time series data from 1980 to 2017, which were excluded in earlier studies of the Zimbabwean economy. Apart from that only trade openness, real GDP, foreign direct Investment (FDI), government expenditure, labour force and inflation rate time series data will be used in the study.

## **1.2 Problem statement**

Despite the voluminous empirical literature employing comparable analytical models and important theoretical advances that explains how trade is related to growth, there still remains considerable debate to be resolved regarding the impact of trade on growth in developing countries. Many conclusive studies of trade and growth were carried out in developed countries and a few in developing countries like Zimbabwe. However, the issue of openness to trade and its impact on growth and whether a country's policy is inward or outward oriented dominated the focus of many of the studies in this area.

Unfortunately, very few studies have been conducted to investigate the relationship between trade liberalisation and economic growth in Zimbabwe. The few include a study of trade openness and growth by Gwaendepi, Musara & Dhoru (2014) and Mandishekwa (2016); also trade liberalisation and growth in SSA by Babatunde (2011), Were (2015) and Zahanogo (2017). However, these previous studies on this subject over-relied on historical and cross-

sectional data, which may not address the country's specific issues. The problem of using the cross-sectional method is that by grouping together countries that are at different stages of economic development, the country-specific effects of trade liberalisation on economic growth and vice-versa are not addressed.

The other challenge arising is that the effects of trade liberalisation on economic growth have not been empirically established recently especially with reference to Zimbabwe. The problem resulted in the formulation of trade and economic policies which negatively affected the general population, investors, manufacturers, trading partners and the economy as a whole. A possible cause of this problem is lack of enough recent research on trade liberalisation and economic growth in Zimbabwe in particular. Perhaps an empirical study which investigates the relationship between trade liberalisation and economic growth could remedy the situation by providing an insight into the relationship between the two.

This study seeks to address this problem by empirically establishing the nature of the long run relationship between trade liberalisation and economic growth using time series data from 1980 to 2017. The study also seeks to replicate and extend past research in so doing helping policy makers and government negotiators in formulating effective economic decisions and policies in the country. The research also seeks to give other academics and researchers a base for future studies in trade and economic growth issues.

### **1.3 Research objectives**

The main objective of the study is to empirically examine the relationship between trade liberalisation and economic growth in Zimbabwe. Given this, the study has the following sub-objectives:

- i. To evaluate and review literature relating to trade liberation and economic growth.
- ii. To establish the effect of trade liberalisation on economic growth in Zimbabwe.
- iii. Based on the research findings, to recommend possible trade policies.

### **1.4 Hypothesis**

Based on the background and the research problem stated above, the null and research (alternative) hypotheses to be tested in this study are as follows:

- i.  $H_0$  -There is no relationship between trade liberalisation and economic growth.  
 $H_1$  -There is a relationship between trade liberalisation and economic growth
- ii.  $H_0$ -Trade liberalisation has a negative effect on economic growth  
 $H_1$ - Trade liberalisation has a positive effect economic growth

A time series analysis using unit root test and the Autoregressive distributed lag (ARDL) bounds testing approach to cointegration will be used to determine whether the null hypotheses as stated above can be accepted or rejected. In so doing, the study will establish if there is a statistically significant relationship between trade liberalisation and economic growth.

### **1.5 Research rationale**

The significance of this study is to enlighten policy makers about the relationship between trade liberalisation and economic growth. This is not restricted to the macroeconomic environment but also to all parties affected that is; households, civil society, cross border traders, trade organisations, government negotiators and investors. This will challenge the social and economic policy makers and government negotiators to formulate and implement policies that are in line with the country's developmental goals. The study will also help by adding to existing empirical evidence and research done in Zimbabwe and in other developing countries.

### **1.6 Contribution of the study**

The subject of trade liberalisation and economic growth has generated a lot of debate at local, national, regional and international levels. There is little understanding of trade liberalisation and economic growth relationship in Zimbabwe since little work has been done to draw out the linkages between these two issues in Zimbabwe recently. The study will contribute the following:

- i. Provide country specific evidence on the relationship between trade liberalisation and economic growth for Zimbabwe as a developing country.



- ii. The information could be very useful to policy makers and other academics in Zimbabwe and other developing countries as they study to formulate macroeconomic policies.
- iii. By providing results that would complement other developing countries that have looked at the effects of trade liberalisation on economic growth.
- iv. By investigating the long run interrelationships among variables in the model.

### **1.7 Outline of the study**

This study is organised in five chapters. Following the introductory chapter, chapter two presents the review of the literature on the relationship between trade liberalisation and economic growth both theoretically and empirically. Chapter three discusses the data and methodology framework. In this chapter, data sources, economic variables and econometric techniques that are used in the study are discussed in detail. Chapter four estimates the economic growth- trade liberalisation model using the methods explained in chapter three and the results are presented and discussed. Finally, the last chapter concludes the study with overall policy recommendations, while highlighting the limitations of the study and suggesting possible areas of further research.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter provides both theoretical and empirical literature review, which correlates with trade liberalisation and its effect on economic growth. This chapter is split into two sections. The first section will explain the theoretical literature to trade liberalisation and economic growth. The second section explains empirical studies and their findings on the effect of trade liberalisation on economic growth.

#### **2.2 Theoretical literature**

Different theories gave different explanations and conclusions on the relationship that exists between trade liberalisation and economic growth. Some theories proposed positive relationship, others advanced negative relationship and some found no relationship at all. This section will explain the theoretical view examining international trade and growth as portrayed by classical and neo-classical theories, new trade theories and endogenous growth models. The section will also cover trade policy reforms in developing countries.

##### **2.2.1 Mercantilist view of trade**

Mercantilist theory was highly nationalistic in its outlook and favoured state regulation and centralisation of economic activities including foreign trade (Blaug, 1978). The mercantilists believed that a nation's wealth and prosperity is reflected in its stock of precious metals namely, gold and silver. At that time, as gold and silver were the currency of trade between nations, a country could accumulate gold and silver by exporting more and importing less (Blaug, 1978; Pentecost, 2000:4). The more gold and silver a nation had the richer and more powerful it was.

The mercantilists argued that government should do everything possible to maximise exports and minimise imports (Pentecost, 2000:4-5). Thus, in order to have export surplus imports were discouraged and exports were encouraged, so that economic growth could be secured. However, since all nations could not simultaneously have an export surplus and the amount

of gold and silver was limited at any particular point of time, one nation could gain only at the expense of other nations (Pentecost 2000:5-6).

For mercantilists, the objective of foreign trade was considered an achievement of surplus in the balance of payments. Hence, they advocated achieving a high trade surplus, which according to the mercantilists it means an excess of exports, both visible and invisible, over imports, calling either for an inflow of gold or for granting of credit to foreign countries, that is capital exports (Blaug, 1978; Pentecost, 2000:5-7). Mercantilism impeded economic growth by promoting overproduction of goods that carry a high opportunity cost and by leading producers to specialise in goods and services that do not take account of comparative advantage.

### **2.2.2 Trade and growth in the classical growth theories**

Classical theories include the contribution by Adam Smith who developed the concept of the absolute advantage. According to Adam Smith, mutually beneficial trade is based on the principle of absolute advantage (Pentecost, 2000:7). Free trade enables companies to specialise in the production of the goods that they manufacture most efficiently. Specialised production leads to economies of scale, which, in turn, lead to higher productivity and economic growth (Samuelson & Nordhaus, 2010:342).

In a free trade system, businesses have incentives to be innovative. By creating more useful products, better production and distribution systems, and more efficient operations, businesses can grow and prosper they by increasing national output (Afonso, 2001). International trade made it possible to overcome the limitations of the internal market and by increasing the extent of the market, free trade facilitated the division of labour and encouraged technical innovations, thereby increasing productivity and overall economic growth.

### **2.2.3 Trade and growth in the neoclassical growth theories**

Heckscher-Ohlin's theory of international trade envisages that a country specialises in the production and export of such goods as conform to its factor endowment. The theory, like the classical comparative cost theory, uses static analytical framework (Heckscher, 1919; Ohlin,

1933). An assumption of the theory, among others is that the factor endowment does not change, and therefore, the pattern and composition of its trade remains stable. Classical and neo classical theories also assumed that such factors of production as land, labour and capital are immobile between countries but mobile within countries (Feenstra, 2004: 4-5). Goods are, however, assumed to be totally mobile both within and between countries (Heckscher, 1919; Ohlin,1933). An implication of the assumption is that the relative supply of labour and capital cannot be altered by imports and exports of these factors. This assumption also implicitly rules out the pattern of growth to alter factor endowment of the economy.

The Heckscher-Ohlin (HO) model indicates that trade will increase the demand for the goods produced by the country's abundant resource (Feenstra, 2004:36). Since the abundant resource in most developing countries is labour, the prediction is an increase in demand for labour intensive goods. On the other hand, trade provides a developing country the opportunity to learn from the more advanced technologies of the developed world (Feenstra, 2004:48-56). The HO model demonstrates that when countries move to free trade, they will experience an increase in aggregate efficiency. The change in prices will cause a shift in production of both goods in both countries (Feenstra, 2004:37-40). Each country will produce more of its export good and less of its import good thereby increasing overall productivity of the country.

On the other hand, technological advancement increases productivity of capital and labour postponing the diminishing returns thereby accelerating the speed of economic growth (Solow, 1956). With a given capital, higher technology gives higher output (Solow 1956). In Solow's analysis of growth, assuming the general price is constant, money demand depends on real output. With this assumption, the choice between holding liquid money and capital stock depends on the real rewards of the capital (Solow, 1956). Free trade enables the movement of technology and high skilled labour from developed countries to least developed countries thereby increasing production and growth.

#### **2.2.4 Trade and growth in the endogenous growth theories**

Endogenous growth theories emerged to a great extent from the contributions of Romer (1986) and Lucas (1988) who stressed the role of capital accumulation on long run economic growth. In contrast to the neoclassical growth model, these theories define capital more broadly and included ideas (or knowledge), learning-by-doing and human capital.

Endogenous growth models emphasise that long run growth rates are not pinned by a forever-diminishing marginal productivity of capital, and can be affected by government policy (Romer, 1986; Lucas, 1988).

#### ***2.2.4.1 Trade and Growth with Human Capital accumulation***

In his two-sector model of accidental learning by doing Lucas (1988) analysed the role of human capital in international trade and hence to growth. The model assumes that workers accumulate (accrue) knowledge through their experience at work. That is, they do not choose firms in order to learn or accumulate human capital, instead they accrue human capital by accidental learning by doing (Lucas, 1988). The decisions concerning the accumulation of human capital depends on the dynamic features of the economy, which makes it endogenous (Lucas, 1988; Kebede, 2002). Since human capital accumulation is the engine of growth, growth will itself be endogenous as well. Free trade increases on the job human capital accumulation thereby increasing institutional quality, output and overall economic growth.

Using a similar approach of accidental learning by doing Young (1991) examines the dynamic effect of international trade on growth. He explores that under free trade less developed countries (LDCs) experience lower growth rates than they enjoy under autarky (Young, 1991). The stagnant growth rate of LDCs is the result of the static comparative advantage, which makes LDCs to specialise in primary goods. However, the less developed country can grow faster than the developed country if the initial knowledge gap between the two countries is small and the less developed country has higher labour input (human capital) (Young, 1991). The model implies that the short-term government subsidies to high-technology industries may lead the economy to acquire a competitive upper hand over its rival and hence it will give the country a permanent and increasing technical advantage (Kebede, 2002).

Lastly, in a stationary growth path, human capital and the quality of consumption goods grow at the same rate (Stokey, 1991). The model shows that if the country is less developed under autarky, implementing free trade policy may slow the rate at which human capital is accumulated, through its impact on investment in human capital accumulation (Stokey, 1991). Under free trade, since high-skilled labour is relatively abundant in the rest of the world, the price of goods produced by highly skilled labour is reduced, which consequently affect the incentive to invest on accumulation of human capital (Stokey, 1991). Thus, in the

long run the developing country may lag behind the rest of the world in terms of human capital. This does not necessarily mean that free trade is harmful to developing countries, as the static gains from trade may outweigh the loss caused by the slower growth rate of human capital.

#### ***2.2.4.2 Trade and Growth with Technological Progress***

In the knowledge driven models pioneered by Grossman and Helpman (1991), and Rivera-Batiz and Romer (1991a) the growth rate of innovation of new products determine the growth rate of the economy. The growth rate of innovation in turn is determined by the prevailing knowledge base and by the scale of employment in the Research and Development (R&D) sector. Thus, the rate of growth of each economy is determined by the existing knowledge or by labour force allocated to R&D sector. In the absence of trade in ideas (no knowledge spillover), the knowledge base of each country remains unchanged. It is thus the increase in the scale of employment in the R&D sector that can generate new ideas and hence higher economic growth (Rivera-Batiz & Romer, 1991a).

Grossman and Helpman (1991) have built models in which a higher degree of openness allows LDCs to adopt technologies developed in the advanced nations at a faster rate and thus to grow, in equilibrium, more rapidly than with a lower degree of openness. Under free trade, the amount of capital goods employed in each country approaches twice the amount which has been used before free trade (Grossman and Helpman (1991)). At the same time the market size for newly developed products is twice as large as it has been before trade. In the long run the researchers in the two countries specialise in different types of designs and duplication of innovated goods will be avoided leading to double the worldwide stock of capital goods.

Grossman and Helpman (1991) and Rivera-Batiz and Romer (1991a) tended to view that, trade leads to resource allocation effect. Static comparative advantage determines the movement of resources from one sector to another as the country opens up for trade in general. International trade may enhance economic growth to the extent that R&D activity is more closely associated to the exporting sector than the import-competing sector. Free trade also leads to market expansion and avoidance of duplication of products (Grossman & Helpman, 1991). The increase in the market size provides a range of intermediate goods at lower costs, which consequently enhance R&D activities and economic growth. Davis (1991)

noted, larger market sizes speed up the rate of learning when there is learning by doing activities.

#### ***2.2.4.3 Trade and Knowledge Spill over***

The product-cycle hypothesis provides a thorough analysis on the issue of invention and production of new products in high-income countries and later production shifts to countries with lower wage rates (Vernon, 1966; Wells, 1968). Furthermore, it explains how a product may emerge as a country's export and work through the life cycle to ultimately become an import. Posner (1961) was the first to provide an analysis of the significance of imitation and innovation processes in determining the pattern of trade between countries. His model shows that trade between countries because of technological innovation that determines the competitiveness of these industries. The relative cost of imitation, that depends on available resources (human capital), determine the time taken to adopt newly developed technology (Posner, 1961).

The essence of the international product life cycle is that technological innovation and market expansion are critical issues in explaining patterns of international trade (Vernon, 1966; Wells, 1968). The model emphasises that foreign direct investment is the main channel through which technology transfer takes place. Free trade leads to movement of technology from highly industrialised countries to developing countries thereby leading to efficient production methods and higher output and growth to the receiving country (Wells, 1968). Understanding the international product life cycle may lead to improved policies resulting in increased exports and reduction in the effectiveness of import competition leading to overall growth.

#### **2.2.5 New trade theories**

The new-trade theory economist Helpman and Krugman (1985) believed that the effects of economies of scale brought by trade promote economic growth. In addition, international trade could also promote economic growth through improving the optimal allocation of resources between materials production sector and knowledge production sector. Helpman and Krugman (1985) stressed out the changes in the distribution of income among industrialised countries as their theory's principal mechanism for accounting for the observed

expansion of trade relative to income. The new trade theory explained trade patterns in the presence of increasing returns and imperfect competition, thereby finding a theoretical justification for the increasingly observed intra-industry trade (Helpman and Krugman, 1985). Firms tend to agglomerate in order to benefit from scale economies and simultaneously would locate close to the market so that transport costs were minimised.

In the last decade of research in international trade, scholars have focused on understanding the agents that make the decisions to engage in international trade, that is, the micro foundations of international trade. In a seminal paper, Melitz (2003) introduced a major extension of new trade theory within a general equilibrium framework that explicitly models the export decisions of firms that are heterogeneous in their productive efficiency. Melitz (2003) indicated the new source of trade gain. When lowered trade barriers stimulate competition on a global scale, low-productivity firms that had been protected by the trade barriers are forced to withdraw from the market, replaced by the increased production volume of high-productivity firms. Therefore, the average productivity of a country as the whole rises.

### **2.2.6 Trade policy reforms in developing countries**

Trade policies in developing countries for the past decade is mainly centred on promotion of exports of finished and intermediate goods at the same time laying the base for eventual production of capital goods for both domestic and exports markets (Makochekanwa, Hurungo & Kambarani, 2012). These policies are expected to lead to higher earnings of foreign exchange which will in turn reduce the balance of payment deficit and unemployment. Most developing countries have put in various incentives to investors in the manufacturing for export such as customs duty drawback, value added tax (VAT) remission, manufacturing under bond scheme, export processing zone (EPZ), government export subsidies among other things.

Developing countries trade policies are now designed to create an environment conducive to promoting countries' products in the international market especially to newly industrialised countries and developed countries (Getz, 2008; Makochekanwa et al., 2012). Trade policies are now formulated with the view to speeding the industrialisation process and making access to foreign markets easier (UN, 2007). Various multilateral, regional, bilateral and preferential trade agreements has been formulated and strengthened in developing nations. The WTO,



African economic community (AEC), SADC, COMESA and East African communities (EAC) are some of the agreements which has helped to shape the trade policies in Africa.

Most developing countries are actively pursuing trade liberalisation and structural reforms to consolidate the re orientation of its economies and complete transition to outward economies. The measures should facilitate the efficient allocation of resources reflecting each economy's comparative advantage (Saungweme, 2013). Improvement of multinational commitments, the transparency and applicability of existing legislation as well as its enforcement would create confidence in the reforms and attract FDI.

The removal of trade protection in most developing countries since year 2000 improved trade in goods and services between developing countries and the rest of the world (OECD, 2008). The policies of trade are now anchored on trade liberalisation and globalisation driven by competitiveness. Industrialisation and rapid growth in developed and newly industrialised countries (NICs) has been mainly attributed to international trade through export led strategies. The trade policies also aim to transform counties into more open, competitive and export led, but it is still a process in most developing countries.

### **2.3 Empirical literature review**

The paper by Dollar (1992) is one of the most cited studies on the relationship between trade openness and growth. Dollar (1992) develops a measure of outward orientation of economy based on the two separate indices of real exchange rate distortion and real exchange rate variability. The indices were each negatively correlated with growth over the 1976-1985 period in a sample of ninety five developing countries. The study used data of international relative price levels prepared by Summers and Heston (1988) in order to construct his outward orientation measure. The Summers- Heston data included relative price levels of the same consumption goods in different countries. Dollar (1992) concluded that openness to trade is positively associated with economic growth. His results implied that trade liberalisation dramatically improve growth performance in many poor countries.

Dollar's study was criticised by Rodrik and Rodriguez (2000) in many aspects. First, even if the law of one price always holds, the impact of equivalent taxes on import and export on relative price level will be different. Second, the assumption that law of one price is always held in the case of free trade has some practical flaws. Dollar's time horizon (1976-1985

period) may not be enough to eliminate deviations unrelated to trade barriers from the law of one price and it is possible to consider the cross country differences in price levels as a result of monetary and exchange rate policies instead of trade restrictions. Finally, Dollar's (1992) growth regression excludes other important determinants of growth. Despite the critiques Dollar's study remains applicable in developing countries where real exchange rate plays a crucial role in determining the degree of trade openness, gains and direction of international trade.

Sachs and Warner (1995) attempted to solve the problem in the literature by constructing an index of openness that combined information about several aspects of trade policy. The aspects included average tariff rate, non-tariff barrier, monopoly of major exports among others to form a Sachs –Warner openness indicator. They examined growth performance within the subset of open economies as well as closed economies. In summary, Sachs and Warner (1995)'s regression results provided strong evidence that protectionist trade policies directly have a negative impact on overall growth performance and indirectly affect the rate of accumulation of physical capital.

The Sachs-Warner openness measure has been used in subsequent cross-country growth studies like (Edwards, 1998; Wacziarg, 2000; Greenaway, Morgan and Wright, 2002). The Sachs-Warner openness variable was also found to be one of the robust growth determinants in the studies taking into account model uncertainty and/or model selection problem (Sala-i-Martin, 1997a; Sala-i-Martin, Doppelhofer & Miller, 2004; Hoover & Perez, 2004; Hendry & Krolzig, 2004).

The Sachs-Warner openness measure is strongly criticised by Harrison & Hanson (1999), Rodrik and Rodriguez (2000). They believed that the significance of the Sachs-Warner openness measure was driven by other factors which are not directly related to trade policy namely socialist country dummy and the black market premium. The Sachs-Warner openness measure is still most applicable to developing countries where protectionist trade policies still prevail. These policies reduce gains from trade and growth in these economies.

In another study by Greenaway, Morgan and Wright (2002) using a sample of twenty-five developing countries to study the effect of trade liberalisation on economic growth. Using a dynamic panel framework and three different indicators of liberalisation the results suggested that liberalisation may impact favourably on growth of real GDP per capita. In their analysis, Greenaway et al. (2002) demonstrated that the relationship between trade and growth is in the

shape of a 'J' curve, increasing initially but declining at certain levels of trade. However, the effect would appear to be lagged and relatively modest. This is because of the variations of trade liberalisation's depth and intensity when being implemented.

Wacziarg and Welch (2003) studied the relationship between trade openness and economic growth with reference to developing and emerging economies. Using a first-difference in growth approach Wacziarg and Welch (2003) updated and extended the Sachs-Warner openness dummy over the 1990-2000 period. These authors concluded that this variable was no longer significant in the 1990s. However, they investigated the time paths of growth within countries over the 1950-1998 period and concluded that after trade liberalisation countries experienced, on average, increases in their annual growth rates by one and half percentage points compared to pre-liberalisation period. However, the result was questionable since Wacziarg and Welch (2003) attribute all growth accelerations to trade liberalisation ignoring the fact that other factors may also stimulate economic growth. In addition, many trade liberalisation efforts are accompanied by other macroeconomic policy changes, such as IMF structural reforms or the world bank structural adjustment loans (SAL) programs since these reforms are generally launched after economic recessions.

Chen and Gupta (2006) investigated the impact of trade openness on economic growth for SADC region over a period 1990 to 2003. The study employed generalized least squares specification and generalized method of moments estimation techniques. The results showed a strong positive impact of trade openness on economic growth in the region over the period of study. The researchers also highlighted the role of education in strengthening the effect of openness on sustainable growth through to a better absorption of knowledge and technological spill overs from trade liberalisation.

Marelli and Signorelli (2011) in another study used panel data model from 1980 to 2007 with an instrumental variable approach for two countries, China and India by focusing on trade dynamics, degree of openness, FDI flows and specialisation patterns. They estimated the links between openness and growth, for the two countries in terms of their integration in the global economy using two stage ordinary least squares. Results showed that both countries in the short-run had high degree of openness despite being hit by big economic shocks like the 2008-09 global crisis, but concluded that there was a positive and statistically significant growth effects of opening up and integrating in the world economy. Thus, free trade, accompanied by effective reforms of the international financial system is the best way to

return to satisfactory growth rates for the world economy and to uphold the catching up process of emerging countries.

Babatunde (2011) explored the relationship between trade openness, infrastructure, FDI and economic growth using a panel of forty-two SSA countries over a period 1980-2003. Using the panel data technique, the results showed that GDP per capita depends on trade openness and FDI. The results further reiterated that the interaction between trade openness and FDI inflows increases economic growth.

Meanwhile, Nduka (2013) analysed the relationship between trade openness and economic growth in Nigeria using time series data from 1970 – 2008. The ordinary Least Squares (OLS) and the Engle Granger two-step approach to cointegration techniques were used. The study revealed that trade openness is positively related to economic growth in Nigeria. Also in Nigeria, using a different approach Nduka, Chukwu and Ugbor (2013) empirically examined and compared the causal relationship between trade openness and economic growth in Nigeria in the pre and post Structural Adjustment Programme (SAP) (1970Q1-1985Q4 and 1986-2011) periods. The study employed Augmented-Dickey Fuller and Phillips-Perron tests for unit root and Engle-Granger approach for cointegration. The outcome of the cointegration test confirmed existence of a positive long-run relationship between trade openness and economic growth in Nigeria. They reiterated that developing countries like Nigeria must identify deeper trade integration as a means to foster economic growth.

Furthermore, Tahir and Khan (2014) carried out a study of twenty-two Asian countries using data over the period of 1990-2009. Empirical analysis was carried out with the help of panel econometric techniques and two-stages least squares method. The results showed that trade openness has contributed significantly to the growth process of the developing countries located in the Asian region. Trade openness is positively related to economic growth in the region. Developing countries should not worry about the weak arguments favouring protectionism and are advised to liberalise international trade to achieve higher growth rates.

Mkubwa, Mtengwa and Babiker (2014) carried out a study in Tanzania. The researchers used time series data from 1970-2010. The periods were subdivided into a closed economy (1970-1985) and an open economy period (1986-2010). Using the OLS technique of estimating regression the empirical findings indicated that trade openness had a positive and significant effect on economic growth in Tanzania. However, this effect was relatively greater during the

closed economy compared to the open economy period. It has been indicated that since late 1980s Tanzania experienced continuous trade deficits in her accounts. This has been the contributing factor in the obtained results. In order to achieve economic growth developing countries' policies should be geared towards more free trade and the elimination of trade barriers.

Moreover, Gwaendepi, Musara and Dhorro (2014) did a research to investigate a long run relationship between trade and other macroeconomic variables for Zimbabwe for the period 1975 to 2005. The study used imports plus exports as a ratio of GDP as a measure of trade openness. The authors employed the Engle-Granger cointegration technique approach to establish the existence of a long run relationship between economic growth and trade variables. The results of the study indicated that trade and economic growth are cointegrated and positively related. The relationship is strengthened by the stability of the macroeconomic policy since negative macroeconomic drivers such as rising inflation can constrain economic growth. Openness to trade was deemed to play a crucial role, where reduction and elimination of barriers to trade promote growth in trade and ultimately economic growth.

Tahir and Azid (2015) studied the relationship between international trade openness and economic growth in fifty developing countries over the period 1990-2009 using the ratio of industry output to GDP as a measure of trade openness. Empirical analyses were carried out with the help of two stage least squares and fixed and random effects models techniques for analysing panel data. The main finding of the paper was that the relationship between trade openness and economic growth was positive and statistically significant for developing countries. The process of trade openness could be enforced gradually in developing countries to achieve long run economic growth.

Sakyi et. al., (2015) investigated the long-run impact of foreign direct investment and trade openness on economic growth in Ghana (1970–2011) within the framework of the endogenous growth literature. Adopting the autoregressive distributed lag bounds testing approach to cointegration the results suggested that the interaction of foreign direct investment and exports has been crucial in fostering growth. Trade openness positively affected economic growth in the long run. From a policy-oriented point of view, the study recommends the promotion of export-led growth strategies in long-term development plans.

Meanwhile, Mbulawa (2015) using time series data for Zimbabwe from 1975-2012 empirically investigated the link between economic growth and FDI, volume of trade,

inflation and capital accumulation. Using the Vector error correction approach, trade openness index and terms of trade as trade indicators the study concluded that trade liberalisation enhance economic growth. The research findings proved that trade openness had a significant positive impact on economic growth in developing countries.

Mafudza, Tambudzai and Kalotay (2015) analysed the implications of Zimbabwe joining Tripartite Free Trade Area (TFTA) to economic growth of the country. The study quantifies the benefits to Zimbabwe of joining TFTA by measuring the responsiveness of the country's GDP to open trade with TFTA member countries that have not been participating in the SADC and COMESA FTAs. The empirical evidence showed that a more open trade regime under the TFTA contributes more to the country's aggregate economic growth.

Mandishekwa (2016) investigated the relationship between trade openness, terms of trade and economic growth in Zimbabwe using time series data. The sum of exports and imports as a percentage of GDP measured trade openness. The study employed vector auto-regressive and granger causality methods for testing for causality. The findings from the study concluded that most variations in GDP are as a result from the GDP itself although it has been found that trade openness is positively related to economic growth. Any shocks in trade openness was transmitted to GDP changes. The country should put more effort to liberalise the economy, however the liberalisation must be well sequenced.

In another study, Gurgul and Lach (2014) focused on linear and non-linear causalities between the international trade and economic growth in the Polish economy. Using quarterly data for the periods 1996-2008 and 1996-2009 separately to capture for the effect of the 2008/2009 financial global crisis. The authors estimated a restricted VAR model involving GDP, exports and imports. The findings of linear Granger causality tests revealed existence of a positive relationship between the export growth rate and growth in GDP in both time periods, while no direct causality was found between GDP growth rate and imports growth rate. In addition, the impulse response analysis performed revealed that a shock from exports caused a positive response in GDP over the next three quarters.

Were (2015) examined empirically the differential effects of trade on economic growth and investment based on cross country data. The study takes into consideration the differential effects of trade and growth by categorising countries by level of economic development, that is LDCs, developing and developed countries. The empirical results based on different categories of countries showed that, whereas trade has positively impacted economic growth

in developed and developing countries, its effects is insignificant for LDCs. The structure and pattern of trade in LDCs and developing countries should be transformed in order to obtain larger growth benefits.

In Kenya a study of the relationship between trade openness and economic growth was carried out by Musila and Yiheyis (2015) using annual data from 1982-2009. The study employed OLS and Johansen Cointegration. Two types of measures namely aggregate openness and trade policy induced openness were used. Aggregate trade openness positively affected the level of investment and the rate of economic growth. On the other hand, trade-policy induced openness have negatively and significantly affected investment and the rate of economic growth. Granger Causality tests suggested that a change in trade openness influenced the long-term rate of economic growth through the interaction with physical capital growth in the case of Kenya. Controlling for other factors, a negative relationship between policy-induced openness and the rate of economic growth was discovered. The negative impact of trade-policy induced openness may occur when liberal trade policies lead to an increase in the cost of intermediate inputs of production as was the case for Kenya during the period of structural adjustment programs.

Khobai, Kolisi and Moyo (2017) studied the long run relationship between trade openness and economic growth in Ghana and Nigeria covering the period between 1980 and 2016. The Autoregressive distributed lag (ARDL) model was employed in this study to examine the long run relationship between the variables. The findings of the study suggested existence of a long run relationship among the variables for both countries. The results further showed that trade openness has a positive impact on economic growth and significant in Ghana while in Nigeria trade openness has a negative but insignificant effect on economic growth. The difference in results in the two countries maybe was a result of different trade and economic policies applied over the years. These results implied that different policy measures applied in developing countries can produce different outcomes on openness-economic growth relationship.

Zahonogo (2017) investigated the effects of trade openness to economic growth in Sub-Saharan African countries. By employing the pooled mean group estimation technique, which is appropriate for drawing conclusion from dynamic heterogeneous panels by considering long run equilibrium relations. The empirical evidence suggested that a trade threshold exists below which greater trade openness has beneficial effects on economic growth and above

which the trade effect on growth declines. Furthermore, the findings supported the view that the relationship between trade openness and growth is not linear for SSA.

Tekere (2001) concluded that trade liberalisation in Zimbabwe under structural economic adjustment lead to negative overall economic growth partnered by deterioration of human development, high rates of inequality, marginalisation of the poor and high unemployment rate. The study reiterated that trade liberalisation undertaken strategically, that is within a clear national development program can be a very useful tool and means of stimulating growth and improving human development.

Yanikkaya (2002) found a negative relationship between liberalisation and growth. The cross country growth regressions were applied to a panel of one hundred developed and developing countries data from 1970-1997 and estimated using the seemingly unrelated regression method as in Barro (1997). When estimating the effect for indicators of trade volumes they found a positive and significant correlation between openness to trade and economic growth. On the other hand, when estimating the impact of restrictions to trade and average tariff rates, their results revealed a positive and significant correlation between the degree of barriers to trade and economic growth. The results were consistent with the predictions of the theoretical growth literature according to which in some instances, poor and small economies can in fact have benefits from restrictions to trade.

Ugurlyu (2010) examined the impact of openness on economic growth for the fifteen EU countries in 1996–2004. The panel data technique called longitudinal data or cross-sectional time series data was used. The variables used were growth, openness, price level, investment and government share of RGDP. The results proved that openness had a weak negative impact on economic growth thus openness decreased growth in that period. The results showed that trade openness affected economic growth negatively maybe because these nations are pioneers of technology and innovation which moves to benefit less developed nations.

Adhikary (2011) studied the linkage between FDI, trade openness, capital formation, and economic growth rates in Bangladesh over a period 1986 to 2008 using time series analysis. The Johansen procedure was applied to test the cointegrating relation between variables followed by a vector error correction model. The empirical results proved a negative long run relationship between openness GDP growth rates. The degree of trade openness unleashes



negative but diminishing influence on GDP growth rates. The negative association between the trade openness and economic growth rates was perhaps due to the exchange rate depreciation, large volume of imported materials and negative trade balance position.

Ulasan (2012) found a negative relationship between liberalisation of trade and economic growth both in short run and long run in Turkey. Ulaşan (2012) studied turkey using data from 1960-2000. In contrast to many previous cross-country growth studies, the study did not support the proposition that openness has a direct robust relationship with economic growth in the long run. In light of data evidence, it was concluded that trade openness does not matter for economic growth. Ulasan (2012) further alluded that without better institutions, sound and stable fiscal and monetary policies, openness to international trade will not guarantee economic growth.

Furthermore, Abbas (2014) concluded that increase in trade liberalisation deteriorates economic growth in four developing and four least developed countries. By augmenting standard production function, the panel fixed effect model was used to estimate impacts of macroeconomic variables on economic growth using eight countries from all over the world. The separate regression model for each developing and least developed economies was estimated using panel fixed effect model. The result showed significant negative impact of trade liberalisation index on economic growth with a greater share being imports than exports. The developing nations should develop production side and adopt export promotion policies besides managing imports for the achievement of sustainable growth.

Ali and Abdullah (2015) examined the relationship and impact of openness of trade on the economic growth of Pakistan during the study period of 1980-2010. The VECM and Johanson multivariate approach were adopted to find out the short and long run estimates. The results of the study showed a short-run positive relationship between trade openness and GDP growth of the country. The long-run results state a negative impact of trade liberalisation on the economic growth of Pakistan. This may be due to the weak conflict management institutions and lack of quality institutions in the country. The negative impact may be due to the raw material exports instead of final goods by Pakistan.

Hye and Lau (2015) in India examined the link between trade openness and economic growth using annual time series data from 1971–2009. The study employed a new endogenous growth model for theoretical support, auto-regressive distributive lag model and rolling window regression method in order to determine long run and short run association between

trade openness and economic growth. Further granger causality test is used to determine the long run and short run causal direction. The results revealed that trade openness index negatively impacts on economic growth in the long run. The new evidence is provided by the rolling window regression results that is, the impact of trade openness index on economic growth is not stable throughout the sample. This shows that in the beginning of trade reforms, the Indian policy makers well managed the trade sector policies but failed in the long run.

Kojo, Saban and Yemane (2014) examined the causal relationship between financial development, trade openness and economic growth for twenty-one African countries. Financial development index was developed based on four different financial development indicators and trade openness index. The panel bootstrapped approach to Granger causality was applied to the study. The empirical results showed limited support for the finance-led growth and the trade-led growth hypotheses. The results imply that recent attempts at trade liberalisation do not seem to have made a significant impact on growth in developing countries.

The subject of trade liberalisation and economic growth has not been exhaustively studied with formal modelling and appropriate econometric procedure in Zimbabwe because of unstable macro-economic history of the country. Most studies in Zimbabwe focused on export led growth hypothesis whilst those on trade openness used old cointegration techniques in Eagle Granger and Johansen test. The data used by some studies in Zimbabwe excluded the hyperinflationary period that is between 2006 and 2009. Gwaendepi et. al., (2014) reiterated that it was difficult, if not impossible to obtain reliable and credible data for the Zimbabwean economy from 2006 to 2009 due to economic meltdown.

The current study tries to fill these gaps by using time series data from 1980 to 2017 including the hyperinflationary period of 2005 to 2009. The study will use estimates of the data derived from United Nations Statistics Division (UNSD) and World Development Indicators (WDI) database. Moreover, the more recent autoregressive distributive lag (ARDL) bounds testing cointegration technique will be used in this study. The technique was chosen because it is simple, it gives realistic and efficient estimates and it is relatively more efficient in small sample sizes. Lastly the study will cover old to more recent time series data in Zimbabwe, that is from 1980 to 2017 thereby covering all economic episodes followed by the country since independence.

## **2.4 Conclusion**

The key focus of this chapter was to trace theoretical underpinnings and linkages between trade liberalisation and economic growth. This was done with a resulting conclusion that many theories would be useful in explaining complex web of important connections that are characteristic of this research topic. Among some of the theories discussed are those pertaining to international trade such as, mercantilist view of trade, absolute advantage theory, Heckscher-Ohlin's theory of trade, new trade theories and those that explain trade and growth including Solow's growth model and endogenous growth theories.

With regards to empirical evidence we identified a number of studies that acknowledged a positive long run relationship between trade liberalisation and economic growth. There are numerous findings in literature, with some studies confirming a negative relationship between trade liberalisation and growth, while others failed to find any significant relationship. The differences in findings are attributed to different econometric modelling techniques, countries included in the studies, variable specifications and different time frame adopted for the studies. The next chapter will focus on the data and methodology used in the study.

## CHAPTER 3

### DATA AND METHODOLOGY FRAMEWORK

#### 3.1 Introduction

This study seeks to investigate the effect of trade liberalisation on economic growth and the relationship between the two variables in Zimbabwe as a developing country. This chapter which presents in detail the methodology used is made up of five sections. The model is specified in the first section. This is followed by data sources and variable definitions, estimation method and conclusion.

#### 3.2 Model specification

To analyse the relationship between economic growth and trade liberalisation econometrically a growth equation is specified. The dependent variable is real gross domestic product (RGDP) and trade openness is among the independent variables as indicated in equation (3.1).

The multivariate regression equation is explicitly specified as follows

$$RGDP = F (OPEN, FDI, GVT, INF, LF) \quad (3.1)$$

Where RGDP = Real gross domestic product

OPEN = Trade openness ((exports plus imports)/GDP)

FDI = Foreign direct investment

GVT = Government expenditure

INF = Inflation rate

LF = Labour force

Trade openness is the proxy for trade liberalisation and is expected to be positively related to economic growth. The variables, foreign direct investment and labour force are also expected to be positively related to economic growth whilst inflation rate and government expenditure are expected to be negatively related to economic growth.

The above model can be expressed in a linearized form as:

$$RGDP_t = \beta_0 + \beta_1 OPEN_t + \beta_2 FDI_t + \beta_3 GVT_t + \beta_4 INF_t + \beta_5 LF_t + \mu_t \quad (3.2)$$

Where  $\beta$ 's are parameters of the model and  $\mu_t$  is the residual term.

The dependent variable in the model is economic growth which is measured as real GDP whilst trade openness that is a proxy for trade liberalisation, foreign direct investment, government expenditure, inflation rate and labour force are the independent variables. The variables have been used in various studies in the literature and are justified in investigating the relationship between trade openness and economic growth in Zimbabwe.

A log linear model is specified by taking the natural logs of equation (3.2):

$$\ln RGDP_t = \beta_0 + \beta_1 \ln OPEN_t + \beta_2 \ln FDI_t + \beta_3 \ln GVT_t + \beta_4 \ln INF_t + \beta_5 \ln LF_t + \mu_t \quad (3.3)$$

Where  $\ln$  stands for natural logarithm.

The transformation of variables to their natural logs enables slope coefficients ( $\beta$ 's) to measure not only the change of mean but also the elasticity of the dependent variable with respect to the percentage change in the independent variables (Gujarati 2003: 420). Apart from that, the log transformation reduces the problem of heteroscedasticity since it compresses the scale in which variables are measured. Though the problem of heteroscedasticity mostly arises in cross-sectional studies, it can also occur in time series analysis such as this study (Gujarati 2003: 420).

### 3.3 Data sources and variable descriptions

The broad empirical literature reviewed of different studies give insights on the selection of variables, how to measure them, data sources and estimation techniques (Coe & Helpman, 1995; Bernstein, 1996). The literature helps in defining the variables and data sources. The choice of dependent variable, independent variables and data sources are discussed below.

### 3.3.1 Data sources

This study uses Zimbabwe's annual time series data from 1980 to 2017, making thirty-eight data points. The period is long enough to establish whether there exists a relationship between the variables being studied. The study will use some of the variables that were identified by Renelt and Levine (1992), Levine and Zervos (1993), and Gwaendepi et.al., (2014) to undertake a cointegration analysis in order to establish the relationship between trade liberalisation and economic growth. The choice of variables was further motivated by the availability of reliable and credible secondary data for the Zimbabwean economy.

Most of the data are self-explanatory and available. The data are sourced from the United Nations Statistics Division (UNSD), World Integrated Trade Solutions (WITS), Zimbabwe National Statistical Agency (ZIMSTAT), International Labour Organisation (ILO) database and World Development Indicators (WDI) statistics databases. Table 3.1 presents the variables used in this study as well as their sources.

**Table 3.1: Variables and data sources**

<b>Variable</b>	<b>Variable Measurement</b>	<b>Sources</b>
<b>Real gross domestic product, RGDP</b>	Total Real Gross Domestic product (in millions \$US)	UNSD/ZIMSTAT
<b>Exports and imports</b>	Total Imports and Exports(all in \$US as a % of GDP). This is the proxy for trade liberalisation.	WITS/ UNSD
<b>Foreign direct investment, FDI</b>	Total FDI (in \$US measured as a % of GDP)	WDI/ ZIMSTAT
<b>Government expenditure, GVT</b>	Total Government expenditure (in \$US measured as a % of GDP)	UNSD
<b>Inflation Rate, INF</b>	Inflation rate derived from the CPI (2010) prices	UNSD
<b>Labour force, LF</b>	Total number of the employed plus unemployed.	UNSD/ILO

UNSD is United Nations Statistics Division; ZIMSTAT is the Zimbabwe National statistical Agency; WDI is the World Development Indicators database; ILO is the International Labour Organisation database; World Integrated Trade Solutions database (WITS).

With regards to the data quality, the World Bank and the United Nations (UN) ensures that its data work and products are of the highest quality by using standards, methodologies, sources, definitions, and classifications that are internationally accepted. General Data Dissemination System (GDDS) and Data Quality Assessment Framework (DQAF) are frameworks for assessing national statistical systems thereby promoting improved dissemination and effectiveness, which encourages countries to improve the quality of official statistics. It also facilitates a comprehensive view of data quality, one that recognizes interrelations, including trade-offs, among elements of quality and allows emphases to vary across data categories and users (World Bank, 2017).

### **3.3.2 Definitions of variables**

In the study of economic growth and trade, many explanatory variables can be included. According to Sala-i-Martin (1997), the various combinations of variables in any one regression are as many as the number of regressions themselves. In this study, key variables were chosen from various empirical growth and trade literature and the availability of quality and accurate data covering the period under study. The variables that have been found to be significant in other studies as well as those relevant to Zimbabwe are used, to avoid the inclusion of irrelevant variables. In this section, each variable is defined and an explanation of how they are measured is discussed.

Real Gross Domestic Product (RGDP) is defined as the value of all goods and services produced within an economy over a given period of time (Samuelson & Nordhaus, 2010:370). RGDP is GDP given in constant prices and refers to the volume level of GDP. Constant price estimates of GDP are obtained by expressing values of all goods and services produced in a given year, expressed in terms of a base period. This variable is reported in the national accounts of the country and is available in totals, per capita terms and in growth rates. Real GDP figures are used in the study.

Trade openness is generally accepted as an important factor in accelerating economic growth. A more liberal trade regime encourages a favourable investment climate that promotes

economic growth. In addition, as the economy opens up, market access is widened. This variable also captures the external technological effects on economic growth, as it comes with exposure to a larger set of ideas or technologies (Winters, 2004). According to Balassa (1982) and Edwards (1997), the issue of how the openness variable contributes to economic growth is an empirical question. There are numerous measures of openness used in previous studies. In this study, however we use the common measure of openness, which is the ratio of exports plus imports to GDP. Trade liberalisation index in this study is represented by trade openness, and it is expected to be positively related to economic growth.

Danziger (1997) defines foreign direct investment (FDI) broadly as an investment made by a foreign investor in order to acquire an ongoing interest in an enterprise operating in a country other than the investor's home country. FDI flows consists of financial flows and inward flows that all increase investment in reporting economy. (OECD, 2008). Thus, FDI can be measured as a flow variable or as a stock. The measures are different in that, FDI stocks display a much less volatile behaviour over time than FDI flows (Sala-i-Martin et al 2004). However, the only variable that is readily available is the FDI inflows. This study will use FDI inflows as a percentage of GDP. Since FDI creates, stable and long lasting links between economies, it is expected to positively affect economic growth.

In the Keynesian model, increase in government expenditure (on infrastructures) leads to higher economic growth. Contrary to this view, the neo-classical growth models argue that government fiscal policy does not have any effect on the growth of national output (Barro, 1990; Abdullah, 2000; Folster & Henrekson, 2001). Policymakers are divided as to whether government expansion helps or discourages economic growth. Advocates of bigger government argue that government programs provide valuable public goods such as education and infrastructure (Nurudeen & Usman, 2010). Proponents of smaller government explained that increase in government expenditure negatively affect economic growth because higher spending undermines economic growth by transferring additional resources from the productive sector of the economy to government, which uses the resources less efficiently (Samuelson & Nordhaus, 2010:310-312). In this study total government expenditure as a percentage of GDP is used and is expected to be negatively related to economic growth.

The labour force, or currently active population, comprises all persons who fulfil the requirements for inclusion among the employed (civilian employment plus the armed forces)



or the unemployed (OECD, 2017). Labour force represents people who are willing and able to work in Zimbabwe, that is, the number of employed plus unemployed. Increase in labour supply is expected to increase output and economic growth will increase. Labour force is expected to be positively related to economic growth.

There is liberal evidence in the literature showing that inflation impacts on growth negatively (Fisher, 1993). The rationale for including inflation as an explanatory variable in the growth equation is that inflation impedes efficient resource allocation as it obscures the signalling role played by relative price changes and increases uncertainty (Temple, 2000). Inflation is an indicator of domestic fiscal and monetary prudence and indicates macro-economic instability. Higher inflation levels are expected to have a negative impact on economic growth. The variable inflation is calculated from consumer price index (CPI) and is recorded annually as a percentage.

### **3.4 Estimation Methodology**

The Autoregressive distributed lag (ARDL) bounds testing approach to co-integration will be used to determine the long run relationship between economic growth and trade liberalisation. Annual data from 1980 to 2017 is used. The adopted techniques are discussed below.

#### **3.4.1 Tests for stationary**

Time series estimation by ordinary least squares requires the time series data to be stationary. A time series is said to be stationary if its mean, variance, and auto-covariance remain constant over time (Gujarati, 2003:812-816).

Consequently, any stochastic time-series whose mean ( $\mu_t$ ) and variance ( $\sigma_t^2$ ) are change over time needs to be differenced to achieve stationarity. If a time series is differenced  $d$  times and the result is stationary, then the stochastic process is said to be integrated of order  $d$ , symbolized as  $I(d)$ . For this reason, the unit root is also called difference-stationary model, since the stochastic time-series is stationary after having been differenced (Wei, 2006).

The simplest model that may contain a unit root is the AR (1) model. Consider the autoregressive process of order one, AR (1), below:

$$Y_t = \theta Y_{t-1} + \varepsilon_t \quad (3.4)$$

where  $\varepsilon_t$  denotes a serially uncorrected white noise error term with a mean of zero and a constant variance.

If  $\theta = 1$ , equation (3.4) becomes a random walk without drift model, that is, a nonstationary process. When this happens, we face what is known as the unit root problem. If, however,  $\theta < 1$ , then the series  $Y_t$  is stationary. The stationarity of the series is important because correlation could persist in nonstationary time series even if the sample is very large and may result in what is called spurious regression (Yule, 1989). To avoid the problem of spurious regressions among non-stationary time series, the time series has to be transformed to make them stationary.

The stationarity test that has become widely popular in time series econometrics is the unit root test. There are several methods used such as the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1981), the Philips-Perron (PP) unit root test (Philips & Perron, 1988) and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test (Kwiatkowski et. al., 1992). The ADF and PP test uses the same critical values. In this research two-unit root tests are employed namely: Augmented Dickey Fuller (ADF) test and Phillips Perron (PP) test. The ADF is considered to be superior because of its popularity and wide application whilst the PP tests are robust to general forms of heteroscedasticity in the error term. The two tests are explained.

#### ***3.4.1.1 Augmented Dickey Fuller test***

The Augmented Dickey Fuller (ADF) test investigates whether a time-series has a unit root. The ADF test takes into consideration situations where the error terms may be correlated with previous terms by adding lagged difference values of the dependent variable to the regression (Gujarati, 2003: 817-818). The basic idea behind the ADF unit root test for non-stationarity is to simply regress  $Y_t$  on its (one period) lagged value  $Y_{t-1}$  and find out if the estimated  $\rho$  is statistically equal to 1 or not. Equation (3.4) can be manipulated by subtracting  $Y_{t-1}$  from both sides to obtain:

$$Y_t - Y_{t-1} = (\theta - 1)Y_{t-1} + \varepsilon_t \quad (3.5)$$

Which can be written as

$$\Delta Y_t = \rho Y_{t-1} + \varepsilon_t \quad (3.6)$$

Where  $\rho = (\theta - 1)$ , and  $\Delta$  is the first difference operator

In practice, instead of estimating equation (3.4), we estimate equation (3.6) and test for the null hypothesis of  $\rho = 0$  against the alternative of  $\rho \neq 0$ . If  $\rho = 0$ , then  $\theta = 1$ , meaning that we have a unit root problem and the series under consideration is nonstationary. It should be noted that under the null hypothesis  $\rho = 0$ , the t-value of the estimated coefficient of  $Y_{t-1}$  does not follow the t-distribution even in large samples (Erdogdu, 2007). This means that the t-value does not have an asymptotic normal distribution. The decision to reject or not to reject the null hypothesis of  $\rho = 0$  is based on the Dickey-Fuller (DF) critical values of the  $\tau$ (tau) statistic.

To solve the problem of serial correlation shown by DF test, Dickey and Fuller developed a test known as the Augmented Dickey-Fuller (ADF) test (Wei, 2006). In the ADF test, the lags of the first difference are included in the regression equation in order to make the error term  $\varepsilon_t$  white noise and, therefore, the regression equation is presented in the following form:

$$\Delta Y_t = \rho Y_{t-1} + \alpha_i \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t \quad (3.7)$$

To be more specific, the intercept may be included, as well as a time trend  $t$ , after which the model becomes:

$$\Delta Y_t = \beta_1 + \beta_2 t + \rho Y_{t-1} + \alpha_i \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t \quad (3.8)$$

The testing procedure for the ADF unit root test is applied to the following model

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \sum_{j=1}^{\delta} \rho_j \Delta y_{t-j} + \varepsilon_{it} \quad (3.9)$$

where  $\alpha$  is a constant,  $\beta$  the coefficient on a time trend series,  $\gamma$  the coefficient of  $y_{t-1}$ ,  $\delta$  is the lag order of the autoregressive process,  $\Delta y_t = y_t - y_{t-1}$  are first differences of  $y_t$ ,  $y_{t-1}$  are lagged values of order one of  $y_t$ ,  $\Delta y_{t-j}$  are changes in lagged values, and  $\varepsilon_{it}$  is the white noise.

The ADF test can be tested on at least three possible models: A pure random walk without a drift. This is defined by using the constraint  $\alpha = 0$ ,  $\beta = 0$  and  $\gamma = 0$  in equation (9). A random walk with a drift. This is obtained by imposing the constraint  $\beta = 0$  and  $\gamma = 0$  in equation (9). A deterministic trend with a drift. For  $\beta \neq 0$ , equation (9) becomes a deterministic trend with a drift model.

The ADF tests the hypothesis of  $\beta_2 = 1$  against the alternative hypothesis of  $\beta_2 < 1$ . Rejection of the null hypothesis indicates that the time-series is stationary whereas non-rejection of the null hypothesis indicates that the time series is non-stationary (Gujarati, 2003:817-818).

### 3.4.1.2 Phillips Perron test

To deal with the problem of serial correlation in the errors, non-parametric statistical methods are used in PP test without including the lag difference terms. The PP test solve the serial correlation problem among error terms by using correction factor which estimates the long run discrepancy of the error process with the modification of the Newey-West formula. The PP test does not require the disturbance term to be serially uncorrelated or to be homogenous. The test allows dependence and heterogeneity of disturbances of either Autoregressive (AR) or moving average (MA) form (Phillips & Perron, 1988).

Similar to the ADF the Phillips-Perron (PP) test investigates whether a time-series has a unit root. The test equation is stated as:

$$\Delta Y_t + \beta_0 + \beta_1 t + \beta_2 Y_{t-1} + \varepsilon_t \quad \varepsilon_t \sim 1(0) \quad (3.10)$$

The main difference between the PP test and the ADF test is that the ADF test accounts for any serial correlation in the error terms by introducing a lagged difference term of the dependent variable (Gujarati, 2003:818). The PP test approximates and adjusts the t-ratio of the  $\beta_2$  coefficient in order to prevent serial correlation from affecting the asymptotic

distribution of the test statistic. In essence, the PP test corrects for serial correlation through the modification of the test statistics by using nonparametric statistical methods. The two tests are very similar in that the asymptotic distribution of the two tests is identical though it may differ in small samples due to the different methods used to correct for serial correlation (Gujarati, 2004:817). Thus, interpretation of the t–statistic is the same as the ADF test.

### **3.4.2 Cointegration test**

Modelling time series in order to observe their long run relationship can be done through co-integration. Granger (1981) and Eagle and Granger (1987) were the first to formalise the idea of cointegration, providing tests and estimation procedure to evaluate the existence of long run relationship between set of variables within a dynamic specification framework. Cointegration is a linear combination of two or more time-series that have the same order of integration but are not stationary (Gujarati, 2003: 822-824). If two or more variables are cointegrated, it shows that there is a long-run relationship between them. Cointegration will determine if the variables move together in the long run. Thus, cointegration establishes a stronger statistical and economic basis for empirical error correction model, which brings together short run and long run information.

Testing for co-integration is a necessary step to establish if a model empirically exhibits meaningful long run relationships. There are several tests of co-integration other than Engle and Granger (1987) procedure among them are Johansen procedure and Autoregressive Distributed Lag Model (ARDL) or the Bounds method. The study will use the ARDL co-integration procedure due to its many advantages as discussed below.

#### ***3.4.2.1 Bounds test Cointegration***

To empirically analyse the long run relationships and dynamic interactions among the variables of interest, the model will be estimated using the ARDL bounds testing approach to cointegration, developed by Pesaran, Shin and Smith (2001). The procedure is adopted because of its numerous advantages over other traditional cointegration techniques such as; Engle and Granger (1987), Johansen-Juselius (1990), Johansen (1992), Gregory and Hansen (1996), Saikkonen and Lutkepohl (2000).

The first advantage of ARDL cointegration approach is that it provides explicit tests for the presence of a single cointegrating vector instead of assuming uniqueness (Haug, 2002). Secondly, the ARDL model is applicable irrespective of whether the underlying regressors are stationary I(0) or integrated in the first order I(1). Thirdly, the existence of a cointegrating relationship can be tested based on the error correction representation. A bounds testing procedure is available to draw conclusive inference without knowing whether the variables are integrated of order zero or one, I(0) or I(1), respectively (Pesaran et al 2001). Fourthly, the model is more suitable and provides better results than multivariate cointegration approaches in case of small sample properties. Lastly, the ARDL technique generally provides unbiased estimates of the long run model and valid t-statistics even when some of the regressors are endogenous (Pesaran et.al., 2001).

The ARDL model used in the study is expressed as follows:

$$\begin{aligned}
\Delta \ln(\text{RGDP})_t = & C_0 + \sum_{i=1}^q \alpha_0 \Delta \ln(\text{RGDP})_{t-i} + \sum_{i=0}^q \alpha_1 \Delta \ln(\text{OPEN})_{t-i} \\
& + \sum_{i=0}^q \alpha_2 \Delta \ln(\text{FDI})_{t-i} + \sum_{i=0}^q \alpha_3 \Delta \ln(\text{GVT})_{t-i} + \sum_{i=0}^q \alpha_4 \Delta \ln(\text{INF})_{t-i} \\
& + \sum_{i=0}^q \alpha_5 \Delta \ln(\text{LF})_{t-i} + \beta_0 \ln(\text{RGDP})_{t-1} + \beta_1 \ln(\text{OPEN})_{t-1} \\
& + \beta_2 \ln(\text{FDI})_{t-1} + \beta_3 \ln(\text{GVT})_{t-1} + \beta_4 \ln(\text{INF})_{t-1} + \beta_5 \ln(\text{LF})_{t-1} \\
& + \varepsilon_t
\end{aligned} \tag{3.11}$$

Where all variables are as previously defined in equations (3.1), (3.2) & (3.3).  $(\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4 \text{ \& } \alpha_5)$  are the coefficients that measure short run dynamics of the model,  $(\beta_0, \beta_1, \beta_2, \beta_3, \beta_4 \text{ \& } \beta_5)$  are the long run multipliers,  $q$  is the optimum lag length for the unrestricted error correction model (UECM),  $c_0$  is the drift,  $\Delta$  is the first difference operator and  $\varepsilon_t$  is the white noise.

The ARDL bound test for co-integration has its roots in the Wald-test (F-statistic). Pesaran et al. (2001) gives two critical values for the ARDL test of co-integration. The lower bound critical value assumes that all variables are I(0) and there is no cointegration whilst the upper bound critical value assumes that all variables are I(1) and there is cointegration among the variables. When the computed F-statistic is greater than the upper bound critical value, then

the  $H_0$  is rejected, meaning that the variables in the model are cointegrated. If the F-statistic is below the lower bound critical value, then the  $H_0$  cannot be rejected meaning that there is no cointegration among the variables. When the computed F-statistic falls between the lower and upper bound, then the results are indecisive, meaning that the relationship between the variables cannot be ascertained.

From equation (3.11) the co-integration equation is as follows;

$$\begin{aligned} \ln RGDP_t = & \beta_0 + \beta_1 \ln(RGDP)_{t-1} + \beta_2 \ln(OPEN)_{t-1} + \beta_3 \ln(FDI)_{t-1} + \beta_4 \ln(GVT)_{t-1} \\ & + \beta_5 \ln(INF)_{t-1} + \beta_6 \ln(LF)_{t-1} + \varepsilon_t \end{aligned} \quad (3.12)$$

Where all variables are previously defined in equation (3.11).

The null hypothesis of no co-integration ( $H_0$ ) and the alternative hypothesis ( $H_1$ ) of cointegration amongst the variables in equation (3.12) are shown below;

$$H_0: \beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0;$$

$$H_1: \beta_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0;$$

The null hypothesis states that there is no cointegration among the variables that is, they have no long run relationship. This is against the alternative hypothesis which states that there is a longrun relationship among variables.

After estimating equation (3.11), the F-statistic will be computed to differentiate the long run relationship among the concerned variables. The F-statistic can be carried out by imposing restrictions on the estimated long-run co-efficients of all variables. In the final step, we obtain the short run dynamic parameters by estimating an error correction model associated with the long run estimates.

#### **3.4.2.2 Error Correction Model (ECM)**

After confirming the existence of long-run relationship among the variables, the next step is to estimate the error correction model (ECM) that indicates the short run dynamic parameters that measures the speed of correction to long-run equilibrium after a short-run disturbance

(Gujarati, 2003: 824). The error correction model (ECM) is very crucial in the cointegration test as it drives from the fact that, if macroeconomic variables are cointegrated, they can be modelled as having been generated by the ECM. The ECM produces better short run forecasts that hold together in economic meaningful way. The associated ECM is derived in order to calculate the adjustment coefficients of the error correction term. In doing so, the short run effects are captured by the coefficients of the first differenced variables in the ECM (Masih, et.al., 2008). The standard ECM is estimated as follows:

$$\begin{aligned}
\ln(\text{RGDP})_t = & C_0 + \sum_{i=1}^q \alpha_0 \Delta \ln(\text{RGDP})_{t-i} + \sum_{i=0}^q \alpha_1 \Delta \ln(\text{OPEN})_{t-i} + \sum_{i=0}^q \alpha_2 \Delta \ln(\text{FDI})_{t-i} \\
& + \sum_{i=0}^q \alpha_3 \Delta \ln(\text{GVT})_{t-i} + \sum_{i=0}^q \alpha_4 \Delta \ln(\text{INF})_{t-i} + \sum_{i=0}^q \alpha_5 \Delta \ln(\text{LF})_{t-i} \\
& + \gamma \text{ECT}_{t-1} + \mu_t
\end{aligned} \tag{3.13}$$

Where all variables are as previously defined in equation (3.11).  $\text{ECT}_{t-1}$  is the error correction term lagged by one period,  $\mu_t$  is vector of white noise error term,  $\gamma$  denotes error correction parameter that measure the speed of adjustment towards the long run equilibrium.

The  $\gamma$  shows how much of the disequilibrium is being corrected, that is, the extent to which any disequilibrium in the previous period is being adjusted. A positive coefficient indicates a divergence, while a negative coefficient indicates convergence. If the estimate of  $\gamma = 1$ , then 100% of the adjustment takes place within the period, or the adjustment is instantaneous and full, if the estimate of  $\gamma = 0.5$ , then 50% of the adjustment takes place each period. Lastly if  $\gamma = 0$ , there is no adjustment, and there is no long-run relationship.

The ECM must be negative and statistically significant to show that there is adjustment to equilibrium. The ECM is lagged by one period to show the percentage of its speed of adjustment from a shock in the previous period to equilibrium in the present period.

According to Bahmani-Oskooee and Brooks (1999) the existence of a long-term relationship derived from equation (3.11) does not necessarily imply that the estimated coefficients are stable. This suggests that there is need to perform a series of diagnostics tests on the model established to confirm the reliability and validity of the results obtained from the ECM.



### 3.5 Diagnostic tests

The ARDL model tries to find the best linear unbiased estimator (BLUE) and thereby diagnostic tests need to be conducted. The tests will ensure that the results are statistically valid by utilising tests for serial correlation, heteroscedasticity, misspecification (RESET) and normality in the residuals.

#### 3.5.1 Normality test

There are several methods of assessing whether data are normally distributed or not. They fall into two broad categories that is graphical and statistical. The common techniques for normality tests are histogram of residuals normal probability plot, Cumulative frequency plots, Jarque-Bera test, Shapiro-Wilks test, Kolmogorov-Smirnov test, Anderson–Darling and Jarque–Bera tests. The Jarque–Bera test for normality is employed in this study.

The Jarque - Bera test is a test based on OLS residuals which is mostly used and it's efficient in different sample test (Jarque & Bera 1987). First, it requires calculating the Skewness and Kurtosis and then measures the OLS residuals.

In the Jarque-Bera test, we set the null and alternative hypothesis as follows:

$H_0$ : The variable is normally distributed.

$H_1$ : The variable is not normally distributed.

The test statistic is

$$JB = \frac{N - k}{6} \left[ S^2 + \frac{(K - 3)^2}{4} \right] \quad (3.14)$$

where N is the number of observations, k is the number of estimated parameters, S is the skewness of a variable, and K is the kurtosis of a variable. Under the null hypotheses where the residuals are normally distributed, if the p-value of the statistics is sufficiently low or lower or equal to the level of significance, then it will be rejected. But if the p-value is found to be reasonably higher, then the normality assumption will not be rejected. In other words, the normality assumption is not rejected mostly when the value of the statistic is close to

zero. The Jarque–Bera test statistic follows the chi square distribution with two degrees of freedom (Jarque & Bera 1987).

### 3.5.2 Heteroscedasticity test

Heteroscedasticity results from a sequence of random variables having different variances. It implies that during regression analysis there is non-consistent variance. Heteroscedasticity is tested using the Lagrange multiplier, also known as Engle’s Arch LM test (Engle, 1982). The test procedure is as follows:

$H_0$ : There is no heteroscedasticity.

$H_1$ : There is heteroscedasticity.

The test statistic is

$$LM_e = nR^2 \tag{3.15}$$

Where  $n$  is the number of observations, and  $R^2$  is the coefficient of determination of the augmented residual regression.

We reject the null hypothesis if the p-value  $\leq$  level of significance and conclude that there is heteroscedasticity.

### 3.5.3 Serial correlation test

Serial Correlation is a correlation among members of the series of error terms ordered in time. It is mainly caused by incorrect functional forms, auto regressions, manipulation of data, data transformation and non-stationarity of the data (Wooldridge, 2009: 274). There are several causes of autocorrelation. These include omitted explanatory variables, misspecification of the mathematical form of the model, interpolation in the statistical observation and misspecification of the true error term.

The problem of serial correlation can be detected using the graphical method, Geary test, Ljung-Box test, Durbin - Watson  $d$  test and Breusch–Godfrey (BG) test. In this study, the Breusch–Godfrey (BG) test is used for testing the hypothesis of lack of first order autocorrelation in the disturbance term. The BG test is a Lagrange multiplier test that resolves

the drawbacks of other methods like the DW test (Wooldridge, 2009: 386). The BG test was chosen because it gives conclusive results and is applicable when a lagged dependent variable is used. The BG test can also take into account higher order of autocorrelation.

#### **3.5.4 Misspecification test.**

Misspecification is the result of incorrect functional form, inclusion of irrelevant variables and/or exclusion of relevant variables. Regression specification error test (RESET) suggested by Ramsey (1969) is used to test specification error in regression in this study. The importance of this procedure is that besides its ease of use, RESET is found to be robust to non-linearity, heteroscedasticity and autocorrelation problems. In order to perform the RESET, an auxiliary regression, whereby the residuals on the vector of variables in the original regression is regressed on other variables is used.

### **3.6 Conclusion**

The objective of this chapter was to specify the economic growth model along with the independent variables, while the ADF and PP unit root tests will be used to assess the stationarity of the variables under study. The long run relationship, among the variables, will be determined using the bounds testing procedure. Lastly the diagnostic tests to be applied are also covered which includes serial correlation, heteroscedasticity, misspecification (RESET) and normality in the residuals. The following chapter analyses the specified models.

## CHAPTER 4

### PRESENTATION AND DISCUSSION OF RESULTS

#### 4.1 Introduction

This chapter presents the results of the empirical analysis of the trade model developed in the previous chapter. ARDL bounds test method were employed to statistically test the dynamic effects of trade liberalisation on economic growth of Zimbabwe. The next section provides the descriptive analysis of variables used in the trade model. This is followed by the section that presents the preliminary results. The empirical results using the autoregressive distributive lag (ARDL) bounds test of the time series data concludes the section.

#### 4.2 Descriptive Analysis

Descriptive analysis was carried out at levels, that is, before the variables were transformed into logs. The variables used are RGDP (Real gross domestic product); OPEN (Trade openness ((exports plus imports)/GDP)); FDI (Foreign direct investment); GVT (Government expenditure); INF (Inflation rate) and LF (Labour force). The study adopts annual data, spanning over the period 1980 to 2017. Table 4.1 presents the mean, median, maximum and minimum values, standard deviation, skewness and kurtosis for the variables used in this study.

The average trade openness over the years is 65.97364 with a maximum value of 109.5220 and a minimum value of 35.91700. Economic growth (RGDP) has an average of 8108.308 with a maximum of 15330.00 and a minimum of 4280.000. Notably, all variables are positively skewed except government expenditure (GVT). Regarding kurtosis only the variables LF and OPEN are less than 3, implying that the observations are fat or short-tailed in distribution while the rest are greater than 3 implying a slim or long tailed distribution.

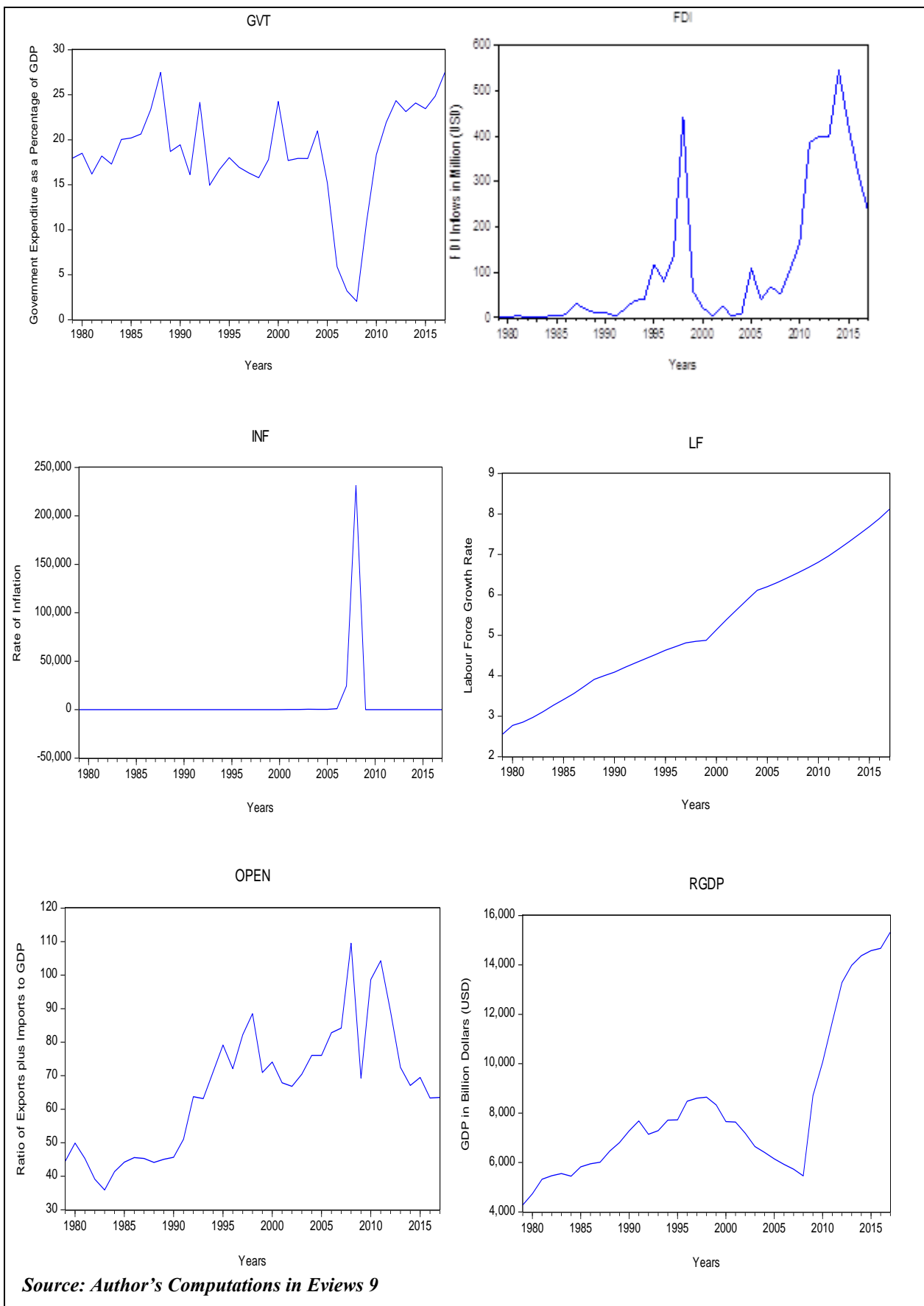
**Table 4.1: Descriptive Statistics**

	<b>FDI</b>	<b>GVT</b>	<b>INF</b>	<b>LF</b>	<b>OPEN</b>	<b>RGDP</b>
Mean	111.4359	18.42387	6625.187	5.160410	65.97364	8108.308
Median	38.00000	18.19400	18.74000	4.851000	67.89800	7281.000
Maximum	545.0000	27.54000	231150.0	8.123000	109.5220	15330.00
Minimum	0.000000	2.047000	-1.600000	2.550000	35.91700	4280.000
Std. Dev.	155.7531	5.641377	37104.40	1.605293	18.67250	3072.851
Skewness	1.452396	-1.109121	5.904590	0.166303	0.308234	1.196492
Kurtosis	3.704606	4.684841	36.21445	1.875702	2.476280	3.246233
Jarque-Bera	14.51821	12.60884	2019.317	2.233843	1.063262	9.403878
Probability	0.000704	0.001828	0.000000	0.327286	0.587646	0.009078
Sum	4346.000	718.5310	258382.3	201.2560	2572.972	316224.0
Sum Sq. Dev.	921843.6	1209.355	5.23E+10	97.92470	13249.16	3.59E+08
Observations	39	39	39	39	39	39

*Source: Author's Computations in Eviews 9*

A graphical representation of variables is presented in Figure 4.1.

**Figure 4.1: Descriptive analysis by graphs**



*Source: Author's Computations in Eviews 9*

Figure 4.1 shows a sharp increase in FDI after 1995 which drastically declined towards zero after 2000. The increase was revived after 2009, however, in 2015, it was declining until 2017. This can be explained by different policies which would attract or push investors out of the country. Government expenditure (GVT) was fluctuating but reached its minimum in 2008, during the hyperinflationary period. Since then, there has been a continuous rise in government expenditure. Inflation (INF) has been on a constant trend but took a sharp increase in 2008 before it was stabilised in 2009, this can be attributed to the dollarization strategy. Labour force (LF) was constantly increasing from 1980 to 2017. This was maybe as a result of an increase in the population of working age, a rise in the labour force participation rate or a combination of the two. The working population may increase due to a rise in the birth rate, a fall in the death rate or net immigration.

Trade openness (OPEN) shows an inconsistent trend with both sharp downturns and upturns. The minimum value was recorded in 1983 while the maximum value was recorded in 2007 before a sudden downturn in 2008. This was attributed to the fluctuations of economic indicators in Zimbabwe such as GDP, imports, exports, inflation rate and exchange rate. These were caused by droughts, structural adjustment programs, government policies among other factors. In 2017, the trend was declining. Generally, the economy was growing steadily as reflected by the RGDP trend from 1980 to 1997. In 1998 it started to decline until 2008, thereafter, it increased again.

### **4.3 Multicollinearity Test**

The results of the pairwise matrix in Table 4.2 show little evidence of multicollinearity using Gujarati's (2003:341) "classic" approach. According to Gujarati (2003:341), existence of a low pairwise coefficients that is not in excess of 0.8, shows that there is no high multicollinearity. Therefore, there is no problem of multicollinearity as presented in Table 4.2.

**Table 4.2: Multicollinearity Results**

	<b>FDI</b>	<b>GVT</b>	<b>INF</b>	<b>LF</b>	<b>OPEN</b>
<b>FDI</b>	1.000000	0.305047	-0.068169	0.685280	0.463838
<b>GVT</b>	0.305047	1.000000	-0.524372	0.035173	-0.337255
<b>INF</b>	-0.068169	-0.524372	1.000000	0.155745	0.400177
<b>LF</b>	0.685280	0.035173	0.155745	1.000000	0.689170
<b>OPEN</b>	0.463838	-0.337255	0.400177	0.689170	1.000000

Source: Author's Computations in Eviews 9

#### 4.4 Non-Stationarity Tests

The results for the non-stationarity tests are reported in Table 4.3. The data used were transformed into the natural log form. To determine the order of integration of the variables, the ADF (Augmented Dickey-Fuller) test complemented with the PP (Phillips-Perron) test in which the null hypothesis,  $H_0:\beta=0$  (that is,  $\beta$  has a unit root) and the alternative hypothesis,  $H_1:\beta<0$  were implemented.

The stationarity tests were performed first in levels and then in first difference to establish the presence of unit roots and the order of integration of all the variables. The results of the ADF and PP stationarity tests for each variable show that both tests fail to reject the presence of unit root for all the variables in level, indicating that these variables are non-stationary at levels. The first difference results show that these variables are stationary at 1 percent level of significance thus integrated of order one I (1). The  $\sim I(1)$  order of integration revealed by these results implies the need to test for cointegration. Therefore, the study tests for cointegration using bounds test.



**Table 4.3: Unit Root Test Stationarity Results<sup>#</sup>**

	ADF	PP		ADF	PP	
Variable	In levels ~ I(0)		Decision	First Difference ~ I(1)		Decision
LFDI	-1.971 (0.298)	-1.854 (0.350)	Non- stationary	-7.656*** (0.000)	-7.655*** (0.000)	Stationary
LGVT	-2.993 (0.045)	-2.411 (0.145)	Non- stationary	-5.081*** (0.000)	-5.627*** (0.000)	Stationary
LINF	-2.546 (0.114)	-2.590 (0.105)	Non- stationary	-5.855*** (0.000)	-6.662*** (0.000)	Stationary
LLF	-1.411 (0.566)	-2.973 (0.047)	Non- stationary	-4.899*** (0.000)	-4.861*** (0.000)	Stationary
LOPEN	-1.779 (0.385)	-1.664 (0.441)	Non- stationary	-7.966*** (0.000)	-8.001*** (0.000)	Stationary
LRGDP	-0.470 (0.887)	-0.868 (0.788)	Non- stationary	-4.417*** (0.001)	-4.486*** (0.001)	Stationary

\*\*\*]level of significance at 1%; figures in parentheses indicates p-values.

<sup>#</sup>test equation with intercept and no trend

Test critical values: ADF [1%: -3.627; -3.621; -3.646; -3.621; -3.621; -3.621] PP [1%: -3.627; -3.621; -3.646; -3.621; -3.621; -3.621]

Source: Author's Computations in Eviews 9

## 4.5 The Long run relationships and the Short run dynamics

### 4.5.1 ARDL Cointegration Test Results

The first step in the ARDL bounds testing approach is to estimate long run equation (3.12) by ordinary least squares in order to test for the existence of a long run relationship among the variables. This is done by performing an F-test for the joint significance of the coefficients of the lagged levels of variables. The lag length of one (1) was selected based on the Akaike Information Criteria (AIC) and the Swartz Information Criteria (SIC). The results of the cointegration test, based on the ARDL bound testing approach, are presented in Table 4.4.

Cointegration is tested on model where all the variables are in logarithms. The results show that the F-statistic is higher than the upper bound critical value at the 5 percent level of

significance using restricted intercept and no trend in specification for the model. Although the F-value lies below the lower bound at 1 percent level of significance, this study uses 5 percent to allow for more degrees of freedom. This implies that the trade liberalisation, the other control variables and RGDP are bound by a long run relationship in Zimbabwe, which means that the variables included in the model share long-run relationships. This leads to the estimation of an Error Correction Model (ECM) to find the speed of adjustment back to the long-run equilibrium.

**Table 4.4: ARDL Cointegration Results<sup>#</sup>**

<b>Wald Test:</b>			
<b>Equation: LRGDP(-1), LFDI(-1), LGVT(-1), LINF(-1), LLF(-1), LOPEN(-1)</b>			
Test Statistic	Value	df	Probability
F-statistic	4.713647	(6, 20)	0.0044
Chi-square	13.28188	6	0.0388
Critical Value Bounds	1%	5%	10%
Lower Bound	4.94	3.62	3.02
Upper Bound	5.58	4.16	3.51

<sup>#</sup>test equation with intercept only

Source: Author's Computations in Eviews 9.

Table 4.5 presents the long run coefficients of the ARDL model. Foreign direct investment, inflation rate and trade liberalisation have long run impact on economic growth. Inflation rate and foreign direct investment are significant at 5 percent level while trade liberalisation is significant at 1 percent. Trade liberalisation and foreign direct investment increase economic growth in the long run while inflation reduces economic growth. Other variables are statistically insignificant, which means that they do not affect economic growth in the long run.

**Table 4.5: ARDL Long Run Regression Results**


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Dependent Variable: D(LRGDP)

Method: Least Squares

Date: 08/14/18 Time: 11:52

Sample (adjusted): 1982 2014

Included observations: 33 after adjustments

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<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>
C	0.009	0.025	0.354
LRGDP(-1)	0.179	0.219	0.818
LFDI(-1)	0.039**	0.021	1.846
LGVT(-1)	-0.068	0.101	-0.674
LINF(-1)	-0.029**	0.016	-1.787
LLF(-1)	-0.178	0.176	-1.015
LOPEN(-1)	0.369***	0.176	2.074

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<i>R-squared</i>	<i>0.567</i>	<i>Mean dependent var</i>	<i>0.013</i>
<i>Adjusted R-squared</i>	<i>0.538</i>	<i>S.D. dependent var</i>	<i>0.043</i>
<i>S.E. of regression</i>	<i>0.036</i>	<i>Akaike info criterion</i>	<i>-3.525</i>
<i>Sum squared resid</i>	<i>0.026</i>	<i>Schwarz criterion</i>	<i>-2.935</i>
<i>Log likelihood</i>	<i>71.163</i>	<i>Hannan-Quinn criter.</i>	<i>-3.327</i>
<i>F-statistic</i>	<i>2.186</i>	<i>Durbin-Watson stat</i>	<i>2.442</i>
<i>Prob(F-statistic)</i>	<i>0.009</i>		

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Source: Author's Computations in Eviews: 9

\*\* Denotes significance at 5%, \*\*\* Denotes significance at 1%

#### 4.5.2 Error correction mechanism result

Table 4.6 presents the error correction estimation for the ARDL model. The coefficient of the ECM variable is found to be negative and statistically significant at 5 percent level confirming the existence of long run relationship among variables. The coefficient of ECM for the cointegrating equation with D(LRGDP) as the dependant variable shows a low speed

adjustment back to equilibrium position, with about 17 percent of disequilibrium in the previous year returning to the long run equilibrium in the current year. This result is consistent with Tahir and Azid (2015), who used industrial output as a ratio of GDP as a new measure of trade openness in fifty developing countries.

Considering short run coefficients, foreign direct investment, inflation and trade openness are statistically significant at 5 percent level having expected signs. All other variables are both statistically and economically insignificant. The short run coefficient for trade openness shows a significantly positive impact on the real GDP at 5 percent level of significance. A percentage increase in trade openness increases economic growth by 33.29 percent. This result concurs with Nduka (2013) and Gwaendepi et. al., (2014) who established a positive relationship between trade liberalisation and economic growth. This shows the importance of reduction in barriers to trade since this can help a country to cheaply import productive capital goods thus enabling more production and economic growth.

Inflation has a negative relationship with economic growth. A percentage increase in inflation rate results in 2.42 percent decline in economic growth. This shows the importance of controlling inflation. The short run coefficient of inflation is statistically significant at 5 percent and has the expected sign. In fact, the impact of inflation on economic growth is usually inconclusive, as some found positive while others found negative. When inflation level is lower and moderate it usually work as an incentive for producers and hence important to boost production. However, higher level of inflation is an important factor for consumption and production which makes the sustainability of economic growth questionable. It is important to note that during the period under study, Zimbabwe passed through a hyperinflationary period from 2003 to 2008 and this can be the reason why the coefficient for inflation is negative. The hyperinflationary period was included to portray the actual effect of inflation during the period of study.

FDI has a positive relationship with economic growth. This is consistent with the result of Yaboah, et al., (2012) who emphasised that FDI is positively related to economic growth in most developing countries. An increase in FDI by one percent increases economic growth by 0.35 percent. In a Keynesian model, investment is the main component of aggregate demand, thus, its increment usually leads to an increase in economic growth. These results show a positive impact of FDI on economic growth in Zimbabwe.

**Table 4.6: ECM Representation of the ARDL Model**

Dependent Variable: D(LRGDP)

Method: Least Squares

Sample (adjusted): 1982 2014

Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic
C	0.022	0.020	1.092
D(LFDI(-1))	0.003**	0.002	1.912
D(LGVT(-1))	-0.010	0.078	-0.131
D(LINF(-1))	-0.024**	0.014	-1.741
D(LLF(-1))	-0.839	1.407	-0.596
D(LOPEN(-1))	0.332**	0.149	2.235
ECT(-1)	-0.170**	0.101	-1.672
<i>R-squared</i>	0.608	<i>Adjusted R-squared</i>	0.606
<i>Serial Correlation F-statistic</i>	0.476	<i>Prob. F(1,24)</i>	0.497
<i>Het Test: LM F-statistic</i>	1.172	<i>Prob. F(7,25)</i>	0.353
<i>Ramsey RESET Test F-statistic</i>	0.115	<i>Prob. F(1, 24)</i>	0.738
<i>Jarque-Bera</i>	207.944	<i>Prob.</i>	0.746

Source: Author's Computations in Eviews 9

\*\* Denotes significance at 5%

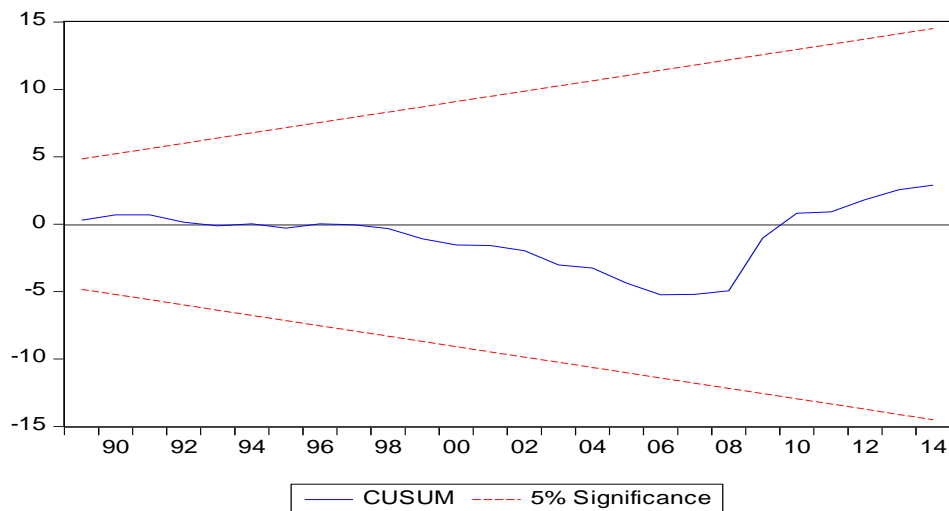
#### 4.6 Diagnostic and Stability Tests

From the diagnostic test results in the lower part of table 4.5, there is no evidence of serial correlation, heteroscedasticity, model misspecification and the errors are normally distributed in the ARDL model. All the probabilities imply that the null hypotheses cannot be rejected at 1 percent level. The serial correlation statistic is 0.476 corresponding to a probability of 0.497. Therefore, the null hypothesis that there is no autocorrelation cannot be rejected at 1 percent level of significance. In the same manner, the heteroscedasticity test statistic is 1.172 with a probability of 0.353. Having a probability greater than 0.01, the null hypothesis is not

rejected thus concluding that the variance of errors is homoscedastic. The tests for model specification and normality have calculated statistics of 0.115 and 207.944 respectively. Their probabilities are 0.738 and 0.745 respectively, hence, since these probabilities are greater than 0.01, the null hypotheses could not be rejected at 1 percent level of significance and the study therefore concludes that the model is correctly specified and errors are normally distributed.

Once the ECM model given in Table 4.5 has been estimated, the cumulative sum of recursive residuals (CUSUM) was applied to assess parameter stability (Pesaran et al. (2001). Figure 4.2 plots the results for CUSUM tests. The results indicate the absence of any instability of the coefficients because the plot of the CUSUM statistic fall within the critical bands of the 5 percent confidence interval of parameter stability.

**Figure 4.2: Stability Test Results**



Source: Author's Computations in Eviews 9

#### 4.7 Conclusion

This chapter reported on the econometric estimation conducted and provided a discussion of the empirical findings of the study. The estimated results were obtained by using the ARDL bounds testing approach to estimate long run and short-run relationships between economic

growth and trade liberalisation and other variables. The bounds test technique suggested a long run relationship among trade openness, FDI and inflation rate which were found to be significant at 5 percent level in the short run. All other variables had no effect on economic growth in the short run; their coefficients were insignificant and with unexpected signs. Furthermore, considering the long run coefficients foreign direct investment, inflation rate and trade openness were found to be significant. The speed of adjustment towards the equilibrium was found to be 16.96 percent. The next chapter affirms the findings by taking the analysis further in order to make conclusions, recommend economic policies and highlight areas for future research.

## CHAPTER 5

### CONCLUSION AND POLICY IMPLICATIONS

#### 5.1 Key Findings

This study examined the existence of a long term relationship between trade liberalisation and economic growth in Zimbabwe using time series data from 1980-2017. In order to investigate the relationship between trade liberalisation and economic growth in the Zimbabwean economy, the study included inflation rate, labour force, government expenditure and FDI as control variables. The ARDL bounds test methodology was employed and the result from co-integration analysis gives a confirmation of a long-term relationship among the variables. The result corroborates with the findings of earlier studies by Nduka (2013), Gwaendepi et al. (2014), and Tahir & Azid (2015), among others, who validated that the relationship between trade openness and economic growth is positive and statistically significant for developing countries.

Since all variables are integrated of order one and there exists a cointegrating relationship, the ECM was adopted. According to the findings, trade liberalisation is an important significant variable to determine economic growth in Zimbabwe. Its multiplier effect is significant both in the short run and long run. As an economy become more open, it is possible to coup the benefits of international trade through importing capital and intermediate goods as well as creating a bulk market for domestically produced goods and services in the international market.

Furthermore, the results show that in the short-run a negative relationship exists between inflation and economic growth in Zimbabwe. That means that an increase in inflation rate reduces economic growth and vice versa. FDI has a little positive impact on economic growth in Zimbabwe. This study therefore concludes that policy makers and government negotiators in Zimbabwe are faced with a challenge to make policies that promote trade openness through balancing of policies that reduce barriers to free trade at the same time promoting exports.



## 5.2 Policy Implications

The findings of this research gave the basis for the policy implications discussed in this study. The importance of trade liberalisation on economic growth in Zimbabwe has been underlined both in the long run and short run, hence, the government should promote and enhance openness in the international market. By doing so, the country can reap the benefits of international trade. International trade can expand markets for both services and goods that otherwise would not have been possible. International trade will bring greater competition and more competitive prices in the market. Thus, products will be available to the consumers at a much cheaper price. The re-assessment of trade barriers like embargoes, permit and licensing, constraints on export, internal taxes, variable levies, quotas and tariffs, obstructions to trade between Zimbabwe and the rest of the world should therefore be reviewed.

With the help of export incentives, modern production techniques and highly advanced transportation systems, promotion of international trade results in a strong overall economy. A number of mechanisms to boost trade liberalisations should be implemented to enable high growth rates. Mechanisms like opening for transnational corporations, outsourcing of manufacturing and services and rapid industrialisation should be instigated.

Another major implication is the negative influence of inflation on economic growth. In this case, policy makers are urged to insulate the country from such negative influences. The study also recommends suitable changes on existing policies that affect inflation rate from the monetary side and the fiscal side. Policies that enhance and support innovative production and economic performances are important. In addition, linkages between foreign and domestic firms need to be encouraged if spill over benefits are to be experienced.

In the same manner, to attain a sustainable economic growth the government should create a conducive business environment which is vital for attracting FDI. This is achieved by stabilising the economy through controlling critical factors such as inflation, which have significant contribution towards enlarging investment and finally economic growth.

This study therefore concludes that international trade policies must be an integral part of individual Zimbabwe's development policies. As such, they need to be interrelated to fiscal policy, monetary policy, tax policies, industrial policy, foreign policy and education policy. Policy makers need to be aware of the role of human capital development, knowledge spillovers, technological progress and FDI in promoting international trade and economic growth in developing countries like Zimbabwe.

### **5.3 Limitations of the study and Areas for Further Research**

While this study examined the relationship between trade liberalisation and economic growth, further areas of study are highlighted for future research. The relationship between trade liberalisation and growth is not a onetime study but it is continuous and it is important to observe the dynamics in the relationship between the two macro-economic variables. By doing so, it is possible to foresee the path of the two variables in the long run so that corrections can be made before occurrence of shocks. In further studies it is also recommended to include appropriate explanatory variables that can explain well the current economic growth. Variables like real exchange rate and human capital can be used in future studies.

Furthermore, this study has focussed on trade liberalisation and economic growth in Zimbabwe. The results in this study solely relate to the Zimbabwean context which not generally comprehensive for application in other developing countries. This prompts for a study that can take a panel of developing countries in order to draw a general conclusion about developing countries. Studies can be done in southern Africa, COMESA region and or SSA.

The index used to proxy trade openness as adopted from literature takes exports plus imports and GDP in its computation. However, the openness to trade can be proxied by barriers to trade themselves. Future studies on this sector may develop a non-tariff barrier index and replicate this study using a combination of tariff and non-tariff barriers. This would present a clearer picture of the level of openness and its impact on growth in economies.

This study focused on the macro analysis of openness to trade which is remarkable and policy informative. However, a more detailed policy informative research requires a decomposition of the transmission routes of trade liberalisation by industry or sector and also examine the effect of openness in such sectors' productivity. This can give a basis for policies designed at boosting sector productivity which might shed more light on the effectiveness of infant industry protection policies which are common in developing countries especially in strategic sectors such as agriculture and the services sectors where inefficiencies are currently present.

Furthermore, the choice of variables used in the study were partly controlled by the availability of data on economic variables in Zimbabwe. Data from developing countries such

as Zimbabwe from 1980 is difficult to obtain. Some of the variables were chosen due to the availability of data from reliable sources such as the World Development Indicators (WDI) and United Nations Statistics Division (UNSD) databases. In addition, the economic data on Zimbabwe during the hyperinflation period from 2006 to 2009 was difficult to obtain. The data obtained were mostly estimates because of the higher figures and the intensity of the economic situation during that period. The researcher used those estimates to come up with the results and conclusion of the research. In future studies, a dummy variable can be used to represent structural break caused by hyperinflation during 2006 to 2009 period.

Data problems limited the extensiveness of this study. The lack of data of the study period hindered the research to a certain extent particularly with reference to newly developed trade restrictiveness indexes such as those by Anderson and Neary (1994) and Looi Kee, Nicita and Olarreaga (2009). These indexes are believed to be more accurate in analysing the issues of trade liberalisation in developing countries.

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## APPENDIX

### APPENDIX A: TABLES

**Table A4.1: Lag Selection Results**

VAR Lag Order Selection Criteria

Endogenous variables: D(LLF) D(LRGDP)

Exogenous variables: C D(LFDI) D(LGVT) D(LINF) D(LOPEN)

Date: 08/14/18 Time: 10:30

Sample: 1979 2017

Included observations: 31

Lag	LogL	LR	FPE	AIC	SC	HQ
0	190.0910	NA	3.10e-08	-11.61877	-11.15620	-11.46799
1	209.2486	29.66335*	1.18e-08*	-12.59668*	-11.94908*	-12.38558*
2	212.5925	4.746144	1.25e-08	-12.55435	-11.72171	-12.28293
3	213.6745	1.396206	1.56e-08	-12.36610	-11.34843	-12.03436

\* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

**Table A4.2: Error Correction Model Results**

Dependent Variable: D(LRGDP)

Method: Least Squares

Date: 08/14/18 Time: 11:06

Sample (adjusted): 1982 2014

Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.021631	0.019806	1.092139	0.2848
D(LFDI(-1))	0.003480	0.001820	1.912088	0.0155
D(LGVT(-1))	-0.010221	0.077906	-0.131193	0.8966
D(LINF(-1))	-0.024203	0.013901	-1.741098	0.0117
D(LLF(-1))	-0.839189	1.407036	-0.596423	0.5561
D(LOPEN(-1))	0.332892	0.148935	2.235152	0.0342
ECT(-1)	-0.169588	0.101410	-1.672300	-0.0104
R-squared	0.608272	Mean dependent var		0.013067
Adjusted R-squared	0.605565	S.D. dependent var		0.043238
S.E. of regression	0.042682	Akaike info criterion		-3.284250
Sum squared resid	0.047365	Schwarz criterion		-2.966809
Log likelihood	61.19013	Hannan-Quinn criter.		-3.177441
F-statistic	1.139926	Durbin-Watson stat		1.858353
Prob(F-statistic)	0.000643			

**Table A4.3: ARDL Long run Regression Results**

Dependent Variable: D(LRGDP)

Method: Least Squares

Date: 08/14/18 Time: 11:52

Sample (adjusted): 1982 2014

Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.008933	0.025267	0.353546	0.7268
D(LFDI(-1))	0.013480	0.001820	1.504321	0.0155
D(LGVT(-1))	-0.010221	0.077906	-0.131193	0.8966
D(LINF(-1))	-0.025603	0.018901	-1.280029	0.0117
D(LLF(-1))	-0.839189	1.407036	-0.596423	0.5561
D(LOPEN(-1))	0.332892	0.148935	2.235152	0.0342
LRGDP(-1)	0.179422	0.219307	0.818129	0.4229
LFDI(-1)	0.039626	0.025636	1.545737	0.0118
LGVT(-1)	-0.068118	0.100999	-0.674443	0.5078
LINF(-1)	-0.029387	0.019762	-1.487029	0.0115
LLF(-1)	-0.178366	0.175802	-1.014583	0.3224
LOPEN(-1)	0.368569	0.176426	2.073772	0.0093
R-squared	0.567406	Mean dependent var		0.013067
Adjusted R-squared	0.537849	S.D. dependent var		0.043238
S.E. of regression	0.035972	Akaike info criterion		-3.525031
Sum squared resid	0.025880	Schwarz criterion		-2.935498
Log likelihood	71.16301	Hannan-Quinn criter.		-3.326671
F-statistic	2.186057	Durbin-Watson stat		2.441966
Prob(F-statistic)	0.008853			



**Table A4.4: Non-linearity result: Wald test**

Wald Test:

Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	4.713647	(6, 20)	0.0844
Chi-square	13.28188	6	0.0388

Null Hypothesis:  $C(8)=C(9)=C(10)=C(11)=C(12)=C(13)=0$

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(8)	0.179422	0.219307
C(9)	0.039626	0.025636
C(10)	-0.068118	0.100999
C(11)	0.029387	0.033766
C(12)	-0.178366	0.175802
C(13)	-0.118569	0.160723

Restrictions are linear in coefficients.

**Table A4.5: LM Serial Correlation Test Results**

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.475590	Prob. F(1,24)	0.4970
Obs*R-squared	0.641230	Prob. Chi-Square(1)	0.4233

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 08/14/18 Time: 12:37

Sample: 1982 2014

Included observations: 33

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.008933	0.025267	0.353546	0.7268
D(LRGDP(-1))	-0.199032	0.421211	-0.472524	0.6408
D(LFDI(-1))	0.005878	0.020360	0.288704	0.7753
D(LGVT(-1))	0.021231	0.082194	0.258305	0.7984
D(LINF(-1))	0.008371	0.024801	0.337534	0.7386
D(LLF(-1))	-0.485048	1.604620	-0.302282	0.7650
D(LOPEN(-1))	0.007079	0.146478	0.048330	0.9619
ECT(-1)	0.038539	0.240120	0.160501	0.8738
RESID(-1)	0.396165	0.574459	0.689631	0.4970
R-squared	0.019431	Mean dependent var		3.68E-18
Adjusted R-squared	-0.307425	S.D. dependent var		0.036473
S.E. of regression	0.041704	Akaike info criterion		-3.289422
Sum squared resid	0.041742	Schwarz criterion		-2.881284
Log likelihood	63.27547	Hannan-Quinn criter.		-3.152096
F-statistic	0.059449	Durbin-Watson stat		2.032784
Prob(F-statistic)	0.999836			

**Table A4.6: Model Specification Test Results**

Ramsey RESET Test

Equation: UNTITLED

Specification: D(LRGDP) C D(LRGDP(-1)) D(LFDI(-1)) D(LGVT(-1))

D(LINF(-1)) D(LLF(-1)) D(LOPEN(-1)) ECT(-1)

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.339123	24	0.7375
F-statistic	0.115004	(1, 24)	0.7375
Likelihood ratio	0.157753	1	0.6912

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.000203	1	0.000203
Restricted SSR	0.042569	25	0.001703
Unrestricted SSR	0.042366	24	0.001765

LR test summary:

	Value	df
Restricted LogL	62.95170	25
Unrestricted LogL	63.03057	24

Unrestricted Test Equation:

Dependent Variable: D(LRGDP)

Method: Least Squares

Date: 08/14/18 Time: 12:48

Sample: 1982 2014

Included observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.010337	0.026345	0.392365	0.6983
D(LRGDP(-1))	0.577595	0.368624	1.566894	0.1302
D(LFDI(-1))	-0.000473	0.021065	-0.022452	0.9823
D(LGVT(-1))	-0.001551	0.088297	-0.017563	0.9861
D(LINF(-1))	-0.003378	0.022681	-0.148917	0.8829
D(LLF(-1))	-0.372246	1.638660	-0.227165	0.8222
D(LOPEN(-1))	0.406722	0.212486	1.914114	0.0676
ECT(-1)	0.103223	0.243817	0.423362	0.6758
FITTED^2	-3.922497	11.56659	-0.339123	0.7375

R-squared	0.291836	Mean dependent var	0.013067
Adjusted R-squared	0.055781	S.D. dependent var	0.043238
S.E. of regression	0.042015	Akaike info criterion	-3.274580
Sum squared resid	0.042366	Schwarz criterion	-2.866442
Log likelihood	63.03057	Hannan-Quinn criter.	-3.137254
F-statistic	1.236307	Durbin-Watson stat	1.881390
Prob(F-statistic)	0.321214		

## APPENDIX B. GRAPHS

**Graph B4.1: Normality Test Results**

