AN INVESTIGATION OF THE RELATIONSHIP BETWEEN TRADE OPENNESS AND ECONOMIC GROWTH IN NAMIBIA

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ABSTRACT

The study investigated the relationship between trade openness and economic growth for Namibia using annual time series data over the period 1980 to 2011. The variables used include GDP per capita, labour force, capital formation, trade openness and real exchange rate. This study employed time series techniques such as unit root, co-integration, Granger-causality, impulse response function and forecast error variance decomposition. The Johansen co-integration analysis and Vector Auto-regression Model (VAR) are used in estimating the long run relationship between trade openness and economic growth. There was co-integration of variables for trade openness and economic growth. The results found a positive long run relationship between the variables. The Granger-causality showed no causation from trade openness and economic growth. The findings suggest that effective policies that promote labour-intensive industrial sectors would boost trade for economic growth in Namibia. Therefore, promoting trade in various avenues can enhance economic growth in Namibia.

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DEDICATION

This thesis is dedicated to my lovely family, my husband, Chinemba and my sons, Kuwunda and Luyando. You are my source of inspiration.

DECLARATION

I, Florence Moono Samundengu, hereby declare that this study is a true reflection of my own research, and that this work, or part thereof has not been submitted for a degree in any other institution of higher education.

…… Date……

Florence Moono Samundengu

Acronyms

ACP	African, Caribbean and Pacific Countries
ADF	Augmented Dickey-Fuller
AGOA	African Growth and Opportunity Act
AR	Auto-Regressive
ARDL	Autoregressive Distributive Lag
BLNS	Botswana, Lesotho, Namibia, South African and Swaziland
BoP	Balance of Payments
CET	Common External Tariff
CMA	Common Monetary Area
CMEA	Council for Mutual Economic Assistance
ECM	Error Correction Model
ECOWAS	Economic Community of West African States
EEC	European Economic Community
EFT	European Free Trade Association

EPA	Economic Partnership Agreement
EPZ-	Export Processing Zone
EU-	European Union
FDI	Foreign Direct Investment
FEVD	Forecast Error Variance Decomposition
FMOLS	Fully Modified Ordinary Least Squares
FTA	Free Trade Agreement
GDP	Gross Domestic Product
GIRF	Generalized Impulse Response Function
GNP	Gross National Product
GRN	Republic of Namibia
IMF	International Monetary Fund
IV	Instrument-Variable
KPSS	Kwaiatkowski-Phillips-Schmidt-Shin
LDCs	Less-Developed Countries
MERCOSUR	Common Market of the South

MFN	Most Favored Nation
MTI	Ministry of Trade and Industry
NDP	National Development Plan
NPT	Namibia Press and Tools International
OLS	Ordinary Least Squares
PP	Phillips-Perron
PPP	Purchasing Power Parity
Q1	Quarter 1
Q4	Quarter 4
RISDP	Regional Indicative Strategic Development
SAARC	South Asian Association for Regional Co-operation
SACU	Southern African Customs Union
SADC	Southern African Development
SIPO	Strategic Indicative Plan for the Organ
SMEs	Small Medium Enterprises

SPS	Sanitary and Phytosanitary
SSA	Sub-Saharan Africa
TEs	Transitional Economies
TIPEEG	Targeted Intervention Program for Employment and Economic Growth
USA	United States of America
USD	United States dollars
VAR	Vector-Auto Regressive
VAT	Value Added Tax
VECM	Vector Error Correction Model
WTO	World Trade Organization

CHAPTER ONE: INTRODUCTION

1.1 Background

The term “trade openness” can be defined as the world’s integration among countries. According to Osabuohien (2007), openness is likened to a situation where nations of the world join together so that they have free movement of labor, capital and free trade. Furthermore, the effect of trade is commended on that it increases competition and enhances efficiency (Ray, 2012). Trade openness is, therefore, assumed to be an important source of economic growth and can be measured in two different ways: activity-based and incentive-focused. According to Shafaeddin (2006) the activity-based approach considers indicators such as exports plus imports, to gross domestic product (GDP). The difference with the activity based approach is that trade is influenced by the export structure and the size of the country rather than trade policy. Countries exporting mainly primary goods and services, for example, Sub-Saharan African countries usually depend on trade than countries with a diversified export structure. The incentive-focused approach relates trade openness to free trade. However, in developing countries free trade is not possible when it comes to international trade markets, even when all restrictions are removed. This is because restrictions on trade through tariffs continue with developed countries. In the case of Namibia, the active-based approach appears more appropriate.

However, economic growth is defined as an increase in production and consumption of goods and services in a given year. It is measured by comparing gross national product

(GNP) of a given year with the GNP of the previous year. GNP is the value of all goods and services produced in a country including the value of imported goods and services, less exported goods and services (Dornbusch, Fischer and Startz, 2004). The principle of economic growth is assumed to be the improvement in technology, capital stock and level of literacy. Growth rate is associated with countries joining globalization through improved openness in international exchange of ideas, technology as well as goods and services. According to Osabuohien (2007), growth rate is associated with countries embracing the ongoing globalization and increasing openness to the international exchange of goods and services as well as ideas and technologies. Krugman (1979) suggests that gains from international trade are obtained by opening up for trade between two countries with differentiated products so that more variety is available to sustain improvement in living conditions in developing countries. The market forces will channel resources towards relatively productive sectors leading to a rise in efficiency, hence increasing the total production size of a trading country or increase the country's GDP.

It is in view of the above assertions that there is a positive long run relationship between openness and the rate of growth as suggested by the growth theories, while higher level of output is obtained through greater openness yield gains to countries mostly in terms of economic performance according to the static allocative efficiency gains theory (Eboreine & Iyoko, 2009). Thus, expansion of market size by the domestic exporters as

suggested by the new growth theory would result in a higher long run growth rate even though no positive link was predicted by this theory as increases in openness can eventually lower growth due to increases in competition. According to Dobre (2008), there are some important routes to strengthen productivity through openness to trade such as:

(a) Efficient allocation of resources; trade allows countries to specialise in the production of goods and services which is cheaper in its raw material/production or has comparative advantage by exchanging their surplus production with that of other countries different surplus production.

(b) Economies of scale; without trade, economies of scale are limited by the domestic market size. Trade allows firms and industries to produce more efficiently. Trade enhances firms' innovativeness so that a high producing firm expands its exports as well as its domestic market. This eventually boosts the whole economy's productivity.

(c) Trade can provide access to new technology through goods and services especially where countries have taken up open trade regime leading to different stages of the production process that incorporate new technology. Trade also brings about greater competition which helps reduce monopoly by lowering prices for consumers and promoting effective competition amongst firms on the world market.

(d) Investment incentives; incentive for investment through trade can be increased by creating business opportunities through better access to export and import

> markets can improve the scope for productive investment thereby increasing foreign direct investment (FDI). FDI brings about technology and innovation improvement resulting in more efficient production and enhancing competition in world market.

Thus, trade openness to economic growth is seen as having a positive outcome. In other words, trade openness improves integration of human societies through economic activities around the globe. There is a danger in removing or abolishing quotas overnight, this may lead to balance of payment adjustment problems. Although, developing nations mostly rely on trade restriction as a measure to protect domestic industry and control, their balance of payment eventually distorts their resource allocation to domestic industry and restrict trade.

There are dynamic effects that are achieved from exposure to imports and exports in terms of openness. Openness to trade provides structural changes in a given country and has the potential of reducing poverty to millions of people by allocating domestic resources in the production for sale or exporting to international markets which has insufficient domestic demand and can import products that are more expensive to be produced locally (Salvatore, 2007). Exports can be defined as goods and services domestically produced for sale to foreign consumers while imports are the buying of foreign goods and services to be consumed locally (Dornbuch, Fisher and Startz, 2004). Exports and imports of commercial goods in the past involved strict customs

regulations, but nowadays, due to trade agreements between countries, only small exports and imports are still applicable to legal restrictions. Trade is not only about export and import, it provides employment opportunities, FDI, which impacts technological advancement for economic development (Yeboah, Naanwaab, Saleem & Akuffo, 2012). According to Yeboah et al. (2012), reduction in trade barriers in Europe has boosted the economic performance due to the creation of a single market.

Trade protection is the major problem despite positive benefit of openness to trade. Over the last half a century, barriers to trade have dropped although some sectors and products are still highly protected. Namibia and United States have a trade agreement which showed that Namibia was 117th largest goods trading partner of the US. Exports plus imports amounted to $574 million in 2011. The exported goods to the US amounted to $137 million in 2011, up by 23.6% from 2010 ranked as 142nd largest goods exporter. In 2011 Namibia was ranked 97th largest importer from the US, which totaled $436 million, up by 123.6% from 2010 (United States Trade Representative, n.d.). The balance of trade of a country is improved when the currency is devalued, which means that volumes of exports increase while a reduction in imports would be recorded because they have become more expensive. The exchange rate influences how productive resources are allocated between tradable and non-tradable goods and services. As such conclusion, the external competitiveness of a nation and position of balance of payments (BoP) is determined by the exchange rate.

The endogenous growth approach found that trade policy has an impact on both the level of income and the long-run rate of growth of an economy through scale, allocation, spillover, and redundancy effects. On the other hand neither the opening up of trade nor different patterns specialisation can affect the rate of growth, but are determined only by comparative advantage in the neoclassical approach (Matadeen, Matadeen & Seetanah, 2011). Some studies concluded that openness played an effective role in developed countries, whereas many studies also concluded openness can play a significant role in developing countries.

In 2010 Namibia's gross domestic product (GDP) was US$ 12.2 billion. GDP per capita income was measured using purchasing power parity (PPP) was US$ 6,323. The Gini Co-efficient was 0.63 (UNDP, 2011). With regards to trade openness and economic growth in Namibia, it appears little has been done in the area of relating trade openness and economic growth studies. It is against this background that the proposed study would like to narrow the gap in the available literature of trade openness and economic growth and recommend policy actions which may be considered by the Ministry of Trade and Industry (MTI).

1.2 Statement of the problem

A number of studies have been done on trade openness and economic growth over the years in developing countries (Rodriguez, 2006, Osabuohien, 2007, Sarkar, 2007 and

Ahmadi and Mohebbi, 2012). In the case of Namibia, Eita and Jordan (2007) and Nashiidi and Ogbokor (2013) investigated only the export-led growth in Namibia. Unlike other previous studies, this study goes further to investigate the question of how strong the correlation between openness and economic growth is and whether international trade is able to ensure improvement in the living conditions of its citizens. The latest Labour Force Survey (2012) indicated that unemployment rate was at 27.4%. Through the Industrial Policy statement, the government of Namibia introduced a programme called Targeted Intervention Program for Employment and Economic Growth (TIPEEG) in order to fight unemployment by increasing total factor production, improve trade and enhance the competitiveness of the economy (Ministry of Industry, 2012). The findings of this study seek to provide a better understanding of the relationship between openness and economic growth.

1.3 Objective of the study

The broad objective is to examine the relationship between trade openness and economic growth in Namibia.

- The specific objective is to examine the causal relationship between trade openness and economic growth.
- Based on the derived results, policy recommendations will be made.

1.4 Hypothesis of the study

The research hypotheses to be tested are listed as follows:

H_0: There is no relationship between trade openness and economic growth in Namibia.

H_1: There is relationship between trade openness and economic growth in Namibia.

1.5 Significance of the Study

The study is expected to highlight the importance of trade openness and economic growth in Namibia and areas in which policymakers can improve in order to enhance economic growth in Namibia. The study will also benefit other organisations (local and international) looking for areas of investment which would have a high likelihood of increasing the country's GDP and so addressing economic problems such as unemployment and poverty.

1.6 Limitations of the Study

The research will utilise secondary data. As such methodological limitations of omitted variable bias are foreseen such as stake holders' views on international trade and economic growth will not be collected. The other limitation is the time factor, that is, the time given to complete the research poses a challenge.

1.7 Organisation of the Study

The study is organised as follows: Chapter 2 focuses on Namibia's economic structure. Chapter 3 analyses the literature review both theoretical and empirical literature. Chapter 4 covers the methodology used in the study. Chapter 5 reveals the empirical results. Lastly, chapter 6 provides conclusions and recommendations.

CHAPTER TWO

NAMIBIA'S ECONOMIC STRUCTURE AND ITS TRADE REGIME

2.1 Introduction

The purpose of this chapter is to provide an overview of Namibia's trade and economic structure. The chapter is organized as follows: section 2.2 reviews Namibia's economic structure, section 2.3 reviews the import and export market and section 2.4 reviews investment incentives. Section 2.5 reviews its trade regime, Section 2.6 reviews the trade policies and Section 2.7 reviews the industrial policies, whilst Section 2.8 concludes the chapter.

2.2. Namibia's economic structure

The World Bank and the IMF classified Namibia as a middle-income developing country. According to the Namibia Statistics Agency (2012), Namibia has an estimated household population of 2 066 398 and a Gini- coefficient of 0,597. It is still among nations with the highest income inequality, with economic growth of 4.5% in 2011 compared to 4.6% in 2012 (BoN, 2012).

On the monetary side, the Namibian currency is pegged at the same rate with the neighbouring South Africa's currency, an economy 40 times larger (Sherborne, 2009). This means that policy makers in South Africa determine important economic variables such as prices, interest rates and exchange rates. In addition, Namibia is a resource-

based economy because primary industries contribute more to GDP than secondary industries. The primary industries comprise agriculture, fishing and mining. Global growth was estimated at 3.9% in 2011 and eased to 3.2% in 2012.

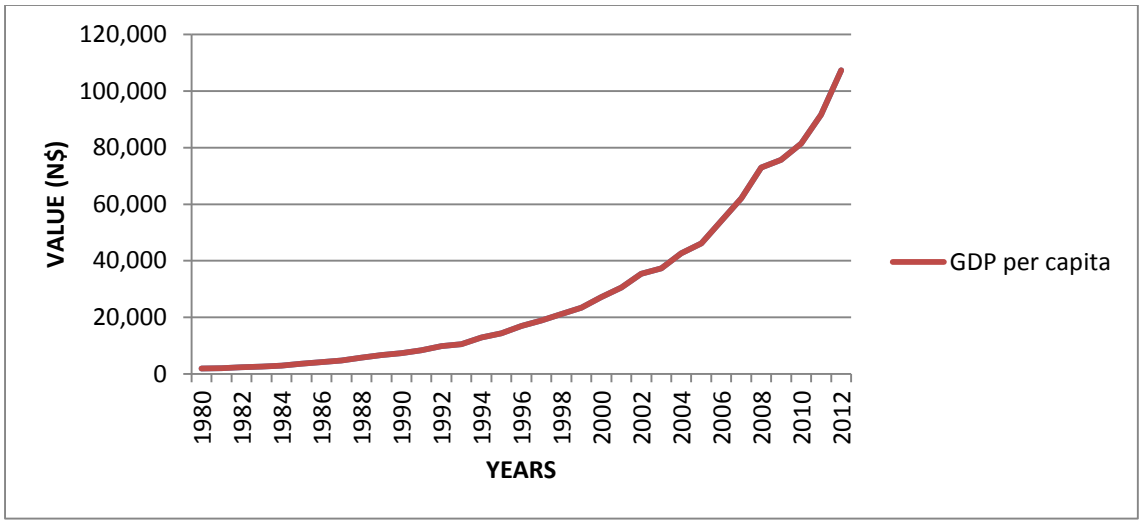

Figure 2.1. GDP per capital growth rate. Reprinted from National Planning Commission-Central Bureau of Statistics (2013).

Figure 2.1 above shows GDP per capita growth from 1980 to 2012 using data obtained from the World Bank. The World Bank (2013) states that Namibia has experienced a steady GDP growth, moderate inflation, limited public debt and steady export earnings despite a GDP growth decline in 2009. In 2009 GDP growth declined by 1% due to the decline in external demand for minerals. The GDP measures the national income and output for a given economy of a country and is equal to the total expenditures of all final goods and services produced at a given period of time within the country. It is accepted that countries with good export performance also do well in their Gross Domestic Product (GDP) performance and vice versa (Jordaan & Eita, 2007).

Historically, Namibia's GDP from 1980 to 2011 averaged 4.3 billion USD reaching a high of 12.3 billion USD in December of 2011 and slowed down in December of 1985 with 1.4 billion USD due to a global crisis. Namibia's GDP value represents 0.02% of the world economy (World Bank, 2012).

The prudent management of fisheries resources has led to significant contributions to GDP and to foreign exchange earnings of the fishing sector. A decade before independence (1980-1989), there was rampant illegal fishing and overfishing in Namibia's Zone of the Atlantic Ocean (Odada & Matundu, 2008). At independence in 1990 the government of the Republic of Namibia (GRN) had to deal with the fishing industry by finding ways of restoring a totally depleted fish stock, by establishing a Ministry of Fisheries and Marine Resources, which introduced fishing quotas to allocate fish catch to Namibian fishing companies so as to minimize the over-fishing problem. The fishing sector then increased significantly with an annual contribution of foreign exchange earnings of 18.2%, while the mining industry contributes 37.6% to foreign exchange earnings and service sector contributes 19.8% (Odada and Matundu, 2008).

The global economic crisis of 2008/09 demonstrated the vulnerability of the Namibian economy to external shocks that led to the slowdown of Namibia's mining sector and hence economic construction of 2009. Overall, inflation rate has been of single digit except in 2002 and 2008. Inflation rate hit 11.3% in 2002 due to depreciation of the South African Rand to which Namibian Dollar is pegged, causing higher importation of inflation while the 2008 rate was attributed to fuel and food prices global spike. By

2011 the inflation rate slowed down to 5% and increased to 6.5% in 2012 due to rising inflation on food and transport (BoN, 2012).

When it comes to trade and structure of trade in Namibia, according to Bank of Namibia's annual report (2012), the economic slowdown in advanced economies adversely affects growth in developing economies because of reduction in their export external demands.

2.3 Import and export market

The Namibian economy is not well diversified as it is concentrated in primary sector activities namely the extraction and processing of minerals, commercial livestock farming and fishing. This makes Namibia vulnerable to short and long-term environmental shocks (World Bank, 2013). According to trade information obtained from the Trading Economic (2013), Namibia imports are concentrated on machinery which include electrical equipment, vehicles, transport equipment, petroleum products and fuel, chemicals, metals and food beverages. The top traditional trade partner is South Africa. This is because of the close historical links between the two nations. Namibia's imports that come from neighboring South Africa, the major import partner, represents 66% of Namibia's imports. South Africa is followed by the Netherlands, United Kingdom and China.

When it comes to exports, Namibia's main export is diamond (25% of total exports). Other exports include uranium, lead, zinc, tungsten, tin, fish, tourism, livestock, logistic

services, beer, beef and grapes (World Bank, 2013). Destinations for Namibian exports include South Africa, United Kingdom, United States of America, Angola, Netherlands and Spain, while exports are relatively minimal to the rest of SADC region (Trading Economic, 2013). Figure 2.2 shows Namibia's major exporting countries and Figure 2.3 presents the imports and exports statistics of Namibia.

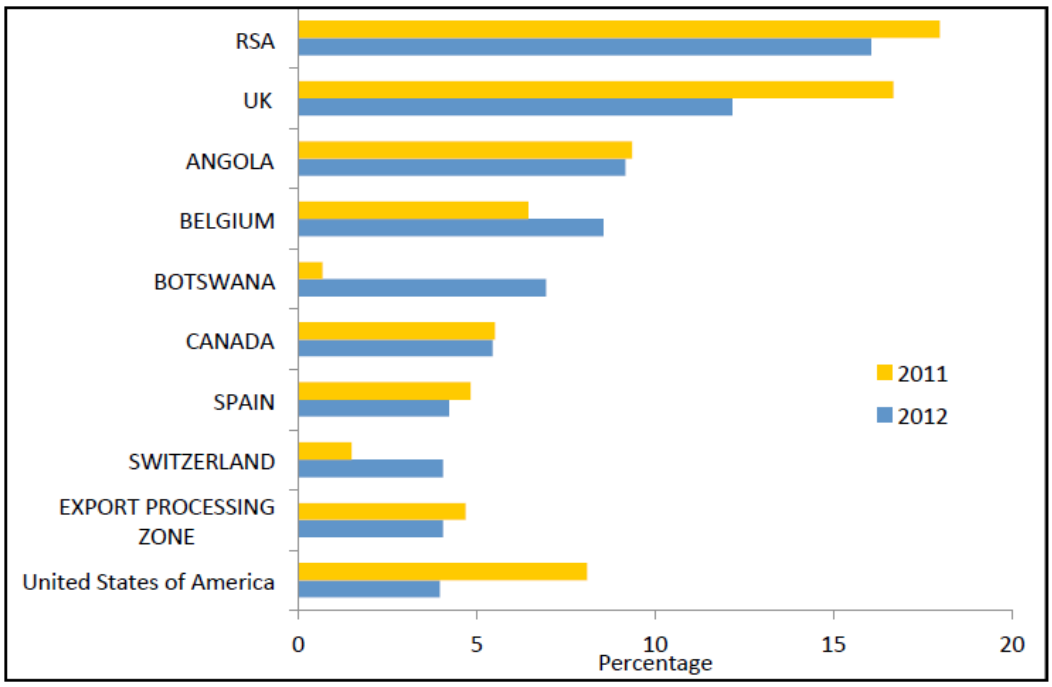

Figure 2.2. Major exporting countries of Namibia. Reprinted from the Namibia Statistical Agency (2012).

The value of Namibia's exports and imports over the period of 2004 to 2012 are shown in figure 2.3.

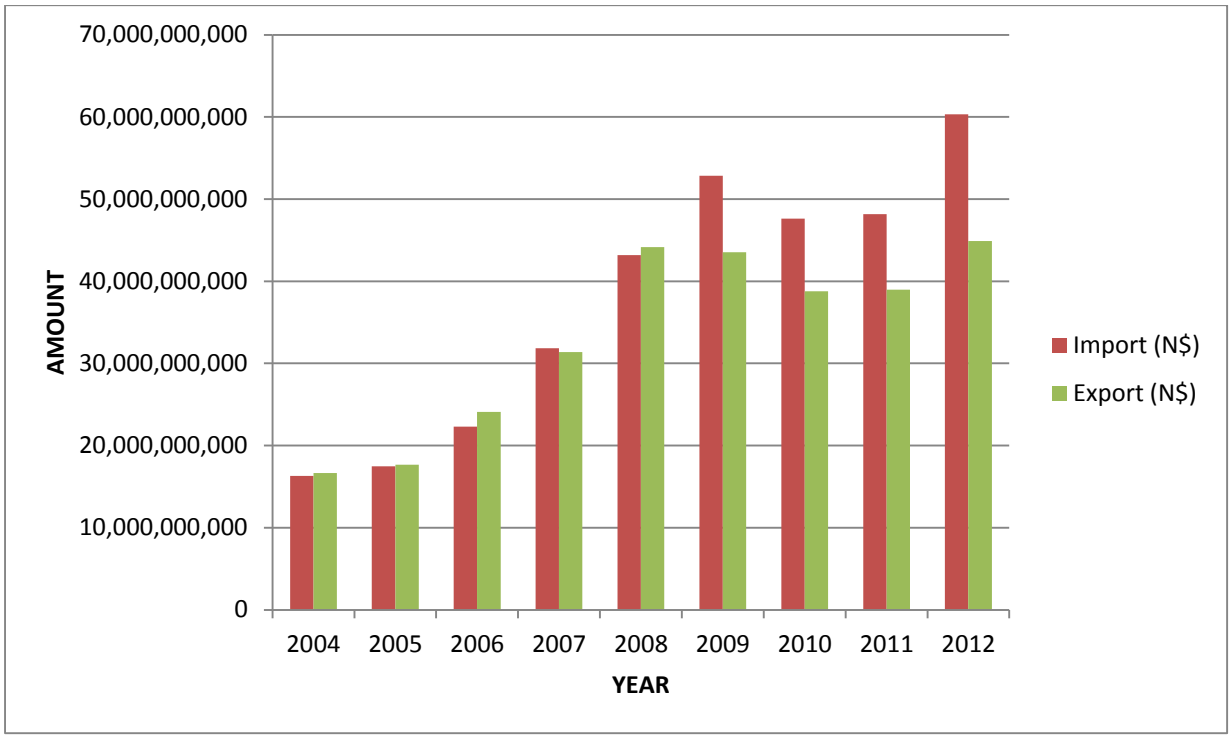

Figure 2.3.Trade statistics on import and export in Namibia. Author's compilation with data sourced from National Planning Commission-Central Bureau of Statistics (2013)

The degree of openness on average has been decreasing. Although, the world trade growth volume estimated an increase of 5.8% in 2011 to 3.2% in 2012 (BoN, 2012), more trade growth is necessary in the long run. The decrease in trade openness should be a concern for Namibia and ways to address this should be a priority. However, the government of Namibia through the Ministry of Trade and Industry has put measures in place to boost trade as outlined below.

2.4 Investment incentives

The Ministry of Trade and Industry adopted investment incentives to boost export and growth through value addition. Investment incentives are offered in Namibia and many other developing countries to attract FDI inflows. First, are the fiscal incentives which are policies that are designed to reduce tax burden of a firm (Banga, 2003). Fiscal incentives include tax concessions in the form of reduction of the standard corporate income tax rate, accelerated depreciation allowances on capital taxes, exemption from import duties on capital taxes, exemption from import duties and duty drawbacks on exports. Fiscal incentives do affect location decisions especially for export oriented FDI. Second, are the financial incentives, which involve direct contributions to the firm from the government (including direct capital subsidies or subsidised loans).

2.4.1 Export Processing Zones

The government of Namibia adopted the export processing zones (EPZs) in 1995 to mainly boost export and ultimately economic diversification. As a policy instrument (GRN, 2006). The main objectives of EPZs are to:

- Facilitate imports of raw materials and capital
- Facilitate the transfer of technical and industrial skills to the local labor force
- Contribute towards an increased share of the manufacturing sector to job creation and GDP

- Enhance the diversification of the local economy

Namibia's EPZ regime offers export oriented manufacturers a range of internationally competitive advantages. Currently, the EPZ has attracted a number of local and international interests. Some 20 companies are fully operational benefiting from the EPZ incentives. These companies are from Africa, Asia, Europe and North America (http:/www.wbepzmc.iway.na). The companies established under EPZ in Walvis Bay produce products such as automotive parts for vehicles such as VW and Audi, assembling of vehicles, clothing, diamond cutting and polishing, fishing accessories and plastic pallets and products. The major companies under EPZ are: Roach Investments, Marine Ropes International, Transvecho and Namibia Press & Tools International (NPT). The city of Walvis Bay is located strategically to reduce costs on transportation where bulk cargo is efficiently handled.

2.4.2 Tax- free regime

EPZ enterprises are exempted from corporate income tax, duties and value added tax (VAT) on machinery, equipment and raw materials imported into the country for manufacturing purposes. The only taxes paid are the income tax on employee's income as well as the 10% withholding tax (non-resident shareholders) on declared dividends. The local and international investors who meet the conditions for admission under the EPZ enjoy equal treatment and eligibility to the EPZ incentives.

2.4.3 Investment Centre and the Foreign Investments Act

The Namibian Investment Centre was established in 1992. It falls under the Ministry of Trade and Industry and serves to assist the minister in the administration of the Foreign Investments Act (GRN, 1993). The act allows foreign nationals to invest and engage in any business activity in Namibia, which any Namibian may undertake provided they comply with any formalities or requirements prescribed by any law in relation to the relevant business activity.

It is, therefore, important to have knowledge of factors which influence investment for economic planning and macroeconomic forecasting purposes. The Income Tax Act makes the following provision for incentives on manufacturing activities and the export of manufacturing goods only such as:

- 125% deduction of cost of remuneration and training of employees involved in manufacturing
- 125% deduction of export expenditure on goods manufactured in Namibia
- 125% deduction of land- based transportation costs of material and equipment to be used in a manufacturing activity
- Taxable income derived from manufacturing is taxed at 18% only for a period of 10 years

- The deduction of the erection costs of a building of 20% in the first year and 8% per annum for the next 10 years
- 80% exemption of taxable income derived from the export of manufactured goods (excluding fish and meat).

2.5 Trade regime

Namibia is a member to regional and multilateral trade arrangements and economic groupings such as: the Southern African Customs Union (SACU), Southern African Development Community (SADC), African, Caribbean and Pacific (ACP) Countries, World Trade Organization (WTO), SACU-European Free Trade Area (Iceland, Liechtenstein, Norway and Switzerland) Trade Agreement, SACU-MERCOSUR (Argentina, Brazil, Chile, Paraguay and Uruguay) Trade Agreement and SACU-India preferential Trade Agreement. Namibia's trade and industry policies are primarily formulated and implemented by the Ministry of Trade and Industry. They are also set and influenced at regional and multilateral level of its membership. Some of the mentioned organizations are briefly discussed below.

SACU is one of the oldest and successful unions dating back to 1910. Re-negotiations were signed in 1969 between newly independent countries of Botswana, Lesotho and Swaziland with South African. Namibia became a member after its independence in 1990 with special focus on barriers to trade, customs and trade facilitation, trade and

investment promotion and sanitary and phytosanitary (SPS). The main objectives of SACU includes: SACU members significantly benefit from revenues that come through customs and excise duties which are pooled in the common revenue pool and then divided among member states of Botswana, Lesotho, Namibia, South African and Swaziland (BLNS). The revenue share is determined by the country's economic performance. SACU member states prescribe a common external tariff (CET) on imports from non- SACU members. It also allows free movements and transit of goods without any tariff within the customs union.

SACU revenue is the major contributor to Namibia's budget, for example, in 2007 there was an increase in payment from SACU which put Namibia's budget into a surplus since its independence. SACU income to Namibia dropped in 2010 and 2011 due to global recession with a total revenue averaging 39.3% of total average. In 2011/2012 Namibia's total revenue and grants from SACU was estimated at N$26,9 billion, decreased than originally estimated at N$28,0 billion (SACU, 2012), while in 2010/2011 the revenue outturn was estimated at N$22,7 billion. This decrease in revenue was as a result of a decline in SACU revenue (SACU, 2010/11).

There are some limitations also for BLNS states in how they engage in SACU agreements such as:

- Difficulty for BLNS countries to protect their infant industry against South Africa.
- Difficulty to influence new investment in industries for BLNS states due to South Africa's dominance.
- Countries such as Namibia, Lesotho and Swaziland who are members of the Common Monetary Area (CMA) agreement lose monetary policy powers.

As a step towards improving its international market access, Namibia is also a member of SADC which was transformed from the Southern African Development Coordination Conference (SADCC) in 1992. The aim of SADC is to improve trade and security within the region. The SADC Trade Protocol was signed in Maseru, Lesotho in August 1996 and came into effect in 2000. A Free Trade Area was established among member states and amended the rules of origin in August 2008. Furthermore, according to SADC Summit Report 2005, SADC had set goals by 2010 to have a customs union, and monetary union with one single regional currency by 2015. The member states comprise of Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

SADC's major project is expansion of the political and economic integration, under the policy document entitled 'Regional Indicative Strategic Development Plan (RISDP)'. It involves markets integration and prevention of poverty of member states. The other is

the Strategic Indicative Plan for the Organ (SIPO), which deals with the security policy. According to Odada and Matundu (2008) there are a number of shortcomings in SADC, the biggest being the lack of political will and inconsistency to agree on a common strategy. There is inadequate economic diversification, low capacity and human skills and weak enforcement power within the member states, mainly due to conflicts of interest since some SACU members are also members of SADC. In addition, the regional court (SADC Tribunal) was formed with the aim of resolving conflicts and disputes between and among member states. However, because of complications in the SADC's organisational structure, the SADC Tribunal hardly acts. In short, for regional integration process to be strengthened, deficiencies in the SADC region need to be fixed.

Namibia is still negotiating for an Economic Partnership Agreement (EPA) between SADC-EPA group and the European Union (EU). Under the Cotonou Agreement, Namibia enjoys the "interim" agreement with the EU and other four SADC-EPA group members. Namibia continues negotiating as part of the SADC-EPA group for a comprehensive EPA with the EU. Under the African Growth and Opportunity Act (AGOA), Namibia still benefits from duty free and quota-free entry of some particular goods into the United States. Furthermore, SACU and members of the European Free Trade Association (EFTA) signed a free trade agreement (FTA) in May 2008. This improved Namibia's market access for SADC countries export's to have free entry into

the EFTA countries, while tariffs on imports from the EFTA countries continue to fall or will eventually be abolished. Only industrial goods, processed agriculture products and fish are covered in this FTA. SADC signed another preferential Trade Agreement (PTA) in April 2009 with the Common Market of the South (MERCOSUR). According to World Bank (2010), Namibia was ranked 66th out of 183 countries in 2009 ease to do business with and 31st out of 39 in Sub-Saharan Africa (SSA) region.

This shows that Namibia depends on imports and exports from the global market with the primary products being the major exports mostly to South Africa and the EU. The country's total exports of goods and services as a percentage of GDP in 2011 was 47.4% compared to 44.7% in 2010. While, imports of goods and services as a percentage of GDP slumped to 52.4% in 2011 compared to 54.7% in 2010 (World Bank, 2013).

2.6 Trade policy

Namibia has no formal trade policy according to the World Bank Indicators (2010). Its tariff policy is governed by the Common External Tariff (CET) of the Southern African Customs Union (SACU). When it comes to trade regime, Namibia is more open compared to an average sub-Saharan African (SSA) country by 11.3 percent. The highest level of tariff protection of 12.6% is given to the agriculture sector and non agriculture sector is 9.6%. Measurement of the country's trade policy's pace is the

wedge between bound and applied tariffs which is currently at 11.4%. Namibia's average MFN applied tariff has remained consistently steady over the past few years at 7.8%.

Due to Namibia's participation in various trade forums; regionally and internationally, the country is guided by the following trade policy notions:

- To create and maintain just and mutually beneficial relations among nations.
- To identify the need and respond to globalization as a powerful trend and world-wide economic liberalization.
- To improve the country's economic diversification drive through viability of domestic production and trading in goods and services.
- To create regional co-operation and integration through joint trade negotiations with more powerful economic blocks such as the WTO, the European Union and the USA.

Another policy which outlines the principles and parameters towards industrialization of the state is a policy statement document called the Industrial policy.

2.7 Industrial policy

The Industrial policy involves the short, medium and long term goals and action plans by the government of Namibia's approach and strategies on industrialization. The policy document aims at improving stakeholder's policies and programs in line with government plans towards achieving Vision 2030. The government believes that the

domestic private sector is the engine for job creation and economic growth. It will, therefore, support the private sector wherever possible in achieving higher production, increasing exports, reduce unemployment rate and income distribution disparities through achieving a competitive real effective exchange rate. In this regard, to reduce the escalating unemployment rate which was recorded at 51% by the latest labour force survey undertaken in 2012, a new program was introduced by the government called Targeted Intervention Program for Employment and Economic Growth (TIPEEG) in helping fight unemployment, as a long-run job creation measure, which will result in total factor production, hence competitiveness of the economy. Furthermore, the industrial policy stipulates the following:

- Limited resources- Due to limited resources, the industrial policy will follow the targeted approach at any point in time. Identified sectors with specified needs during a particular period in time will be supported with clear documentation highlighting such priority. Such an approach will be the integrated development approach, which will be built on market integration, industrial development and infrastructure development.
- As a small country sized population, of about 2 million, the economic policy will focus on openness towards market access in products and services domestically produced through regional economic integration, which is a WTO key element towards economic openness.

- Namibia's development and manufacturing practices will be emphasised on going green. Currently, the gas emission levels are low and protection of future industrialisation plans is of great benefit to Namibia and the global market.
- Incentives- The incentive regime aims at implementing measures for industrial competence and capacity development resulting in increased production possibility frontier, which will also make it easier to set up business and operate effectively in Namibia. Furthermore, other incentive regimes include the export development programmes, and support schemes such as economic zones, special-purpose vehicles and the tax regime.
- Political stability- This includes other institutional factors such as the property rights and rule of law. The strategy is to observe closely what emerging economies are doing and adapt to future trends, making investors see Namibia differently from other developing African countries.
- Development and promotion of SMEs- some important issues to be looked at by the Namibian Government include the following;
    - The SME entrepreneurs' development programs and training promotion
    - Advocating for banking conditions/regulations easier for SME bank to set up business Namibia

2.8 Conclusion

This chapter looked at the Namibian economic structure and its trade regime. Namibia is classified as a middle-income developing country by the World Bank and the IMF. Although, Namibia has achieved moderate economic growth over the past few years, it is still among nations with the highest income inequality. Namibia is a resource-based economy with a growing primary sector. Namibia's export market is concentrated on extraction and processing of minerals, commercial farming and fishing. These products are exported mainly to South Africa and to Europe. Furthermore, Namibia's imports comprising largely machinery, petroleum products and food and beverages come mainly from South Africa. Namibia's growth performance from the 1980s has been slow compared to other developing nations. The constraints to growth could be related to factors such as high levels of inequality in income and wealth and the monetary integration with South Africa, which is a diversified economy and causes a huge impact to domestic industry.

In trying to avoid the Namibia from being vulnerable to short and long-term environmental shocks, the government has formulated a number of programmes and policies aimed at promoting domestic and foreign investment to improve economic growth in order to achieve the structured goals. Some of these include the Industrial policy, the Fourth National Development Plan (NDP 4) and Vision 2030.

Namibia is a member of regional and international organisations that influence its trade activity. At the regional level, Namibia is a member of SACU and SADC. Consequently, Namibia's fiscal contribution to national budget, its trade policies and other bilateral agreements are influenced by its membership. At the international level, the European market is important to Namibia because of export access which is duty free on meat and fish products, therefore, the EU markets play a major role by contributing to SACU revenue pool.

The world is increasingly becoming integrated as a global village and Namibia should continue to diversify its economy, because in the long-run only diversified and competitive domestic industries will survive competition from multinational industries. Economic theories show that countries that trade more tend to grow faster. Openness to trade allows efficient allocation of resources to effective productivity, providing access to new innovation and technologies. This leads to long-run sustainable growth rate of the economy. Despite major trade agreements in allowing free trade among member states, protectionism on trade continues to slow down our economies out of poverty.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter provides an overview of theoretical and empirical literature in order to understand how trade openness affects economic growth. The chapter is organised as follows: - Section 3.2 reviews theoretical literature on trade and growth. A review of recent empirical literature will be presented in Section 3.3 and Section 3.4 core growth model and Section 3.5 conclude the chapter.

3.2 Theoretical Literature

The theoretical link between trade and growth is provided in brief exposition. It is argued that the effect of openness on steady-state growth in theoretical analysis is ambiguous (Obadan & Okojie, 2010).

Following the theoretical contributions by Romer (1990) and empirical work of Levine and Renelt (1992), the core growth model explanatory variables included are: investment, population growth, initial human capital and initial per capital. However, Greenaway et al (2002) also added to this list of explanatory variables, terms of trade variables and trade liberalization proxies. In this regard, this work is in tandem with the

views of Greenaway et al (2002). There are a number of trade theories applicable to openness and economic growth such as, the traditional theory, dynamic theory, new trade theory, and growth theory. They are discussed below.

3.2.1 The traditional theory

The traditional theory, assumes free trade through imports and exports are the best strategies from the welfare point of view. These welfare improvements are due to specialised gains according to the comparative advantage in which a country that opens up can be assured of trade benefits in a static model and consumption gains are explained in the Ricardian model where a country specialises in producing goods in which it has comparative advantage. On the other hand, the Hecksher- Ohlin-Samuelson model shows gains in the two country model, two factor models in which each country specialises based on their factor endowment. Obadan and Okojie (2010) assert that international trade is only possible if perfect competition is allowed to prevail and other things held constant. Imperfect competition may include externalities and absent of uncertainty in both countries. In the traditional theory, growth originates from trade (Obadan & Okajie, 2010).

3.2.2. The new trade theory

Furthermore, the new trade theory assumes imperfect competition. The new trade theory is associated with Krugman (1986) among others. The assumption of perfect competition and non existence of externalities are important in the traditional theory,

but are relaxed in the new trade theory. Under conditions of imperfect competition the new trade theory concludes that trade restrictions to trade could be welfare gain (Obadan & Okajie, 2010). However, Matadeen, Matadeen and Seetanah, (2011) argue that the theory is based on trade policy rather than between trade volumes and growth.

According to Webster (2003), in international arena trade, restrictions are used to win market power, which can get rid of foreign competitors. For instance, products can be sold below marginal cost or underpriced until the competitors leave the market; this is known as predatory pricing. When this happens, producers with market power can then switch to mark-up pricing. At international level, having market power allows or makes it possible to increase output and market share. This eventually allows production at a decreasing average cost in industries characterised by economies of scale and smaller foreign competitors stand no chance to produce under such conditions.

In the externality case, spillovers in the production process between social marginal costs and private costs can also be welfare improving. Relevant externalities are linked to the following: first, is the physical capital accumulation; second, is the accumulation of human capital or improvement in human skills (such as job on training and education of workers) and third, is the introduction of new technology. Firms of an economy can benefit from one another if positive externalities exist amongst each other. These results

continue to be argued between trade-growth links (Yanikkaya, 2003). The last theory is the growth theory which includes both the neoclassical and endogenous growth theories.

3.2.3 Neoclassical growth models

The neoclassical theory is associated with Ramsey (1928), Solow (1956) and Koopmans (1965). The neoclassical model assumed closed economy, but analyses of open economies in recent years apply this growth model. The neoclassical model centers its works in international economics, macroeconomics and public finance in which it uses a wide range of aggregate economic analysis (Obadan & Okajie, 2010). Solow model introduced a number of related facts to economic growth in which the system adjusts to a given growth rate of labour force and steadily reaches a steady state of proportional expansion, such as the relative constancy of capital-output ratio over time. The model states that trade has a positive impact on the level of income (Matadeen et al., 2011).

3.2.4 Endogenous growth theory

Endogenous growth theory can be defined as economic growth form within a system, mostly a state or a country. This growth theory was pioneered by Grossman and Helpman (1991) Romer (1990) and Lucas (1988). Obadan and Okajie (2010) state that the difference between this model and the other theories stated before, is that per capital output growth converges to zero in the steady state resulting in a positive correlation between investment rates and growth across countries. To the newly industrialised

countries, this theory provides hope due to the different ways of development without relying on trade alone. It focuses on education and new technology development for the world market. According to Stensnes (2006), the model thereby explains its long-run increases in output growth rate; it has the following five phenomena.

Firstly, trade liberalisation may promote economic growth by accelerating the rate of technological change. Secondly, export-oriented development strategy leads to higher growth due to some strictly economic factors. Thirdly, there is export of technology from industrialised countries to developing countries through foreign direct investment (FDI). Fourthly, external capital for development through outward orientation is possible. Lastly, an open economy improves its rate of economic growth through economies of scale in production and through positive spillover effects from technological development. However, Romer (1990) outlined the four basic preconditions for growth which are: investment, population growth, initial human capital and initial per capital.

The model explains how countries can develop within the global market by finding complementary goods and services (like education) within their economic and political boundaries. It is, however, difficult to theoretically address the strengths, relevance and

validity of each factor in relation to trade and economic growth. Each should be determined by empirical studies.

3.3 Empirical Literature

The empirical literature on openness and growth is indeed extensive. A number of studies relate the difficulty in measuring openness. In determining the relationship between trade openness and economic growth and the direction of causality, a range of research has been undertaken both country specific and cross country. While some studies confirmed a positive impact of openness on growth, others did not. In this section, the empirical literature discussed covers the link between trade openness and income, export growth and economic growth, the causal link between trade openness and economic growth, the relationship between trade openness and economic growth and the indirect impact of openness and economic growth.

The impact of trade on income has no strong presumption on theoretical literature, but same empirical literature has examined the link (Irwin and Tervio, 2000, Dollar and Kraay, 2002 and Rodrik and Rigobon, 2004). Irwin and Tervio (2000) assessed the impact of trade on income during the twentieth century with time period from pre-world war 1 of 1913 to post war 1990, using cross country regression with sample of 62 and 40 countries. The ordinary least squares (OLS) estimation and the two-stage least squares (2SLS) estimation methods were used. The results showed a positive impact of trade on income.

Dollar and Kraay (2002) investigated the link between trade and income, using a large sample of 92 developed and developing countries selected from East Asia and Pacific, Latin America, Sub-Saharan Africa, Middle East, North Africa, West Africa, Canada, United States, Latin America and Caribbean over a period of four decades using OLS methods. The results showed that in middle-income countries like Korea, poor people are better off than those in India as average income in Korea is higher than in India. The study concludes that openness to international trade improves income of the poor by increasing overall incomes, although the findings confirm the need for further research in income distribution changes. The author further recommended that openness to international trade and fiscal policies should be the focal point of effective strategy to poverty reduction.

Rodrik and Rigobon (2004) estimated the interrelationships between openness, democracy, rule of law and income using the method of identification through heteroskedasticity (IH). The dataset of 86 countries split into two sub-samples of colonies versus non-colonies and continents of East-west (Eurasian countries) versus those of North-South axis (Africa and the Americas) with time period of the twentieth century. The results showed that openness has a negative impact on income levels, but has a positive effect on the rule of law. While both democracy and rule of law improve economic growth.

Harrison (1996) estimated the link between trade and poverty in 51 countries using cross country regression with time period 1960 to 1984. Results showed no evidence of positive relationship between openness and economic growth. The study concluded that the poor never benefits from globalization due to unequal distributions from trade.

Another strand of literature on export growth and economic growth is essentially a dynamic one and, therefore, can be studied in a dynamic framework based on time series data. Some studies done include Ekanayake (1999), Vohra (2001) and Din (2004). A study done by Ekanayake (1999) used annual time series data from 1960 to 1997 to examine the causal relation between export growth and economic growth in developing Asian countries. A co-integration and error-correction model technique was used. The results showed a bi-directional causality in seven of the eight countries, with short-run Granger causality running from economic growth to export growth. It was concluded that there was little evidence of causal relation between export growth and economic growth.

Vohra (2001) examined the role of export-growth in five Asian countries namely India, Pakistan, Philippines, Malaysia and Thailand using time series data from 1973 to 1993. The empirical results show that exports have a positive and significant impact on economic growth on countries that have obtained a level of economic development. India and Pakistan were exceptions. The results also confirm that export expansion strategies and promotion of foreign investment are important for liberal market policies.

Din (2004) examined annual time-series data for the export-led growth hypothesis for the five largest economies of the South Asian region, namely Bangladesh, India, Nepal, Pakistan, and Sri Lanka using a multivariate Vector-Auto Regressive (VAR) framework, the concept of Granger causality was employed to determine the direction of causation between export and output. For India and Sri Lanka, the sample period is from 1960 to 2002, whereas for Nepal it is 1965 to 2002. For Bangladesh and Pakistan, the sample period is from 1973 to 2002. The results showed a bi-directional causality between exports and output growth in the short-run for Bangladesh, India, and Sri Lanka. There was long-run relationship for Bangladesh and Pakistan among exports, imports, and output, whereas, no evidence of a long-run relationship among the relevant variables was found for India, Nepal, and Sri Lanka.

In another study analysing the causal linkages between openness and growth are outlined. In the issue of causality, economic growth is Granger-cause openness. This means supporting the growth driven trade hypothesis for a given country (Iyoko and Eboreime, 2009, Matadeen et al, 2011 and Bajwa and Siddiqi, 2011). The study by Iyoko and Eboreime (2009) used time-series data from 1981 to 2006, the co-integration techniques investigated the causal relationship between globalisation and economic growth in Nigeria. Variables used were globalisation proxied by openness and foreign direct investment (FDI). This was built on the Mendel Fleming's model of open macroeconomics. The results showed a unidirectional causality between FDI and growth with FDI Granger causing growth and no causality between openness and

growth. However, openness Granger caused external debt in Nigeria. The study concluded that appropriate strategies for development such as effective exchange rate policy, domestic fiscal discipline diversification of the domestic base and debt reduction should be encouraged for implementation in Nigeria.

Matadeen et al. (2011), used time-series data using bi-annual data for the period 1989-2009, through a Vector Error Correction Model (VECM) to investigate the causal links between trade liberalisation and economic growth of Mauritius. They found that openness enhances growth and also trade openness indirectly promotes economic growth by boosting private physical capital in the short-run. A study by Bajwa and Siddiqi (2011) investigated the casual link between trade openness and economic growth for four South Asian countries, that is, Bangladesh, India, Pakistan and Sri-Lanka using Panel cointegration and fully modified ordinary least squares (FMOLS) technique for periods 1972 to 1985 and 1986 to 2007. The motive was to determine what happened before and after the implementation of South Asian Association for Regional Co-operation (SAARC). The results showed that from 1972 to 1985 there existed a short-run unidirectional causality and from 1986 to 2007 a short-run bi-directional causation existed. Finally, a positive long-run causality existed between the variables.

It was noted that South Asian countries should implement export oriented policies and export value added products which will require technological advancement, for rapid economic growth will be expected in the region.

There is a study with empirical evidence of indirect impact of openness to economic growth through investment and productivity. The use of openness to growth is highly sensitive due to the fact that endogeneity which prevents the correct estimation of link between trade and growth is not controlled. Most of cross sectional studies revealed an indirect impact For instance, the influential study by Levine and Renelt (1992) assessed the impact of trade on income in 92 countries for the past four decades during the twentieth century using cross-country regression. Results found indirect impact between economic growth through investment and productivity.

There are a number of studies which argue that trade does not impact economic growth. The authors included Vamvakidis (2002) and Hassan and Islam (2005).The study by Vamvakidis (2002) examined the relationship between trade openness and economic growth in developed and developing nations using a cross country regression for the time period data from 1920 to 1990. The results showed that before 1970 there was no positive relationship between openness to trade and economic growth. In 1930s the correlation obtained was negative. The study concluded that only recent phenomena have shown a positive relationship between trade openness and economic growth. The findings further indicate that trade was only linked to growth only after the 1970s, not

before. Thus, the study confirms that national policy must be linked to trade policy to improve the economic growth.

Hassan and Islam (2005) investigated the role of financial development and openness on economic growth in Bangladesh using time series data from 1974 to 2003. Johansen co-integration test and Granger causality test was done. Results showed that there was no co-integration relationship and no causal relationship detected in Granger causality test between financial development and growth and trade openness and growth. Although a bi-directional causal link was found between financial development and trade openness. However, the study concluded that financial development can mutually contribute to poverty reduction.

Adhikary (2011) examined the linkage between trade openness, capital formation, FDI and economic growth in Bangladesh. The study used annual time series data period from 1986 to 2008 and employed Johansen-Juselius procedure and vector error correction model. Results found a negative, but diminishing influence of trade openness on GDP growth rates.

The impact of openness on growth is highly sensitive to the measure of openness used. Most analysts face the problem of measuring trade liberalization. Empirical studies have not been clear on this issue. Where some studies found positive link, others found no link or negative link due to different proxies and methodology for liberalization, hence

questioning the measure of openness and the robustness of variables (Levine and Renelt, 1992). In their study of trade liberalization and its impact on growth, Greenaway, Falvey and Foster (2001) employed the panel data technique and random-effects model. The reason for their study is to argue there is inconclusive evidence of previous work. In their study, the measure of openness developed was based on deviations of actual trade from the expected, given factor endowments and geographical characteristics of the country. The additional literature to this study includes the use of panel framework to examine inter-temporal and inter country variation. The panel model provided a dynamic interpretation of the link between trade and growth. The results found a positive and significant relationship between trade and growth suggesting a measure of openness is quite robust. In this regard, the study recommends that government should promote level of infrastructure thereby boosting imports by reducing domestic transport costs.

However, there are also studies that examined the relationship between trade openness and economic growth. Such studies confirmed a positive link while a few did find a negative impact to growth depending on the technique applied. Some influential contributions include the following Sarkar (2007), Osabuohien (2007), Capolupo and Celi (2008), Kim (2008), Obadan and Okojie (2010), Marelli and Signorelli (2011), Yeboah, Naanwaab and Saleem (2012), Ahmadi and Mohebbi (2012). Sarkar (2007) examined the relationship between openness (trade-GDP ratio) and economic growth of 51 countries, with 16 rich countries and 35 less-developed countries (LDCs) using a

cross-country study of averages and panel regression analysis data from 1981 to 2002. Results showed that only 11 rich and highly trade dependent countries have higher real growth which is associated with higher trade share. A study of individual less-developed country experience was also done using time-series Autoregressive Distributive Lag (ARDL) approach with time period 1961 to 2002. The results showed that the majority of less-developed countries experienced no positive long-term relationship between openness and growth. The study concluded that only the middle income groups experienced a positive long-term relationship.

Capolupo and Celi (2008), used panel estimators for comparing three different groups of countries namely; the historical European Economic Community (EEC), the countries of former Council for Mutual Economic Assistance (CMEA) customs union and a group of Transitional Economies (TEs) with data set from 1960 to 1990 to examine whether trade openness spurs economic growth. The results showed that the coefficient of real openness for the two groups which are EEC and CMEA had a negative sign, but TEs group had a positive sign meaning that there is no robust and positive relationship between trade and growth. Transition countries benefit more in terms of productivity growth through trade from international transfer than western counterparts. Thus, the study concluded that there should be an indirect connection that goes from trade to investment and then growth.

Osabuohien (2007) examined the impact of trade openness on economic performance focusing on Ghana and Nigeria (ECOWAS members) using time series data from 1975 to 2004 employed vector Autoregressive (VAR) Approach. They found a unique long-run relationship between economic performance, trade openness, real government expenditure, labour force and real capital stock. The results showed that openness to trade was to benefit Ghana more than Nigeria

Kim (2008) used the instrument-variable (IV) threshold regressions approach of time period 1960 to 1995 for 61 countries to investigate whether the effects of trade openness may differ along with the level of economic development. Results showed differences of trade effects on long run economic growth. This confirmed that developed countries have a greater trade openness resulting to more beneficial effects on long-run growth and standard of living, while less developed countries experienced a significantly negative influence to growth and real income through international trade. There long and short of it is that developed countries should undertake more outward-oriented reforms, for sustainable economic growth and development while developing countries should undertake more conservative trade policies.

Obadan and Okojie (2010) used annual time-series data covering the period 1980 to 2007 to examine the effects of trade on economic growth and development in Nigeria. Variables used included growth rate of GDP, openness, exchange rate, foreign direct investment, domestic investment and political stability. The results showed that trade

openness had a positive impact on economic growth in Nigeria and a strong negative impact on growth due to political instability. It was concluded that Nigeria's export base which solely depend on petroleum should be diversified to include agricultural and solid minerals export.

Marelli and Signorelli (2011) used panel data model from 1980 to 2007 with an instrumental variable approach for two countries namely; China and India by focusing on trade dynamics, degree of openness, FDI flows and specialization patterns and also estimate the links between openness and growth, for the two countries in terms of their integration in the global economy. 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. The robust growth of the two "giant" nationals is currently helping the entire world economy recovery because they experienced a small deceleration in their growth paths during the first global impact of the crisis.

A study by Yeboah, Naanwaab and Saleem (2012), used alternative panel models from 1980 to 2008 to examine the relationship between trade and productivity. The Cobb-Douglas production function estimated the impact of FDI, exchange rate, capital-labour ratio and trade openness on GDP for 38 African countries. The results showed that 17 countries growth was above average while majority countries were below average

returns-to-scale. This confirmed a positive relationship between trade openness and GDP.

A study by Ahmadi and Mohebbi (2012) examined the effect of trade openness on economic growth in Iran using OLS method for estimation parameters from 1971 to 2008. Results indicated significant positive effect of trade openness on economic growth in Iran and concluded that oil revenue and investment growths have a significant positive effect on economic growth in Iran.

In the case of Namibia Ogbokor (2005) examined on the macro-economic impart of trade on the Namibian growth using bivariate and multivariate models from 1991 to 2001on time series data. Variables used included exports, foreign direct investment (FDI) and GDP .The study focused more on exports and inward foreign direct investment as a source of growth, without including imports. Results showed that FDI and exports are important for the growth of the Namibian economy. The study suggested an aggressive export industrialized policy.

Jordaan and Eita (2007) estimated annual time-series data for the period 1970 to 2005 using the error correction model (ECM) to analyse the causality between exports and GDP. Results showed that exports Granger cause GDP and GDP per capita. It was concluded that export incentive promotion has a positive influence on growth in GDP.

Kalumbu and Sheefeni (2014) examined factors leading to changes in terms of trade and how the terms of trade impact economic growth in Namibia. The study employed time series for the period 1980 to 2012 using Vector auto regression technique. Variables used included real GDP and net barter terms of trade (NBTT). The results showed a uni-causal relationship from economic growth to terms of trade and a negative relationship between terms of trade and economic growth in Namibia. Table 3.1in the appendix shows different approaches used to identify openness and shows how in some instances, this may have resulted in different findings.

This research will be based on the growth theory because this theory competently addresses questions of trade and economic growth. Due to the difficulty in measuring openness, a number of studies have used different measures to examine the effects of trade openness on economic growth.

3.4 Conclusion

The chapter reviewed a number of growth theories. The endogenous growth theory has been used as the basis of the study because it is concerned with economic growth from within a system or a country. The theory competently addresses questions of trade and economic growth. Due to successes of outward-looking countries emerging and inward-looking countries failing, trade openness was widely seen to favour economic growth such as improving the size of market, economies benefit from specialization, and

increases its returns to scale. Further trade openness allows government to adopt policies that are less distortionary and macroeconomic management types that are more inclined towards international level of competitiveness as part of their growth strategies.

The empirical literature reviewed above, showed that the methodology and variables used play a role in the results that emerge from the studies. Most of the studies used time-series data and employed Vector Auto regression (VAR) approach while others employed Error Correction Model. The other method mostly used is the panel technique, where the overall results showed a positive link between openness and economic growth despite different methodologies and openness proxies used. In some cases Granger causality ran uni-directional and in some cases it ran bi-directional from trade openness to economic growth. Furthermore, the instrument-variable (IV) technique was used by Kim (2008), results showed a negative influence of trade openness to growth in some countries. In addition, Ahmadi and Mohebbi (2012) used OLS method with results showing a positive relationship between trade openness and economic growth. However, a robust and clear relationship is yet to be established between openness and economic growth.

From the theoretical literature most studies support the positive relationship between trade and economic growth.

However, there are still econometric weaknesses such as variables used, omitted variable bias and different methods of trade openness. In the case of Namibia, Eita and Jordan (2007) and Nashiidi and Ogbokor (2013) investigated only the export-led growth in Namibia. Jordaan and Eita (2007), estimated time-series data for the period 1970 to 2005 using the error correction model (ECM) to analyse the causality between exports and GDP in Namibia, whereas Nashiidi and Ogbokor (2013) investigated export-economic growth in Namibia, using annual time series data over the period 1970 to 2008 using the Johansen co-integration technique and VECM for the Granger causality test. The next section provides the methodological path of the study.

CHAPTER FOUR: METHODOLOGY

4.1 Introduction

This chapter presents the methodology. It will be presented as follows: Section 4.2 reviews the econometric framework and model specification, Section 4.3 reviews the data, data measurements and data source. Section 4.4 presents description of variables whilst Section 4.5 concludes the chapter.

4.2 Econometric Framework and Model Specification

4.2.1 Model specification

This study uses the Cobb-Douglas production function (Cobb and Douglas, 1928) which is an economic growth model. The model is represented as follows:

Trade openness

$$T(\%) = \big((X + M)/Y\big) \times 100$$

Y = GDP

X = X(e, Y^*) = export revenue

M = M(e, Y) = import expenditure

$\Rightarrow T = f(e, Y, Y^*)$

Inverse the above function to get Y function

$\Rightarrow Y = f(T, e, Y^*)$

e: exchange rate,

Y^**: foreign GDP*

Assume Y^* is constant, $Y = f(T, e)$

For per capita measure, $y = f(T, e)$ *(1)*

Neo-classical economic growth theory

$y = f(k) = AK^{\alpha}$ *(2)*

y: per capita GDP

k: per capita capital

Combine (1) and (2) getting

$y = f(T, e, k,)$ *(3)*

Equation (4) is augmented by including additional factors thereby output becomes a function of trade openness, exchange rate, capital stock and labour.

$y = f(T, e, k,) = Y = AK^{\alpha} L^{\beta} e$ (4)

Where:

Y is per capita GDP is used to capture the level of economic performance, K and L are capital and labour inputs respectively, while parameters α and β are their shares of output Y. A is production, trade openness will be proxied by exports + imports / GDP, L is labour force which will be proxied by population growth and K is real capital stock which will be used as gross fixed capital formation. According to Osabuohien (2007), real exchange rate is another additional factor following Yeboah et al (2012). An implicit form of equation (3) is shown below:

$$GDP_t = f\,(RK_t\ L_t\ TROP_t\ RER_t) \tag{5}$$

Furthermore, in explicit form equation (2) can be expressed as follows

$$GDP_t = A_t\ RK_t^{\delta_1}\ L_t^{\delta_2}\ TROP_t^{\delta_3}\ RER_t^{\delta_4}\ u_t \tag{6}$$

Where:

GDP : Real per capita gross domestic products

RK : Real capital stock (proxied by gross fixed capital formation)

L : Labour force in the economy (proxied by population growth)

TROP : Degree of trade openness for the country

RER : Real exchange rate

u : Stochastic term used to capture other variables in the model not included.

Time dimension is represented by subscripts't'. The linear form of equation (5) above can be done by taking logarithm of both sides of the equation as follows:

$$log\, pgdp = \delta_0 + \delta_1\, log\, rk + \delta_2\, log\, l + \delta_3\, log\, trop + \delta_4\, log\, rer + e \qquad (7)$$

Where:

δ_0 is *log* A, the intercept of the regression equation

e is *log* U which denotes the log of residuals and

$\delta_{i's}$ (i=1,…, 5) are parameters to be estimated that measures the rate of change in the dependent variable.

Specifying the production in log-liner form (with an error term) the model may be written as:

$$pgdp = \alpha + \beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 + u \qquad (8)$$

The apriori expectations are that $\delta_{i's} > 0$.

4.2.2 Estimation Technique

Test for Stationarity

In econometric analysis the stationarity of variables is very important when studying the different time series behavioral patterns. There are three conditions to be satisfied for series to be stationary as shown below:

- the constant mean through time, thus

  $$E(X_t) = \mu \quad (9)$$

- the constant variance through time, thus

  $$Var(X_t) = E[(X_t - \mu)] = \sigma^2 \quad (10)$$

- the covariance which relay upon the number of periods between two values, thus

  $$Cov(X_t, X_{t+k}) = E[(X_t - \mu)(X_{t+k} - \mu)] = Y_k \quad (11)$$

As shown above, according to Gujarati (2003) variables that are non stationary could lead to spurious regression results. Furthermore, non stationary variables could lead to incorrect conclusion thereby leading to incorrect policy formation. The problem of non stationarity can be prevented by differencing the variables several times to obtain stationarity.

This approach examines the patterns and trends in the data. It also tests for the order of integration of the time series variables so as to obtain a meaningful regression analysis against spurious. This will be achieved by testing for stationarity (unit root). 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, Phillips, Schmidt & Shin, 1992). The ADF and PP test uses the same critical values. The test in this study uses the three methods namely the ADF test, the PP test and the KPSS test which will include both for intercept with and without trend. The tests are based on the first order auto-regressive [AR(1)] process as proposed by (Enders, 2004). The ADF test uses additional explanatory variables by lagging the left-hand side variable to approximate the autocorrelation as shown below: in the works of (Arif & Ahmad, 2012):

$$\Delta Y_t = \delta y_{t-1} + \sum_{i=1}^{k} \delta_i \, . \, y_{t-1} + e_t \qquad (12)$$

Where k denotes the number of lags for Δy_{t-1}, which is large enough to include the existence of autocorrelation in e_t but small enough to save the degrees of freedom.

The (PP) unit root test will then be conducted. The advantageous (over ADF) is that PP tests capture time series properties in the presence of possible structural change, for it needs no lag length specification for the test regression (Enders, 2004). The ADF and PP test uses the same critical values. PP test permits dependence among disturbances of auto-regressive (AR) form. The test in this study will cater both for intercept with and without trend. This test is based on the first order auto-regressive [AR (1)] process as proposed by (Enders 2004):

$$\Delta y_t = \beta' \mathbf{D_t} + Y y_{t-1} + \varepsilon_t \qquad (13)$$

Where:

Δy_t is the variable of interest,

$\mathbf{D_t}$ Deterministic components (constant/constant & trend),

ε_t is I(0) and may be heteroscedastic.

Furthermore, PP tests corrects for heteroscedasticity in the errors and for any serial correlation. The correction mainly estimates the spectrum of ε_t at zero frequency that is robust to unknown form of autocorrelation and heteroscedasticity. In addition, to confirm this analysis, the KPSS test will be conducted. Kwiatkowski, Phillips, Schmidt and Shin (1992) derive their test by starting with the model (Enders, 2004):

$$Y_t = \beta' D_t + u_t \, , u_t \sim I(0) \tag{14}$$

$$\mu_t = \mu_{t-1} + \varepsilon_t \, , \varepsilon_t \sim WN(0, \sigma_\varepsilon^2) \tag{15}$$

D_t = deterministic components (constant/constant & trend)

The hypotheses to be tested are

$H0 : \sigma_\varepsilon^2 = 0$, $Y_t \sim I(0)$

$H1 : \sigma_\varepsilon^2 > 0$, $Y_t \sim I(1)$

The stationarity test is a one-sided right–tailed test. It tests the null hypothesis that the time series is stationary. If the null hypothesis is rejected, this concludes that a variable is not stationary.

Testing for Co-integration

Co-integration means a long run relationship of variables linked at equilibrium when individual series are non stationary in levels, but after differencing become stationary. If long run properties are comparable of two or more series then they are known to have co-integrated. It is possible that individual series could diverge and be unstable in the short run from each other, but in the long run equilibrium values may converge. The importance of co-integration helps in identifying the short run and long run relationships and also prevents non stationary series from the problem of spurious regression.

As stated earlier, co-integration eliminates spurious regressions of non stationary series. After the order of integration is tested and should the variables be found to be integrated of order one or I (1), then tests for co-integration between variables can be conducted. There are two approaches commonly used in co-integration testing, the Engle and Granger (1987) and the Johansen (1988) likelihood ratio test. The study will follow the latter test since the Johansen procedure is correct for endogeneity and autocorrelation. This procedure allows for co-integration of multiple equations unlike the Engle and Granger which allows for one co-integrating equation. This means that in Engle and Granger errors obtained in the first step are carried on to the second step. AS such testing for co-integration using the Johansen procedure the generalized VAR model is shown below as follows:

$$z_t = A_1 z_{t-1} + A_2 z_{t-2} + \ldots A_p z_{t-p} + \varepsilon_t \quad (16)$$

Where:

z_t is all the n variables in the VAR

$A_1,\ldots,A_p$ and B are matrix of coefficient to be estimated

ε_t is the error term.

The two VAR models will be estimated as follows;

$$\Delta y_t = \beta_{y0} + \beta_{y1}\,\Delta y_{t-1} + \ldots + \beta_{yp}\,\Delta y_{t-p} + \gamma_{y1}\,\Delta x_{t-1} + \quad + \gamma_{yp}\,\Delta x_{t-p} - \lambda_y(y_{t-1} - \alpha_0 - \alpha_1\, x_{t-1}) + \nu_t^y \quad (17)$$

$$\Delta x_t = \beta_{x0} + \beta_{x1}\,\Delta y_{t-1} + \ldots + \beta_{xp}\,\Delta y_{t-p} + \gamma_{x1}\,\Delta x_{t-1} + \quad + \gamma_{xp}\,\Delta x_{t-p} - \lambda_x(y_{t-1} - \alpha_0 - \alpha_1\, x_{t-1}) + \nu_t^x \quad (18)$$

Where:

$y_t = \alpha_0 + \alpha_1\, x_1$ is the long-run co-integrating relationship between the two variables and λ_y and λ_x are parameters, they measure how y and x react to deviations from long-run equilibrium. When it comes to decision making using the t-statistics, the rejection of the null hypothesis means that, the calculated value of the test statistics is greater than the critical value, meaning the null hypothesis of no co-integration is rejected. In that case it can be concluded that that there is co-integration. Co-integration has two statistic processes as given below: in the works of (Sheefeni, 2013):

(i)Trace test

$H_0: rank(\pi) \leq r$(at most r integrated vector)

$H_1: rank(\pi) > r$(at least r + 1 integrated vector)

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

T is noted as sample size, $\hat{\lambda}_i$ is characteristic root of estimation. If H_0 is rejected, then r + 1 long run cointegration relationship exists.

(ii) Maximum eigenvalue test

$H_0: rank(\pi) \leq r$(at most r integrated vector)

$H_1: rank(\pi) > r$(at least r + 1 integrated vector)

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

The maximum eigenvalues tests r co-integrating vectors of the H_0 against the r+1 co-integrating hypothesis of the H_1.

The advantage of VAR model treats each variable simultaneously as endogenous and each variable relates to its own past values including other variables past values. Furthermore, VAR model provides a channel to test causality in the Granger causality manner or sense.

Granger causality test

Granger causality in this study will use VAR model. Granger causality is used to give direction of possible causality between pairs of variables this is due to Granger (1986). A simple Granger causality test involves two variables *x* and *y*. The equation is shown as follows:

$$x_t = \sum_{j=1}^{p} \alpha_j \, x_{t=j} + \sum_{j=1}^{p} \beta_j \, y_{t=j} + u_t \quad (19)$$

$$y_t = \sum_{j=1}^{p} \eta_j \, x_{t=j} + \sum_{j=1}^{p} y_j \, y_{t=j} + v_t \quad (20)$$

The null hypotheses to be tested are:

H_1: $\eta_j = 0$, $j = 1 \ldots p$ which means that the *x* does not Granger cause *y*; and

H_1: $\beta_j = 0$, $j = 1 \ldots p$ which means that *y* does not Granger cause *x*

For example if *x* aids in the prediction of *y,* if it's true, then x is said to "Granger cause" *y*. If none of the hypothesis is rejected, this means that *x* do not Granger cause y and *y* also does not Granger cause x. This shows that the two variables are independent of each other. Granger causality helps in forecasting ability, but does not give true causality. If causality lacks from both sides of the two variables, this means that the two variables are interdependent. The importance of the direction of causation helps in economic policy strategies. For instance, if causation runs from trade openness to GDP growth then trade openness promotion strategies should be implemented as an

appropriate method for economic growth for a country. On the other hand, if causation runs from GDP growth to trade openness then the country is expected to increase in its trading, thereby focusing on its economic growth policies.

Apart from estimating Granger causality, the VAR Mode can also be used to examine the impulse response function and the variance decomposition.

Impulse Response Function

The impulse response function traces effects of shocks on all the endogenous variables in dynamic marginal effects on their current and future values. This allows the establishment of duration the effects of shocks takes to die out (Enders, 2004).

A simple bivariate VAR (1)

$$IP_t = a_{11}IP_{t-1} + a_{12}M1_{t-1} + \varepsilon_{1,t}$$

$$M1_t = a_{21}IP_{t-1} + a_{22}M1_{t-1} + \varepsilon_{2,t}$$

Changes in $\varepsilon_{1,t}$ affects the current value of IP and changes future values of IP and M1 because IP is lagged in both equations. The study will make use of generalized impulse response function (GIRF) which is not sensitive to the ordering of variables and can be used in both linear and nonlinear multivariate models. Unlike the traditional cholesky impulse response function that is sensitive to ordering of variables. According to Pesaran and Shin (1998) GIRF is unique for it has historical patterns of correlation

between shocks. In this study the impulse response shows how output or economic growth react to trade openness, investment and labor force over time. Shocks can also be estimated through the variance decomposition.

Variance Decomposition

The variance decomposition examines the importance of each individual shock over all other variables (Enders, 2004). The variance decomposition also determines normalisation of the VEC Model, therefore, a normalised variable should explain its own variation by less than 50%. If it does not satisfy the normalisation condition, then the variable is exogenous and normalisation is inappropriate.

4.3 Data, its Measurements and source

The study uses annual secondary data obtained from the World Bank. The study period ranges from 1980 to 2011, representing a sample size of 32 observations. The variables are described in table 4.1 with their expected sign based on the economic theory.

4.4 Description of variables

Table 4.1

Description of Variables in the Study

Variable	Description of variables	Expected signs
GDP	GDP per capita (GDP)	Positive
TROP	Trade openness	Positive
L	Labor as proxy for population growth	Positive
K	Real capital as a proxy for gross capital formation	Positive
RER	Real exchange rate	Positive

Source: Author's own construct.

Economic theory generally serves as a guide for the expected signs listed above.

Definition of variables

The choices of variables in the model are based on the following reasons:

Per capita gross domestic product (Y) is the dependent variable, while openness, population, gross fixed capital formation and real exchange rate are the independent variables. The variables in the model are justified in investigating the relationship

between trade openness and economic growth in Namibia. GDP per capita growth (Y) measures the performance of the economy from low productivity towards high productivity, which can be related to their trade specialisation. A positive sign is expected for this variable.

Trade openness (TROP) is captured by using trade share ratio (export / import) / GDP as a measure of openness. This approach calculates trade openness used by Osabbuohien (2007), Matadeen et al. (2011), Stensnes (2006) and Ahmad and Mohebbi (2012). There are other measures available for trade openness, but this measure captures qualitative and quantitative restrictions directly related with trade level to the rest of the world. According to theory openness is positively related to economic growth, hence it increases markets for new products by allowing market forces to allocate resources to productive sectors which leads to efficiency and makes use of scale of economies. A positive sign is expected for this variable.

Real exchange rate (RER) is the main determinate of the balance of payment (BoP) of the nation in reference to its position and external competiveness. It is a useful resource between tradable and non-tradable goods. Exchange rate also influences resource allocation (Dornbuch et al 2004). This follows the works of lopez and Thirlwall (2004),

Nguyan (2008) and Yeboah et al (2012). A positive sign is expected. This is complemented by Labour (L) (proxied by population growth).

Data on labour force is not readily available, thus population growth is used. An increase of human capital may encourage capital accumulation and Real capital (K) (proxied by real fixed capital formation) can be measured as private sector investment in percentage of GDP. They are important factors in determining economic growth according to the standard production function in the traditional economic theory. A positive sign is expected for this variable as shown from various works earlier reviewed (Mataden et al. 2011 and Obaden & Okojike, 2010).

Capital formation data is important in growth of Namibia in that investing in infrastructure can contribute significantly to both private and public sectors in potential sectors like Tourism, Mining, Fishing and Agriculture just to mention a few. Investing in infrastructure adds value to economy and creates job opportunities by attracting more investment thereby entering into new emerging markets which leads to diversification in its export markets. A positive sign is expected for this variable as shown from various works earlier reviewed. (Adhikary, 2011)

The measurement of trade openness in international trade is associated with exchange controls, licenses, prohibition, quotas and tariff to mention a few. Edward (1998) mentioned that black market share has been associated with trade restrictions such as coverage of qualitative restrictions (QRs), tariff average and collected tariff ratios (CTR) defined as ratio of tariff revenues to imports. Levine and Renelt (1992) and Sachs and Warner (1995) used black market premium, the value is averaged in foreign exchange rate market and used as overall extent of external sector distortions as a proxy. The following measurement were used by Edward (1998), average import tariff on manufacturing was measured as average import tariff and heritage foundation index of distortion in international trade was measured as trade distortion through government policies 1 to 5 values were taken as index. Furthermore, collected trade taxes ratio was measured as total revenues taxes on trade (import + export) to total trade. In Leamer's (1998) openness index was measured as average residuals of trade flows regression, while Sach's and Warmer open index was measured as weighted average of changes in domestic prices is equal to the trade reforms. Finally, the world development report outward orientation index is classified according to their degree of openness which has four categories.

The variables used are fundamental to the endogenous growth theory which illustrates that a country with more open trade should concentrate on sectors where it has comparative advantage. According to Romer (1989) a long run equilibrium growth rate

can be obtained through reduced cost of inputs and increased specialization. Trade openness is also known to improve efficiency inputs allocation through technological progress thereby eliminating protection on industries imports substitution. This results improved economic growth (Solow, 1957). In another development, Edward (1998) argues that trade openness does not improve the growth rate of poorer countries, but rather through cost of imitation and knowledge of its initial stock. Moreover, Levine and Renelt (1992) also urged the positive link between trade openness and economic growth reporting that increased trade openness leads to lower real exchange rate and higher inflation which impacts the domestic investment negatively, while Krugman (1994) argues that amount of tariff and non-tariff barriers which is the degree of trade openness affects only the volume of trade, not the link between imports, exports and economic growth. In theoretical literature both the classical and neo-classical growth models mention that capital is linked to economic growth. In other words, should there be no capital, then investment will not be there and consequently there will be no growth. While in empirical literature, Levine and Renelt and Harrison (1996) found a positive link between investment share and trade share in GDP. In another development Greenaway et al (2001) reported that higher export level led to an outward grading and lower levels led an economy to an inward grading. Thus, the results confirmed that openness led to growth because there was higher GDP growth in outward oriented economies than inward oriented economies. Finally, exchange rate affects the performance of the economy negatively should there be macroeconomic instability. Lopez and Thirlwall (2004) reports that in liberalization process, exchange rate plays an

important role in the balance of payment by ensuring that imports do not exceed exports if the country is to benefit effectively from trade.

However, different measurement of trade openness employed by researchers in a cross-country analysis contribute to conflicting findings, According to Edward (1998) openness results are affected by openness indicator, time period, functional form and estimated technique. Moreover, Billmeier and Nannicini (2007) state that cross-country estimators suffer from lack of transparency, while time series control for time invariant unobservable characteristic of the country. Harrison (1996) used export +imports / GDP suggested that this measure of trade openness is simply and mostly used as indicator. Attention to this regard will be applied using a country data analysis to investigate the linkage of trade openness and growth in Namibia with new evidence of literature.

CHAPTER FIVE: EMPIRICAL ANALYSIS AND RESULTS

5.1 Introduction

This chapter presents the empirical analysis and results of the study. The chapter is organised as follows: Section 5.2 presents detailed estimation of variables which is analyzed using techniques namely unit root test for stationarity, the vector error correction model which estimates the Granger causality test, the impulse response function that traces changes in each variable for current and future effect and the variance decomposition, which estimates responses of variable shocks overtime.

5. 2: Detailed Estimations

5.2.1 Unit Root Tests

The statistical properties of the series in the study are first investigated through unit root tests. Unit root tests help to test whether the series can provide correct inferences. In standard economic theory, the stationarity test is important to ascertain that estimations of regression are consistent. The unit root test applied the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The KPSS is estimated to confirm the tests since the KPSS has much higher power limitation. The results of unit root test are presented in Table 5.1.

Table 5.1

Unit root tests: ADF and PP in levels, first and second difference

Variable	**Model specification**	**ADF**				**PP**			
		Levels	**1st diff**	**2nd diff**	**OI**	**Levels**	**1st diff**	**2nd diff**	**OI**
LnGDP	Intercept and trend	-1.66	-4.15*	-6.01*	1	-0.93	-5.99*	-31.49*	1
	Intercept	0.79	-4.25*	-9.39*	1	0.32	-4.26*	-32.44*	1
LnL	Intercept and trend	-7.96*	-0.41	-3.41	0	0.08	-2.45*	-2.11	1
	Intercept	0.90	-6.19*	-0.99	1	-2.40*	-2.28	-1.96	0
LnRK	Intercept and trend	-3.54*	-7.12*	-6.92*	0	-3.49*	-7.12*	-17.97*	0
	Intercept	-3.29**	-7.16*	-6.99*	0	-3.32	-7.16*	-16.01*	0
LnTROP	Intercept and trend	-5.34*	-2.42	-5.11*	0	-2.22	-10.30*	-14.95*	1
	Intercept	-5.23*	-2.09	-5.20*	0	-2.16	-6.11*	-15.24*	1
LnRER	Intercept and	-1.68	-5.27**	-8.04**	1	-1.72	-5.28**	-18.44**	1

	trend								
	Intercept	-2.57	-5.07**	-8.19**	1	-2.55	-5.07**	-18.87**	1

Source: Author's compilation and values obtained from Eviews

*Notes***: (***a) * mean the null hypothesis is rejected at 1%.*

*(b) ** mean the null hypothesis is rejected at 5%.*

*(c) *** mean the null hypothesis is rejected at 10%.*

The null hypothesis is that there is presence of unit root. Table 5.1 show the results of the ADF and PP test of all the variables in levels, first difference and second difference. After testing the ADF test and the PP test in levels, it reveals that some variables like LnGDP and LnRER are still non stationary in levels. After taking first difference, the calculated ADF test and PP test rejected the null hypothesis of unit root when the calculated ADF test and PP test statistics, is compared in relation to their critical values. However, different order of integration is depicted. The KPSS test is another unit root used to complement the ADF test and PP test.

Table 5.2

Unit root test: KPSS in levels and first difference

Variable	**Model Specification**	**KPSS**		
		Levels	**First Difference**	**Order of integration**
InGDP	Intercept and trend	0.19*	0.10**	0
	Intercept	0.45**	0.62*	0
LnL	Intercept and trend	0.19*	0.12**	0
	Intercept	0.74*	0.42*	0
InRK	Intercept and trend	0.06**	0.08**	0
	Intercept	0.14**	0.10**	`0
InTROP	Intercept and trend	0.14**	0.35	0
	Intercept	0.64*	0.50*	0
InRER	Intercept and trend	0.18*	0.07**	0
	Intercept	0.60*	0.39**	0

Source: Author's compilation and values obtained from Eviews

*Notes***: (***a) * mean the null hypothesis is rejected at 1%.*

*(b) ** mean the null hypothesis is rejected at 5%.*

*(c) *** mean the null hypothesis is rejected at 10%*

The null hypothesis is that there is no unit root. This means that the null hypothesis for KPSS can be rejected if the t-statistic computed is greater than the critical value. Table 5.2 shows the KPSS test that variables for the model are stationary in levels on all the variables, therefore, this suggests that all the variables are integrated of the order 0.

5.2.2 Co-integration Test

Co-integration test is used in testing the linear combination of two or more time series. When the series are more than one they link to form a long run relationship that is possible even if individually they contain stochastic trend/non-stationary, as over time they are assumed to move together and be stable and stationary (Granger,1990). In this case, since the variables are integrated of the order one, variables are expected to have a long run relationship. The Johansen test (Johansen-Juselius, 1990) was used. Table 5.3 below shows the Johansen co-integration test based on trace and maximum Eigen values of the stochastic matrix.

Table 5.3

Johansen cointegration test based on Trace and Maximum Eigen Value test of the Stochastic Matrix

Maximum Eigen Test				**Trace test**			
H_o: rank=r	$H_{a:}$ rank=r	Statistics	5% Critical Value	H_o: rank=r	$H_{a:}$ rank=r	Statistics	5% Critical Value
r = 0	r = 1	73.47**	33.88	r = 0	r ≥ 1	123.93**	69.82
r ≤ 1	r = 2	27.46	27.58	r ≤ 1	r ≥ 2	50.46**	47.86
r ≤ 2	r = 3	13.44	21.13	r ≤ 2	r ≥ 3	23.00	29.80
r ≤ 3	r = 4	7.09	14.26	r ≤ 3	r ≥ 4	9.57	15.50
r ≤ 4	r = 5	2.48	3.84	r ≤ 4	r ≥ 5	2.47	3.84

Source: Author's compilation using Eviews.

*Note: ** mean the null hypothesis is rejected at 5%.*

The null hypothesis of co-integration states that there is no co-integration. In co-integration testing, using the t-statistics indicates that the rejection of the null hypothesis means that the calculated value of the test statistics is greater than the critical value, meaning that the null hypothesis of no co-integration is rejected and concludes that there is co-integration. Table 5.3 shows the trace test that the null hypothesis has been rejected because the calculated t-statistics of 123.93 is greater than 69.82 of the critical

value and concludes that there is co-integration between the variables. Furthermore, the test for Maximum Eigen value Test showed that one of the calculated values is greater than the critical value at 5% significant level. This means that there more than one co-integrating equation. Thus, a unique long run relationship exists among the variables and tells us that output growth, trade openness, capital formation, labour force and exchange rate are co-integrated. After co-integration results have been presented as above, the VEC technique was used to estimate the regression for the Granger causality, the impulse response function and the forecast error variance decomposition.

5.2.3 Vector Error Correction Model

After co-integration has been done, the restricted VAR, also known as the Vector error correction model (VECM) is estimated when the variables are co-integrated. The VAR procedure responds to how a change in one variable affects the future system or shows forecasts of economic shocks (Engle & Granger, 1987). Furthermore, the VAR model in this study is used to test the relationship between GDP per capita, trade openness, capital formation, labor and exchange rate.

The restricted VAR was first applied to test the information on lag and how stable the model is. The information on lag is shown below in Table 5.4

Table 5.4

Lag order selection for VAR system

Lag	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	NA	3.96e-09	-5.157913	-4.924381	-5.083204
1	290.5605	1.19e-13	-15.59793	-14.19674	-15.14968
2	**80.67988***	**1.05e-14***	**-18.17758***	**-15.60872***	**-17.35578***

*Note: (a) * indicates lag order selected by the criterion (b) LR: Sequential modified LR test statistics (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion and HQ: Hannan-Quinn information criterion*

Table 5.4 shows the level of lags and the convergence point of the model is referred to as the optimal lag length. Two lags were selected by LR, FPE, AIC SC and HQ. Table 5.5 following shows the stability condition.

Table 5.5

Polynomial stability condition of the VAR system

Roots	**Modulus**
0.968578	0.968578
0.766410	0.766410
0.673265 – 0.316870i	0.744105

0.673265 + 0.316870i	0.744105
0.618287	0.618287
0.178174 – 0.448403i	0.482505
0.178174 + 0.448403i	0.482505
0.325889	0.325889
-0.220677	0.220677
-0.178285	0.220677

Source: Author's compilation using Eviews

Note: (a) all the modulus is less than one, hence characterising the stability condition.

Table 5.5 shows that all of the modulus is less than one, hence fulfills the stability condition that states that all modulus must be less than one and all roots are expected to lie within the unit circle. Thus, Figure 5.1 in the appendix confirms that no root lies outside the circle and concludes that VAR satisfies the stability condition. Since the model indicate that the variables are co-integrated and stable, the VEC model further estimates the Granger Causality, the Impulse Response Function and the Forecast Error Variance Decomposition.

5.2.4 Granger Causality Test

Granger causality estimates possible causality direction between variables or if variables predict each other. When the probability is less than 0.05, then the null

hypothesis is rejected meaning that there is causality. The five variable-VAR results are summarized in Table 5.6.

Table 5.6

Granger Causality Test results for the generic model

	Dependent Variable in Regression				
Regression	GDP	RK	LL	TROP	RER
GDP	0.000	0.777	0.819	0.213	0.135
RK	0.564	0.000	0.128	0.845	0.917
LL	0.779	0.869	0.000	0.390	0.460
TROP	0.485	0.790	0.163	0.000	0.385
RER	0.751	0.639	0.152	0.614	0.000

Source: Author's own computation

*Note: ** denotes the rejection of the null hypothesis at 5% level of confidence*

(a)The entries in the table show the ρ- values for F-test

The interpretation of Granger causality uses the ρ values and α as they represent the level of significance. The null hypothesis allows the Granger cause to be rejected, if α is greater than the ρ values and the regressors are the ones that predict the dependent variables while, the dependent variables do not predict themselves. In this case, as shown in Table 5.6 all the variables have no predictive power over any other variable. This implies that there is no related causality between the variables.

5.2.5 Impulse Response Function

The Impulse Response Function plots time paths difference between variables. The Generalised Impulse Response Function (GIRF) shows how GDP reacts to exogenous shocks in TROP, L, RK and RER. The GIRF capture multivariate models for both linear and nonlinear unlike the Cholesky Impulse Function where variables are sensitive to the ordering. Figure 5.2 below illustrates the response of GDP to the shocks in real GDP, trade openness, capital formation, labor and real exchange rate.

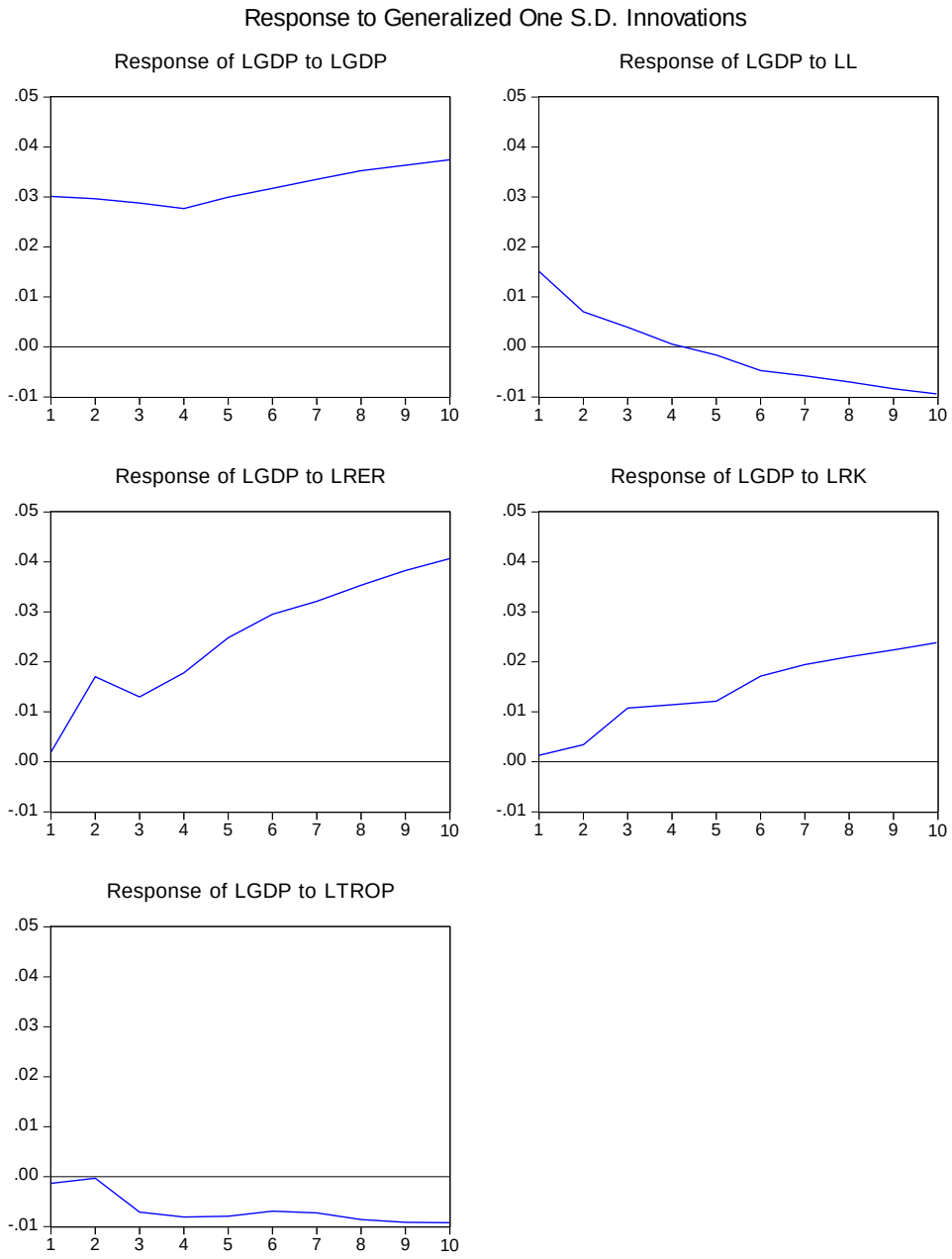

Figure 5.2. Impulse response of output growth of the generic model

Figure 5.2 shows the response of GDP to the shocks in TROP, RK, L and RER. As illustrated in the graph, a shock to real GDP leads to a mild fall in the first three years above the steady state. In the fourth year and onwards, it peaks up and maintains a positive equilibrium state above the steady state from .03 in the initial year to .04. In the long run, the effects of shock tend to wear out and GDP moves in a horizontal manner.

The shock to trade openness (TROP) leads to a sharp increase in GDP in the second year reaching the steady state, and then declines sharply in the third year below the steady state. In the long run, the effects of shock tend to wear out and GDP continues to moves in a decreasing manner below the steady state. This implies that trade openness shows negative effect to economic growth. This does not conform to expectation as the neoclassical theory states that trade have a positive impact on the level of income. However, the decrease in trade is confirmed in a report by the World Bank (2013) that Namibia's import exceeds its exports and trade has remained unchanged since 1990 at 55 to 60% of total GDP. Furthermore, efforts to grow the manufacturing industry is yet to take root, while the main primary export in form of minerals has declined due to global spillover have negatively affected its trade growth.

The impact of capital formation (RK) on GDP shows a sharp increase in economic growth from the first year onwards at .00 to .02 in the tenth year. This shows a positive

impact to economic growth. In the long run, the effects of shock turn to wear out and GDP moves in a horizontal manner. The results conform to theoretical expectation. The output equation of Cobb-Douglas production function implies increasing returns to capital and labour. This means that as investment increases, the higher will be the output growth. Furthermore, a suggestion on increased capital for infrastructure in the manufacturing industry so as to increase value on exported goods will also increase output growth for Namibia. According to a report by World Bank (2012) Namibia has seen a decline in ranking from 42nd among 175 countries to 78th among 183 countries.

A shock in labour (L) lends to a sharp decrease in GDP above the steady state up to the fourth year. The fall continues gradually until it reaches the steady state equilibrium in the fourth year, but continues to fall onwards until the tenth year. This suggests that labour force has a negative impact to economic growth. In the long run GDP moves in a decreasing manner. The outcome is not in line with the expectation in neoclassical production function, where skills or education is a public good and one does not prevent others from obtaining it. This means that when researchers interact amongst each other this result in increased productivity and growth. In this case, more investment in education is needed to improve the skilled labour in Namibia, which is in line with vision 2030.

The shock in real exchange rate leads to an increase in economic growth from the first year and by the second year it shows a decrease, then picks up in the third year and continues to increase above the steady state. In the long run, it moves in the horizontal manner from .00 in the first year to .04 in the tenth year. This implies a positive effect to economic growth as expected. Real exchange rate volatility plays an important role to Namibia in real value transfer of intra SACU revenues. If the real exchange rate appreciates then the real value reduces and vice versa, hence the transfers in turn affect the real GDP growth of Namibia.

Consequently, it is noted that a shock in three variables namely trade openness, capital formation and real exchange rate showed an increase in first year before decreasing, but capital formation maintained an upward trend, while real exchange rate and capital formation in the long run move in a positive manner above the steady state. This shows that there is a negative, but significant relationship between trade openness and economic growth. In addition, to further uncover the interrelationship of variables and movement with time, the forecast error variance decomposition test is done.

5.2.6 Forecast Error Variance Decomposition

The forecast error variance decomposition (FEVD) is used so as to achieve the forecast ability and how each variable is important in random innovation using the VAR model. The FEVD results are illustrated in Table 5.7.

Table 5.7

Variance decomposition

Variance Decomposition of D(LGDP)					
Year	**D(LGDP)**	**D(LL)**	**D(LRK)**	**D(LTROP)**	**D(LRER)**
2	87.882	4.043	0.116	0.697	7.261
4	80.025	11.022	1.821	1.267	5.864
6	68.350	18.173	3.109	0.840	9.529
8	60.251	22.850	4.687	0.587	11.624
10	54.666	25.870	5.660	0.465	13.340
Variance Decomposition of D(LTROP)					
Year	**D(LGDP)**	**D(LL)**	**D(LRK)**	**D(LTROP)**	**D(LRER)**
2	1.873	6.134	10.336	80.755	0.902
4	1.647	7.812	15.003	73.066	2.472
6	2.626	7.696	15.471	72.380	1.827
8	2.937	7.410	16.839	71.117	1.697
10	2.707	6.426	18.356	71.059	1.452
Variance Decomposition of D(LRK)					
Year	**D(LGDP)**	**D(LL)**	**D(LRK)**	**D(LTROP)**	**D(LRER)**
2	2.297	24.964	63.458	0.181	49.099
4	10.355	25.544	58.630	0.358	5.112
6	16.595	22.537	56.625	0.328	3.915

8	20.019	20.079	55.587	0.396	3.918
10	21.490	18.382	55.125	0.445	4.557
Variance Decomposition of D(LL)					
Year	**D(LGDP)**	**D(LL)**	**D(LRK)**	**D(LTROP)**	**D(LRER)**
2	23.971	74.370	1.359	0.028	0.272
4	15.615	75.111	6.145	0.014	3.115
6	7.160	74.391	10.269	0.071	8.109
8	2.864	71.562	12.877	0.095	12.602
10	1.480	68.444	14.206	0.0860	15.784
Variance Decomposition of D(RER)					
Year	**D(LGDP)**	**D(LL)**	**D(LRK)**	**D(LTROP)**	**D(LRER)**
2	2.352	34.040	1.260	2.680	59.396
4	7.176	34.248	2.982	5.575	50.019
6	6.326	39.261	3.260	4.366	46.787
8	5.204	43.204	4.046	3.955	43.592
10	4.649	45.975	5.041	3.353	40.982

Source: Author's own computation

Note: (a) *A two year interval for each variable was made for the FEVD*

(b) Choleski ordering: GDP, LK , L, TROP and RER

It has been noted that as time horizon increases error in GDP, RK, L, TROP and RER decreases due to their own innovation. The forecast errors in GDP, TROP, L and RER

have been increasing with time horizon due to their own innovation except in RER by TROP and in L by GDP where it has been decreasing as time horizon increases. Furthermore, the forecast errors in GDP by L, RER and RK increased as time horizon increases. As such the variance of growth rate is at 100% in the first year. In the fourth year, the variance decomposed in GDP growth rate by its own variance (80.02%) followed by labour (11.02%), real exchange rate (5.86%) and capital formation (1.27%). Furthermore, in the tenth year, the GDP growth rate is approximately constant at 55% followed by labour at 26%, real exchange rate and capital formation (13% and 6% respectively). However, trade openness share in explaining the variation of real GDP indicates a gradual increase from the second to fourth year, then decrease from the sixth year onwards maintaining a constant 0%. In conclusion, the GDP growth rate volatility is usually caused by its own variation, accounting for the majority portion of the fluctuations (more than 50%).

CHAPTER SIX: CONCLUSION AND POLICY IMPLICATION

6.1 Conclusion

The study investigates the relationship between trade openness and economic growth in Namibia using annual time series data for a period 1980 to 2011. In investigating the relationship between trade openness and economic growth in the Namibian economy; openness, capital formation, labour and exchange rate are used as explanatory variables while GDP per capita is the dependent variable in VEC model. Based on stationarity test results using ADF test and PP test showed some variables were stationary in levels, some in first difference and one variable in second difference. Since variables were stationary in different orders, the KPSS test was used to complement the results and stationarity at 5% level of significant for the variable was found and integrated of order 1.

Co-integration test estimated and confirmed that a unique long run relationship exists among the variables. Furthermore, the VEC model estimated the Granger causality results showed that there is no related causality between variables, suggesting no long run causal relationship between trade openness and economic growth. Shocks in real exchange rate and capital formation showed they affect economic growth. However, the effect of the shocks in real exchange rate, capital formation and GDP per capita itself

tend to wear out in the long run. While labour and trade openness affected economic growth negatively.

Furthermore, the variance decomposition analysed that the GDP growth rate volatility accounts for the majority portion caused by its own variation followed by labour, real exchange rate, capital formation and the least was trade openness. This implies that trade openness provide little importance in relation to capital formation in changing GDP growth rate in Namibia.

6.2 Discussion of the result and Policy Implication

The positive impact of real exchange, capital formation and GDP per capita on economic growth is stated by the neoclassical theory. This positive influence of capital formation on GDP growth is similar to the study of Levine & Renalt (1992) and Adhikary (2011). However, trade openness reveals a negative and insignificant sign on changes to GDP growth. The evidence contradicts our positive theoretical expectation. Perhaps, this is due to higher importation of goods than exports and the exportation of mainly primary products with less value addition, hence the deficit in trade balance. The study by Doric and Golley (2004) confirms that specializing in primary exportation has a negative effect for growth which results in little benefit for developing economies in trade.

There exists no related causal relationship between trade openness to GDP growth. The lagged response in capital formation and exchange rate variables reveals a positive and significant effect on changes in GDP growth of Namibia. The results are in line with the theoretical literature of neoclassical theory of linkage between variables and similar to findings of Yamada (1998), Kohpaiboon (2003) and Adhikary (2011). Kohpaiboon (2003) states that FDI (in relation to exchange rate) has greater impact on growth under export-led trade regime in relation to an import substitution regime. Yamada (1998) confirms that adopting export oriented policies that promote labour-intensive industries and investments that create job opportunities for the poor people also leads to economic growth for the country. Furthermore, the variance decomposition analyzed that the GDP growth rate volatility accounts for the majority portion caused by its own variation followed by labour, real exchange rate, capital formation, and lastly trade openness. Trade openness provides little importance in relation to capital formation and labour in changing GDP growth rate in Namibia. Yamada (1998) found similar results on capital formation and supports the effective policy in improving industrial sectors to boost the economy of the country. The following recommendations are made:

- The policy implication of this study are: since labour is the strongest determinant of economic growth, the government should invest more in capital infrastructure to boost investment which brings about new technology and educational development to increase economic growth, with the resultant benefit of employment creation and poverty reduction.

- Improvement on manufacturing sector with labour-intensive output so as to promote exports, create employment thereby reduces poverty.
- Trade-led policies would be necessary to improve exports and discourage imports especially on primary products were demand are inelastic.

6.3 Area for Further Research

The thesis reviews theoretical and empirical literature on the economic effects of trade on growth. The primary focus of the report is the relationship between growth and trade. A critical assessment of the literature still needs to be made along indications above, as well as are several empirical explorations of the relationship between international trade and economic growth arising from the assessment. Economic theory generally supports the conclusion that trade has a positive effect on economic growth. Theorists disagree as to whether increases in the growth rate of a country's economy after a single episode of trade lasts forever. Among the unresolved issues in such researches is the appropriate quantitative measurement of "openness" and the variables used in estimation.

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Appendix

Table 3.1: Selected Studies on Trade Openness

Study author, date	Measure of trade /openness	Variables used	Countries	Findings
Levine and Renelt, 1992	Trade / GDP ratio	Per capita GDP, Openness, Government consumption /GDP, Inflation, Population, Arable land per worker	92 countries (past four decades) Period: past four decades	Indirect impact between trade openness and economic growth through investment and productivity.
Harrison, 1996	Black	Capital stock,	51 countries	No evidence of relationship between trade

	Market Premium	Labour force, Arable land, Technological change, GDP growth, Openness measure	Period:1960-1984	openness and economic growth
Edward, 1998	Sach's and Warner Open Index, World Development Outward Orientation Index, Leamer's Openness	Initial GDP per Capita, Initial Human Capital, Openness, Total Physical Capital	93 countries Period:1960-1990	Negative relationship between openness and productivity growth.

	Index, Average Black Market, Average Input tariff on Manufacturing, Average coverage of non Tariff Barriers, Heritage Foundation

	Index of Distortions in International Trade, Collected Trade Taxes Ratio, Wolf's Index of Import Distortions			
Irwin and Tervio, 2000	Trade / GDP ratio	GDP, Population growth, Openness	150 countries Period: 1913-1990	Positive significant impact
Gries, Kraft and Meierriekes, 2003	Trade / GDP ratio	Real GDP per capita, Openness, Liquid liabilities to	16 sub-Saharan African countries Period: 1960-2004	No significant long run relationship between trade openness, finance and growth

		GDP, Private credit to GDP		
Hassan and Islam, 2005	Trade / GDP ratio	Openness, Private credit, Domestic credit, Real GDP	Bangladesh Period: 1974-2003	Bi-directional causal relationship between financial development, trade openness and growth
Osabuohien, 2007	Trade / GDP ratio	Per capita GDP, Real government expenditure, Labour force, Real capital stock, Openness	Ghana and Nigeria Period: 1975-2004	Positive impact between trade openness and economic growth
Sakar, 2007	Trade / GDP ratio	GDP per capita, Openness	51 countries Period: 1981-2002	Less developed countries showed no positive long term relationship. Middle income countries experienced a positive long term relationship between trade openness and economic growth

Adhikery, 2011	Trade / GDP ratio	Real GDP, capital formation, FDI, Openness,	Bangladesh Period: 1986-2008	Negative and diminishing effect between trade openness and GDP growth rate
Yeboah et al, 2012	Trade / GDP ratio	FDI, Exchange rate, Capital-Labour ratio, Trade openness	38 countries Period: 1980-2008	Positive relationship between trade openness and GDP growth

Source: Author's own construct

Cointegration

Date: 09/04/12 Time: 16:04
Sample (adjusted): 1982 2011
Included observations: 30 after adjustments
Trend assumption: Linear deterministic trend
Series: LGDP LL LRER LRK LTROP
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.913611	123.9314	69.81889	0.0000
At most 1 *	0.599654	50.46461	47.85613	0.0278
At most 2	0.361178	23.00179	29.79707	0.2460
At most 3	0.210504	9.557893	15.49471	0.3163
At most 4	0.078945	2.467072	3.841466	0.1163

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.913611	73.46683	33.87687	0.0000
At most 1	0.599654	27.46282	27.58434	0.0518
At most 2	0.361178	13.44390	21.13162	0.4122
At most 3	0.210504	7.090821	14.26460	0.4785
At most 4	0.078945	2.467072	3.841466	0.1163

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

lag length

VAR Lag Order Selection Criteria
Endogenous variables: LGDP LL LRER LRK LTROP
Exogenous variables: C
Date: 09/04/12 Time: 16:05
Sample: 1980 2011
Included observations: 30

Lag	LogL	LR	FPE	AIC	SC	HQ
0	82.36870	NA	3.96e-09	-5.157913	-4.924381	-5.083204
1	263.9690	290.5605	1.19e-13	-15.59793	-14.19674	-15.14968
2	327.6637	80.67988*	1.05e-14*	-18.17758*	-15.60872*	-17.35578*

* 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

AR Root (Stability)

Roots of Characteristic Polynomial
Endogenous variables: LGDP LL LRER LRK LTROP
Exogenous variables: C
Lag specification: 1 2
Date: 09/04/12 Time: 16:05

Root	Modulus
0.968578	0.968578
0.766410	0.766410
0.673265 - 0.316870i	0.744105
0.673265 + 0.316870i	0.744105
0.618287	0.618287
0.178174 - 0.448403i	0.482505
0.178174 + 0.448403i	0.482505
0.325889	0.325889
-0.220677	0.220677
-0.178285	0.178285

No root lies outside the unit circle.
VAR satisfies the stability condition.

Granger Causality

VEC Granger Causality/Block Exogeneity Wald Tests
Date: 09/04/12 Time: 16:06
Sample: 1980 2011

Included observations: 29

Dependent variable: D(LGDP)

Excluded	Chi-sq	df	Prob.
D(LL)	0.398417	2	0.8194
D(LRER)	4.004418	2	0.1350
D(LRK)	0.505354	2	0.7767
D(LTROP)	3.090749	2	0.2132
All	6.653426	8	0.5744

Dependent variable: D(LL)

Excluded	Chi-sq	df	Prob.
D(LGDP)	0.500134	2	0.7787
D(LRER)	1.554148	2	0.4597
D(LRK)	0.280510	2	0.8691
D(LTROP)	1.884747	2	0.3897
All	4.346481	8	0.8246

Dependent variable: D(LRER)

Excluded	Chi-sq	df	Prob.
D(LGDP)	0.571648	2	0.7514
D(LL)	3.763442	2	0.1523
D(LRK)	0.894362	2	0.6394
D(LTROP)	0.976224	2	0.6138
All	6.688068	8	0.5706

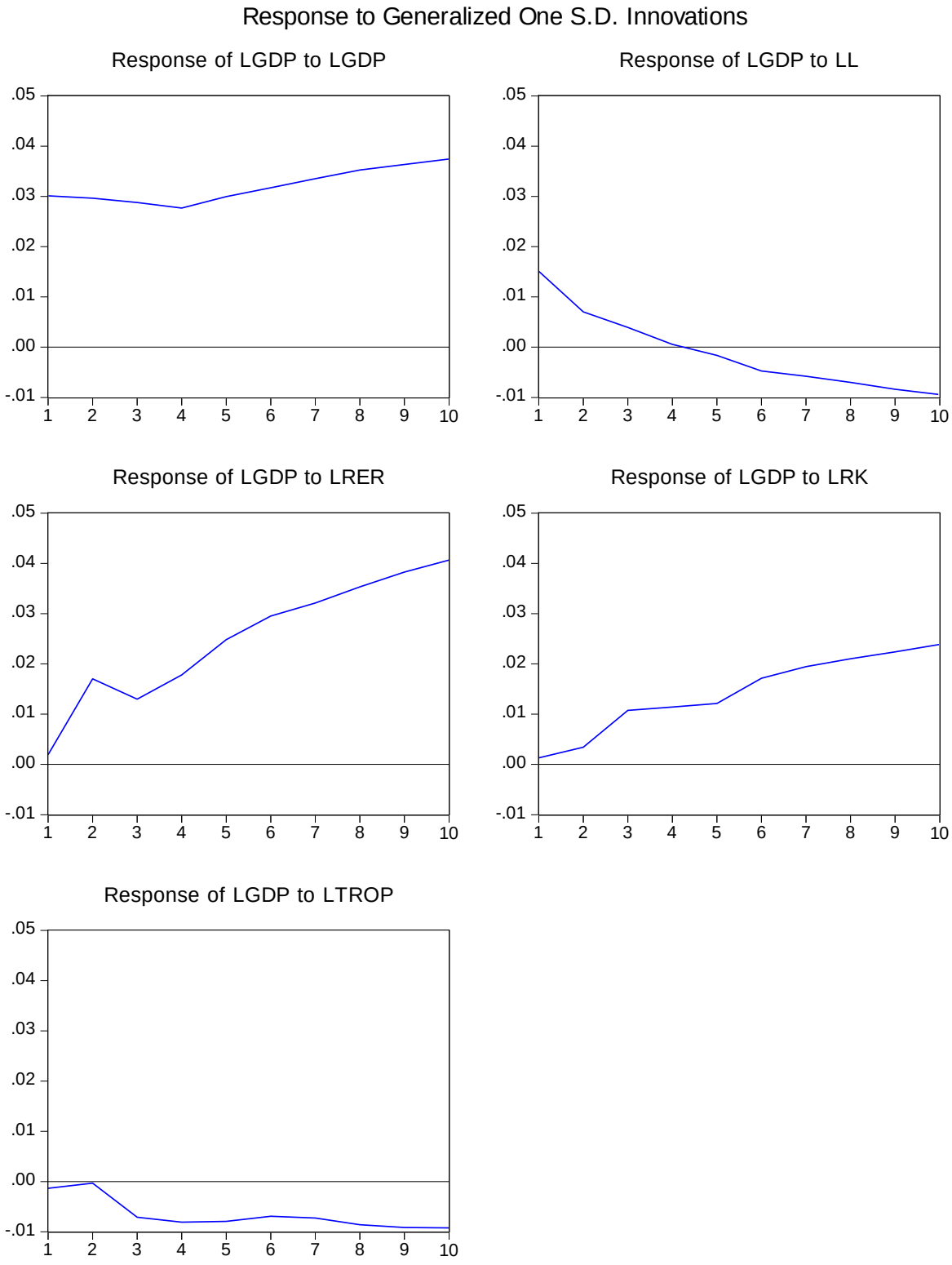
Dependent variable: D(LRK)

Excluded	Chi-sq	df	Prob.
D(LGDP)	1.145827	2	0.5639
D(LL)	4.111337	2	0.1280
D(LRER)	0.174440	2	0.9165
D(LTROP)	0.336398	2	0.8452
All	6.420690	8	0.6002

Dependent variable: D(LTROP)

Excluded	Chi-sq	df	Prob.
D(LGDP)	1.447145	2	0.4850
D(LL)	3.626367	2	0.1631
D(LRER)	1.910142	2	0.3848
D(LRK)	0.471304	2	0.7901
All	5.233777	8	0.7323

Impulse Response Test


Response to Generalized One S.D. Innovations
Response of LGDP to LGDP
Response of LGDP to LL
Response of LGDP to LRER
Response of LGDP to LRK
Response of LGDP to LTROP
.05
.04
.03
.02
.01
.00
-.01
1
2
3
4
5
6
7
8
9
10

Variance Decomposition Test

Variance Decomposition of LGDP: Period	S.E.	LGDP	LL	LRER	LRK	LTROP
1	0.030096	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.045054	87.88210	4.043503	7.261286	0.115611	0.697496
3	0.055534	84.67344	7.412754	5.589566	1.243211	1.081025
4	0.064972	80.02531	11.02171	5.864280	1.821572	1.267127
5	0.075831	74.34968	14.52295	7.920131	2.123120	1.084110
6	0.087898	68.35002	18.17261	9.528796	3.109021	0.839552
7	0.100131	63.87433	20.80250	10.62750	4.019105	0.676569
8	0.112660	60.25099	22.85020	11.62440	4.687064	0.587344
9	0.125222	57.19175	24.51578	12.55952	5.210377	0.522576
10	0.137736	54.66578	25.86982	13.34026	5.659387	0.464748

Variance Decomposition of LL: Period	S.E.	LGDP	LL	LRER	LRK	LTROP
1	0.000527	25.14421	74.85579	0.000000	0.000000	0.000000
2	0.001770	23.97072	74.37038	0.272201	1.359133	0.027573
3	0.003859	20.48908	74.51665	1.237290	3.750560	0.006422
4	0.006801	15.61464	75.11125	3.115044	6.145325	0.013734
5	0.010570	10.90496	75.12338	5.560303	8.369030	0.042322
6	0.015060	7.160452	74.39111	8.108623	10.26862	0.071201
7	0.020115	4.527285	73.11787	10.49946	11.76645	0.088932
8	0.025559	2.863589	71.56221	12.60227	12.87708	0.094848
9	0.031222	1.928112	69.95051	14.36297	13.66580	0.092610
10	0.036960	1.480158	68.44371	15.78382	14.20633	0.085985

Variance Decomposition of LRER: Period	S.E.	LGDP	LL	LRER	LRK	LTROP
1	0.144267	0.419554	34.03961	65.54084	0.000000	0.000000
2	0.198778	2.351691	34.31217	59.39612	1.260088	2.679930
3	0.245651	5.806893	33.05826	52.67443	2.654965	5.805450
4	0.279456	7.176024	34.24816	50.01931	2.981635	5.574869
5	0.307933	6.970122	36.98951	48.00711	3.220144	4.813112

6	0.338775	6.326214	39.26151	46.78664	3.259525	4.366114
7	0.374836	5.711685	41.29017	45.32062	3.515682	4.161849
8	0.413634	5.203537	43.20389	43.59204	4.045937	3.954602
9	0.453862	4.856786	44.80556	42.09938	4.582694	3.655574
10	0.495997	4.649103	45.97483	40.98229	5.041027	3.352751

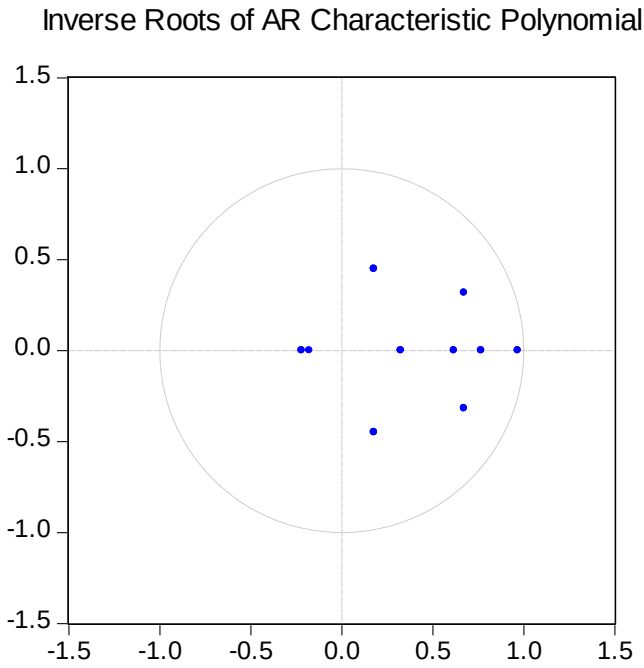
Variance Decomposition of LRK:

Period	S.E.	LGDP	LL	LRER	LRK	LTROP
1	0.275547	0.192236	26.95170	9.829534	63.02653	0.000000
2	0.308463	2.297336	24.96438	9.098989	63.45831	0.180986
3	0.368763	8.461725	25.83699	6.410906	58.84855	0.441822
4	0.415423	10.35526	25.54437	5.112064	58.63039	0.357914
5	0.457052	13.89443	23.84457	4.417174	57.50139	0.342437
6	0.492297	16.59522	22.53690	3.914573	56.62516	0.328154
7	0.522202	18.61360	21.21491	3.798734	56.00825	0.364503
8	0.547666	20.01909	20.07940	3.918100	55.58701	0.396404
9	0.569618	20.96646	19.14481	4.181488	55.28423	0.423012
10	0.589782	21.49012	18.38161	4.557428	55.12541	0.445432

Variance Decomposition of LTROP:

Period	S.E.	LGDP	LL	LRER	LRK	LTROP
1	0.087896	0.202227	6.043237	0.297690	6.482031	86.97482
2	0.116840	1.873499	6.133993	0.902213	10.33553	80.75476
3	0.128206	1.694170	6.417009	2.326481	14.36448	75.19786
4	0.136199	1.647039	7.811864	2.472179	15.00286	73.06606
5	0.147249	2.097064	7.986529	2.146280	14.91308	72.85705
6	0.159649	2.626052	7.695812	1.827103	15.47131	72.37972
7	0.169818	2.907823	7.572113	1.751158	16.26328	71.50563
8	0.177762	2.937240	7.409930	1.697068	16.83904	71.11672
9	0.185272	2.841329	6.988594	1.581446	17.47495	71.11368
10	0.193349	2.707307	6.426182	1.452112	18.35551	71.05889

Cholesky Ordering: LGDP LL LRER LRK LTROP


Inverse Roots of AR Characteristic Polynomial
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-1.5
-1.0
-0.5
0.0
0.5
1.0
1.5