



**UNIVERSITY OF ZIMBABWE**  
**FACULTY OF SOCIAL STUDIES: DEPARTMENT OF ECONOMICS**

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**ANALYSIS OF THE IMPACT OF DOLLARISATION ON  
ZIMBABWE'S INTERNATIONAL TRADE FLOWS  
(2009-2013)**

**BY**

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A dissertation submitted in partial fulfilment of the requirements of the  
Master of Science Degree in Economics

April 2015

## **DECLARATION**

I hereby declare that this dissertation is my own work and that it has not been submitted for assessment to another university or for another qualification. Acknowledgements have been made in instances where work of other people has been used.

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## **DEDICATION**

I dedicate this dissertation to my family for their valuable support.

## **ACKNOWLEDGEMENTS**

I am humbly indebted to all those who extended intellectual guidance and moral support which helped me in putting together this work. In particular, I acknowledge with thanks the supervision of Dr. Albert Makochekeanwa of the University of Zimbabwe, and some colleagues at the World Trade Organisation in Geneva, Switzerland, for their candid comments.

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## ABSTRACT

This study analyses the extent to which dollarisation or the multi-currency system impacted on Zimbabwe's trade flows to, and from, its major trading partners during the period 2009 to 2013, in comparison with the period prior to dollarisation, 2000-2008. Studies that have been done on other dollarised countries have shown mixed results regarding the trade-enhancing effects of dollarisation. This study used the Gravity Model of trade analysis to estimate the effect of dollarisation and other variables on Zimbabwe's exports and imports. A cross-section of twelve (12) Zimbabwe's major trading partners, constituting at least 90% of total trade, formed part of the study over a period of fourteen (14) years. The Gravity Model panel dataset was estimated using the Pooled Ordinary Least Squares regression method, with variables including GDP, distance, exchange rate volatility and dummies for dollarisation, free trade agreements and common language. The study found that dollarisation had no significant effect on the country's exports. Dollarisation was found to have had a very significant effect on imports with an estimate of 0.82 implying that Zimbabwe's imports increased by 147% i.e.  $100(e^{0.82}-1)$ , holding other things constant. This finding is consistent with results of major studies done elsewhere and is kind of a true reflection of the surge in imports actually experienced by the country during the period 2009-2013. The study concludes that dollarisation was more favourable to imports than exports, and contributed to some extent to the country's deteriorating balance of trade. The results, however, show that there could be other critical factors behind Zimbabwe's trade performance given that only 40% of the variation in trade was explained by the variables under consideration.

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## ABBREVIATIONS

|           |                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------|
| AREAER    | Annual Report on Exchange Arrangements and Exchange Restrictions of the International Monetary Fund |
| CFA       | Common Franc Area (Currency Union of Central and West Africa)                                       |
| CMA       | Common Monetary Area                                                                                |
| COMESA    | Common Market for Eastern and Southern Africa                                                       |
| CZI       | Confederation of Zimbabwe Industries                                                                |
| ELCC      | External Loans Coordinating Committee                                                               |
| EU        | European Union                                                                                      |
| EMU       | European Economic and Monetary Union                                                                |
| EPA       | Economic Partnership Agreement                                                                      |
| FDI       | Foreign Direct Investment                                                                           |
| FTA       | Free Trade Agreement                                                                                |
| IDB       | Integrated Trade Database                                                                           |
| IMF       | International Monetary Fund                                                                         |
| IDP       | Industrial Development Policy (2012-2016)                                                           |
| MOFED     | Ministry of Finance and Economic Development                                                        |
| MOIC      | Ministry of Industry and Commerce                                                                   |
| NTP       | National Trade Policy (2012-2016)                                                                   |
| OGIL/OGEL | Open General Import/Export Licence                                                                  |
| OLS       | Ordinary Least Squares                                                                              |
| RBZ       | Reserve Bank of Zimbabwe (Central Bank)                                                             |
| RTA       | Regional Trade Agreement                                                                            |
| SADC      | Southern Africa Development Community                                                               |
| SMP       | Staff Monitored Programme (IMF)                                                                     |
| SPS       | Sanitary and Phyto-Sanitary Measures (Human, Animal and Plant Health)                               |
| UNCTAD    | United Nations Conference on Trade and Development                                                  |
| WAEMU     | West African Economic and Monetary Union                                                            |
| WTO       | World Trade Organisation                                                                            |
| ZIMASSET  | Zimbabwe Agenda for Sustainable Socio-Economic Transformation (2013-2018)                           |
| ZIMRA     | Zimbabwe Revenue Authority                                                                          |
| ZIMSTATS  | Zimbabwe National Statistics Agency                                                                 |

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# **1 CHAPTER 1: INTRODUCTORY CHAPTER**

## **1.1 INTRODUCTION**

The economic policy of dollarisation, or using another country's currency, in place of one country's own domestic currency as legal tender, has been adopted by a number of countries as a tool to enhance macroeconomic stability, and in particular, fighting inflation and promoting international trade. The policy of dollarisation has been seriously considered to achieve economic goals of financial stability, trade integration and price stability (Klein, 2002, Jacome & Lonnberg, 2010).

Zimbabwe, to the best knowledge of this researcher, is the latest country to abandon its national currency in favour of dollarisation. The multi-currency system adopted by Zimbabwe in February 2009 is regarded, in its own right, as dollarisation even though at least five foreign currencies have been contained in the legal tender basket. The foreign currencies adopted include the US dollar, the British pound, the South African rand, the EU euro and the Botswana pula, which replaced the Zimbabwe dollar that had practically lost all its monetary functions to continue in circulation namely; being a medium of exchange, unit of account and store of value. This was following a decade-long period of macroeconomic instability that was characterised by hyper-inflation which reached a record level of 231 million per cent<sup>1</sup> by mid-2008. The multi-currency system is widely credited for restoring macroeconomic stability in Zimbabwe to some extent, and in particular arresting hyper-inflation. All economic growth variables, including the trade component, were expected to improve on their performance relative to the period prior to dollarisation.

Since dollarisation is not a new phenomenon, a number of both theoretical and empirical studies have been done for some countries on the dollarisation-growth-inflation-trade nexus and the general findings have been that dollarisation is, indeed, an important tool that can be used to arrest higher levels of inflation, promote trade and spur economic growth (Berg & Borensztein, 2000; Rose, 2000; Frenkel & Rose, 2002; Edwards & Magendzo, 2004; Bergin & Lin, 2010). There have been, however, mixed findings on the impact of dollarisation on trade with some researchers finding statistically significant impact, while others finding otherwise. The main benefits of dollarisation on bilateral trade have been found to revolve

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<sup>1</sup> Inflation figures available at: <http://www.rbz.co.zw/about/inflation.asp>

around its ability to reduce trade transaction costs via the exchange rate and price level between the dollarised country and the country whose currency is adopted (Lin & Ye, 2006). Renowned academics on the dollarisation-trade nexus such as Andrew Rose et al (2000, 2002 & 2004), have always found that a common currency between countries can increase bilateral trade flows in the currency union by more than three times. Contrariwise, a notable study by Michael Klein (2002) found no meaningful evidence to conclude that dollarisation promotes bilateral trade between countries that use the same currency.

The case of Zimbabwe is rather unique in the sense that its dollarisation took the form of multi-currencies rather than just one currency as has been the case with other countries. Also, unlike other countries that were joining a currency union, Zimbabwe did not get into a currency union per se but unilaterally adopted multi-currencies on its own. Against the brief introduction, this study intends to analyse the extent to which dollarisation (multi-currency system) in Zimbabwe impacted on the country's bilateral trade flows with its major trading partners during the period 2009 to 2013 in which the dollarisation policy has been in place so far<sup>2</sup>. For purposes of this study, the multi-currency system is regarded as de facto dollarisation and is referred to as such throughout the paper.

## **1.2 STATEMENT OF THE PROBLEM**

Since 2009 with the adoption of dollarisation, Zimbabwe experienced phenomenal growth in total trade with its trading partners although the direction of trade has been more inward (imports) than outward (exports). According to data from the Zimbabwe National Statistics Agency (ZimStats), Zimbabwe's total trade (imports + exports) with the rest of the world tripled from US\$4.3 billion in 2008 to around US\$12 billion in 2011 before slightly going down to US\$10 billion in 2014<sup>3</sup>. The trade deficit worsened from US\$1.1 billion in 2008 to an all-time high of US\$5 billion in 2011. The negative trade balance slightly improved to US\$3.9 billion in 2013 and US\$3.3 billion in 2014 (RBZ, 2015), but has still been very high and unsustainable. In actual fact, the trade deficit pre-dollarisation was less than half the level of the deficit during dollarisation. A number of economic agents have attributed the poor increase in total trade driven by imports chiefly to the policy of dollarisation.

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<sup>2</sup> Year 2014 has been excluded from the study due to unavailability of trade data on Zimbabwe's trading partners on international databases by the time of conducting this research.

<sup>3</sup> Zimbabwe export receipts for 2014 amounted to US\$3.6billion, while imports amounted to US\$6.4billion (2015 Monetary Policy Statement by the Reserve Bank of Zimbabwe).

The dollarisation and trade relationship, which is the basis of this study, revolves around reduced transaction costs and exchange rate stability. A number of studies have been carried out to determine the extent of the impact of dollarisation or currency unions on trade and the results have been mixed although a good number of the studies point to trade-enhancing effects of three or more times (Rose et al, 2000, 2002 & 2004). Other studies such as that of Klein (2005) and Nitsch (2005) found no meaningful evidence of trade enhancing effects of dollarisation on trade. Where dollarisation has been found not have significant positive impact on trade it has been suggested that there could be some other country specific factors which could cause dollarisation not offer all perceived and intended benefits and these factors usually include a country's risk profile. Benoni & Lindahl (2014) advise that dollarised countries would need to do much more than just dollarise such as dealing with economic and political country risk if they would want to see meaningful benefits out of dollarisation. Jacome & Lonnberg (2010) advise that dollarising countries should reduce trade-restrictive tariffs and non-tariff barriers to promote exports which are expected to generate more foreign exchange inflows to sustain the dollarisation. This would imply that in as much as dollarisation is perceived to facilitate trade, the policy also depends on trade for it to sustain itself otherwise a country can experience serious liquidity challenges that can hamper economic growth as is happening in Zimbabwe currently.

This study therefore seeks to find out in the context of Zimbabwe whether the phenomenal growth on Zimbabwe's trade flows was mainly due to dollarisation and if so, it attempts to measure the extent of the impact. This is against the background that there could have been other factors that were behind the country's trade performance besides dollarisation especially due to the peculiarity of the Zimbabwe economic situation.

### **1.3 OBJECTIVES OF THE STUDY**

The main objective of this study is to determine the extent to which dollarisation in Zimbabwe impacted on the country's international trade flows with its major trading partners during the period 2009 to 2013 and compare it with the period prior to dollarisation, 2000-2008.

The specific objectives of the study are to;

- i. Ascertain the extent to which dollarisation in Zimbabwe influenced the country's total bilateral trade flows to and from its trading partners during the period 2009 to 2013;
- ii. Ascertain the extent to which dollarisation impacted on the flow of imports into Zimbabwe and impacted on the country's exports to major trading partners during the period under review, and
- iii. Identify other factors that could have influenced the direction, composition and quantum of Zimbabwe's trade with its major trading partners and make policy recommendations that could promote trade to the country's best advantage.

#### **1.4 RESEARCH QUESTIONS**

The study seeks to answer the following research questions;

- i. To what extent did dollarisation or the multi-currency system in Zimbabwe impact on the country's total trade with key trading partners during the period 2009 to 2013?
- ii. To what extent did dollarisation impact on the flow of imports into Zimbabwe during the period under review?
- iii. To what extent did dollarisation impact on Zimbabwe's exports to major trading partners during the same period?
- iv. To what extent did dollarisation impact on the country's balance of trade during the period under review?
- v. What other factors could have contributed to Zimbabwe's trade performance during the period under review?
- vi. What policy recommendations could be put forward for Zimbabwe to increase on its trade to the best of its advantage?

#### **1.5 HYPOTHESES TESTING**

The following hypotheses will be tested in the study;

*Null Hypothesis ( $H_0$ ):* Dollarisation had a minimal impact on Zimbabwe's trade flows and balance of trade during the period 2009 to 2013.

*Alternative Hypothesis ( $H_1$ ):* Dollarisation had a direct significant impact on Zimbabwe's trade flows and balance of trade during the period 2009 to 2013.

## 1.6 JUSTIFICATION OF THE STUDY

The subject of dollarisation and its impact on trade in Zimbabwe has not been widely studied empirically by many to the best knowledge of this researcher. There have been some qualitative analytical pieces of work in general on options for the best currency regime for the country. A detailed study on the impact of dollarisation on Zimbabwe's trade performance is important going forward under the new national development strategy, the Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZIMASSET) (2013-2018)<sup>4</sup>, which policy-makers expect to turn-around the fortunes of the economy. ZIMASSET and the National Trade Policy of Zimbabwe (2012-2016) recognise the importance of trade as 'the engine for economic growth and development'. It is common knowledge that dollarisation in Zimbabwe has incentivised imports due to limited exchange rate risk and disincentivised exports as evidenced by the general reluctance by local manufactures of goods to export due to several factors noted by the Confederation of Zimbabwe Industries (CZI) in its 'State of the Manufacturing Sector Survey' of 2014. Although the policy of dollarisation was received with enthusiasm and high expectations by economic agents, little did they anticipate that the policy could in some way negatively impact on economy.

Three notable studies on Zimbabwe's dollarisation focussed on the way forward for Zimbabwe regarding the country's currency regime, that is, whether to continue with the multi-currency system or to de-dollarise. Chigumira, Chipumho & Shamu (2009), Makochekanwa (2009) and Chigome (2011) did some analytical research on this and proposed a number of policy options for consideration. The studies, however, did not focus conclusively on the impact of dollarisation on trade, hence this researcher's keen interest to explore how and to what extent dollarisation impacted on Zimbabwe's trade.

The findings of this research will give evidence-based recommendations to policy-makers in an effort to boost Zimbabwe's bilateral trade flows to the best advantage of the country. The determination of the extent of the impact of dollarisation on the country's trade performance could assist policy makers in determining an ideal policy mix to facilitate increase in Zimbabwe's trade with the rest of the world. The government can consider trade effects of the policy of dollarisation as it considers options for a future sustainable currency regime for the country. This is in light of the current liquidity and competitiveness challenges the

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<sup>4</sup> Available at <http://www.zimtreasury.gov.zw/zim-asset>

country has been faced with. There has always been need to address the foreign currency shortage in the economy and also boosting foreign currency reserves for the country in order to tackle head-on the country's high external debt and attract capital inflows. These myriad of challenges can only be solved by boosting valued-added exports, which is the most sustainable source of foreign currency.

The private sector is expected to benefit from this study by appreciating the situation the country is faced with in terms of trade with the rest of the world under the multi-currency system. In as much as industry would prefer the local market to foreign markets as they would still get the foreign currency they require, the small size of the internal market in Zimbabwe cannot spur growth through trade hence the need to look beyond the country's borders. The liquidity challenge the local industry has always cried about and the protectionist policies they have always advocated for to counter competitiveness challenges posed by cheap imports are better handled by boosting exports.

The academia and other researchers are expected to benefit from this study that has not been extensively explored by many in the country. The study attempts to present evidence-based analysis of the impact of the multi-currency system on Zimbabwe's trade flows. The academia is recommended to further carry out research in this area guided by the groundwork laid by this study.

## **1.7 METHODOLOGY**

In order to examine the extent of the impact of dollarisation on Zimbabwe's trade flows with its major trading partners during the period 2009 to 2013, the study makes use of the Gravity Model of trade analysis, which is an empirical model that has been used to explain trade flows between countries or trading partner countries. The model postulates that the flow of trade between two countries is proportional to the size of the two countries' economies and that it is inversely proportional to the distance between them. For this study, the model is extended to incorporate additional variables that have been found to have influence on trade, including dollarisation and free trade agreements.

To get a clear analysis of the impact, the study estimates exports and imports separately, using Pooled OLS Gravity Equations. In addition to the quantitative analysis, the study also

carries out qualitative analysis of Zimbabwe general macroeconomic performance and operating environment with a view to establishing the extent of the impact of other factors on the country's trade flows during the period under review. Accordingly, a qualitative analysis will form part of Chapter 2 on the background and synopsis of Zimbabwe's experience with dollarisation.

## **1.8 ORGANISATION OF THE STUDY**

Following this introductory chapter (Chapter 1); the study is structured as follows; Chapter 2 gives background and synopsis of Zimbabwe's experience with dollarisation in relation to the country's international trade performance; Chapter 3 reviews both theoretical and empirical literature with focus on the objectives of the study and research questions; Chapter 4 outlines the research methodology for the study; Chapter 5 presents and analyses information/data gathered; and Chapter 6 summarises research findings and concludes with policy recommendations. Suggestions for future research on the subject matter on the dollarisation and trade nexus are recommended thereafter.

## **2 CHAPTER 2: ZIMBABWE EXPERIENCE WITH DOLLARISATION**

### **2.1 OVERVIEW OF MACROECONOMIC PERFORMANCE**

The general economic performance of Zimbabwe has been lethargic since the period at which the country embraced the IMF-backed Economic Structural Adjustment Programme (ESAP) of the 1990s. The situation further deteriorated from year 2000 when the country embarked on a fast-tracked land reform programme whose controversy resulted in the country being slapped with sanctions by some members of the international community. The country's GDP growth averaged 2.4% per year from 1980 to 1992. As confirmed in the National Trade Policy (2012-2016) document (NTP)<sup>5</sup>, from 2000 to 2008 Zimbabwe's economy contracted by over 40% due to a myriad of challenges among them; hyper-inflation that reached a record high of 231 million per cent by mid-2008, poor export performance due to commodity price instability on the international market (Zimbabwe is a major exporter of primary commodities), balance of payments (BOP) difficulties and a huge unsustainable external debt. The country has not been able to attract meaningful BOP external support due to sanctions and multilateral financial institutions such as the IMF and the World Bank have not come yet to the country's rescue because of arrears.

Productive sectors of the economy underperformed during the 'lost decade' 1998-2008 due to high interest rates, high costs of production and excessive exchange controls which affected their ability to import essential goods and services. The exchange controls also required exporters to surrender a significant proportion of their proceeds to the monetary authorities in exchange of the local currency, which was under threat from hyperinflation. Foreign exchange shortages, and poor utility supplies (electricity, water and coal) and infrastructure bottlenecks (due to deferred maintenance) sum up the host of challenges the country was faced with (WTO, 2011). Independent researchers such as Chigumira, Chipumho & Shamu (2009) confirmed the above-cited challenges and the serious macroeconomic instability that Zimbabwe went through which resulted in industrial capacity utilisation going down and the country facing skills flight to other countries.

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<sup>5</sup> Available at: [www.mic.gov.zw/policies](http://www.mic.gov.zw/policies)

In February 2009, following the consummation of the Government of National Unity (GNU) between the country's main political parties (ZANU-PF and MDC), the Government of Zimbabwe adopted a new economic revival strategy dubbed the Short Term Emergency Recovery Programme (STERP)<sup>6</sup> which embraced the multi-currency system that officially replaced the local currency. Zimbabwe's inflation dramatically fell to a single digit level of 7.7% by end of year 2009 from 231 million per cent of the previous year. Industrial capacity utilisation in the manufacturing sector increased from an average of 10% to 32.3% by end of year 2009. An array of monetary and fiscal policy austerity measures under the stewardship of then Finance Minister, Tendai Biti, brought some remarkable macroeconomic stability. The policy reforms included liberalisation measures that removed price and foreign exchange controls and fiscal prudence. As a result, the economy grew by 5.7%, 8.1%, 9.3% and 10.5% in 2009, 2010, 2011 and 2012, and the sectors that were driving these growth rates were mainly mining and agriculture (WTO, 2011).

Unpredictably, the economic rebound the country experienced from 2009 to 2012 started slowing down with GDP growth rate decelerating from 10.5% in 2012 to 4.5% in 2013 and 3.1% in 2014 due to systemic challenges affecting all sectors of the economy. The challenges, somewhat similar to yesteryear challenges, include high costs of production, antiquated plant and machinery, competitiveness in face of cheap imports, weak demand for goods on the local market. The ZIMASSET proposed an economic growth target of 6.1% per year from 2014 to 2018, and with these sudden developments, it is highly unlikely that the target will see the light of day.

According to the Reserve Bank of Zimbabwe Monetary Policy Statement for 2015, annual average inflation, which fell from 3.7% in 2012 to 1.6% in 2013, declined further to -0.2% in 2014. The negative inflation trend is expected in 2015 and likely beyond and is being termed by authorities as disinflation or self-correction to the pricing structure and not necessarily deflation. The explanation to this has been that the 'invisible hand' set up the country's price structure based on higher levels of the hyper-inflationary era and this ended up fixing prices domestically higher than the price levels in some neighbouring countries such as South Africa.

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<sup>6</sup>Available at: <http://www.zimtreasury.gov.zw/sterp>

The IMF (2014) noted that Zimbabwe state of the economy is precarious, characterised by lack of foreign exchange reserves, large external debt, huge current account and tight foreign currency liquidity challenges. It also observed the fiscal space challenges the country is faced with amid incapacity to generate more revenue by government. The Confederation of Zimbabwe Industries (CZI) in its 'State of the Manufacturing Sector Survey' for 2014<sup>7</sup> decried the poor state of the manufacturing sector. Deindustrialisation is fast taking its toll, and the business chamber organisation has appealed to both the private and public sectors to take action before the situation seriously gets out of hand. Table 2.1 below shows the levels of industrial capacity utilisation for the manufacturing sector from 2000 to 2014.

**Table 2.1: Zimbabwe Industrial Capacity Utilisation**

| Year                                | 2000 | 2002 | 2004  | 2006  | 2008 | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  |
|-------------------------------------|------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|
| <b>Average Capacity Utilisation</b> | 56%  | 60%  | 59.2% | 33.8% | 10%  | 32.3% | 43.7% | 57.2% | 44.9% | 39.6% | 36.3% |

Source: CZI Manufacturing Sector Surveys (2009-2014)

The major factors that have been identified by the CZI as affecting industrial capacity utilisation are listed in Table 2.2 below for the years 2012 to 2014;

**Table 2.2: Factors Affecting Industrial Capacity Utilisation (2012 – 2014)**

| Capacity Constraint                         | 2012 (%ge) | 2013 (%ge) | 2014 (%ge) |
|---------------------------------------------|------------|------------|------------|
| Low Local Demand                            | 13.3       | 17.6       | 28.8       |
| Working Capital Constraints                 | 32.3       | 40.2       | 26.5       |
| Competition from Imports                    | 9.5        | 12.5       | 14.2       |
| Antiquated Machinery and machine breakdowns | 11.4       | 9.8        | 7.3        |
| Drawbacks from current economic environment | 8.4        | -          | 7.0        |
| High cost of doing business                 | 8.0        | 5.2        | 6.2        |
| Shortage of raw materials                   | 5.3        | 5.9        | 6.2        |
| Power and water shortages                   | 9.9        | 8.8        | 3.8        |
| Other factors                               | 1.9        | -          | -          |
| <b>Total</b>                                | <b>100</b> | <b>100</b> | <b>100</b> |

Source: CZI Manufacturing Sector Survey (2014)

<sup>7</sup> Available at: [http://www.czi.co.zw/CZI\\_2014.pdf](http://www.czi.co.zw/CZI_2014.pdf).

The authorities in Zimbabwe are quite alive to the challenges the country is facing. The country has been under two successive IMF Staff Monitored Programs (SMPs) wherein the authorities agreed to implement some proposed policy reforms. The initial SMP ran from March 2013 to June 2014, while the second one was approved to run from October 2014 to December 2015. The main objectives of the new SMP include improving the country's fiscal and external positions; putting in place measures to tackle the country's external debt, and improving the business climate (MOFED, 2015). After successful completion of the SMP, Zimbabwe might be able to qualify for debt relief and budgetary support from multilateral financial institutions and bilateral development partners. Since 2000, Zimbabwe has not benefited from any international budgetary support save for humanitarian support (WTO, 2011).

In a statement at the end of the First Review of the Zimbabwe SMP in March 2015<sup>8</sup>, the IMF advised that despite the difficulties Zimbabwe is facing, the authorities have been making progress in implementing the agreed reforms. Some of the reform measures noted include tax regime reform, balancing fiscal accounts including managing the public sector wage bill, restoring confidence in the financial services sector, improving the investment climate, and stepping up efforts to clear outstanding arrears and re-engage with multilateral financial institutions.

## **2.2 EXPERIENCE WITH MULTI-CURRENCY DOLLARISATION**

As indicated in the preceding section, hyperinflation in Zimbabwe between year 2000 and 2008 was so endemic to the extent that the local currency had to be abandoned by economic agents before it was officially phased out in March 2009. As noted by Chigumira, Chipumho & Shamu (2009), the hyper-inflation increased the cost of doing business and affected the competitiveness of locally produced goods in comparison with foreign products. Economic agents' lost confidence in their own currency as it had lost its basic function of being a store of value and it became difficult to conduct normal transactions using it. As such, people resorted to conducting illegal foreign currency transactions in both the formal and informal sector using 'black' or 'parallel' market exchange rates to evade exchange controls. The parallel market exchange rates were indexed depending on whether it was a cash transaction

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<sup>8</sup> <http://www.imf.org/external/np/sec/pr/2015/pr15175.htm>

(lower exchange rate but more beneficial) or an electronic transaction (better exchange rate but less beneficial). The latter option was less beneficial in the sense that agents had to be paid for their foreign exchange in trillions of Zimbabwe dollars into the bank account, of which it was difficult to withdraw the cash equivalent out of the bank. The money in the bank ended up losing value due to inflation. This system was popularly referred to as 'burning Zim dollar' in street language.

Due to the unstable macroeconomic environment and following recommendations by various economic agents including captains of industry and commerce, Zimbabwe authorities unilaterally officially adopted the use of multi-foreign currencies as legal tender alongside the local currency in January 2009<sup>9</sup>. This move was without formal agreements with the countries whose currencies were adopted. The five currencies adopted then were the US dollar, the South African rand, the British pound, the Euro and the Botswana pula<sup>10</sup>.

The dominance of each of the multi-currencies adopted in 2009 has been dependent upon the proximity of one area to some of the countries whose currencies were in use. Initially towns closer to South Africa preferred rands (Beitbridge and Bulawayo for instance); and those close to Botswana (Bulawayo and Plumtree) preferred pulas (Noko (2009)). The US dollar, however, has dominated the market as the most preferred currency because of its stability against other currencies and the fact that transactions by government have largely been denominated in US dollars, including payments to the civil service. The South African rand has lost favour with economic agents despite the fact that South Africa is Zimbabwe's largest trading partner. The stability of the US dollar against the rand has seen suppliers from South Africa having tendency to quote their goods and services in US dollars for Zimbabwe importers. The euro has not really found favour in Zimbabwe despite being one of the legal tenders.

With dollarisation, the country's central bank and monetary authority, the Reserve Bank of Zimbabwe, lost its independence on monetary policy to a greater extent. The central bank's role has largely been limited to bank supervision and surveillance. In support of dollarisation,

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<sup>9</sup> The Zimbabwe dollar was officially phased out in March 2009

<sup>10</sup> In February 2014, the Reserve Bank of Zimbabwe announced the inclusion of four additional currencies into the multi-currency basket and these are the Australian dollar, Chinese Renminbi (Yuan), Indian rupee, and the Japanese yen.

the monetary authority deregulated exchange controls on imports and exports as well as capital controls. For instance, external loans of up to US\$5 million, since 2009, and now US\$7.5 million since 2014 are approved by banks without prior approval of the External Loans Coordinating Committee (ELCC) of the central bank (RBZ, 2014).

With the advent of the multi-currency system, the business sector and transacting public had limited confidence in the financial services sector in general and the monetary authority in particular following nasty experiences of the Zimbabwe dollar and hyper-inflation era. The scepticism affected foreign currency inflows into the normal banking system initially but as noted by Noko (2009), within six months after dollarisation bank deposits increased by 141% from US\$290 million in 2008 to US\$700 million in June 2009, and then US\$1.5 billion by end of 2009. By December 2014 bank deposits in Zimbabwe stood at US\$4.4 billion from US\$3.9 billion the previous year driven by tobacco sales (RBZ, 2015).

The positive developments in terms of economic recovery that were brought about by dollarisation in Zimbabwe were quite noticeable and commended locally and internationally. Chigumira, Chipumho & Shamu (2009) hailed dollarisation for arresting hyperinflation to single digit levels, bringing stability in the financial services sector and capital markets, bringing about fiscal discipline and general economic stabilisation. Despite these positive developments, dollarisation had its own downsides. Of major concern has been the exchange rate volatility between the US dollar and the South African rand in view of the fact that Zimbabwe imports much of its goods from South Africa. The rand has been unstable and this has had negative effect on pricing of goods and competitiveness of locally manufactured goods which have faced stiff competition from cheap imports mainly from South Africa and China. In addition, the inability by the RBZ to utilise monetary policy instruments to influence economic activities through interest rates and exchange rates left the economy exposed to external influences. The monetary authority was incapacitated by dollarisation to generate seigniorage revenue and kind of lost its lender-of-last-resort function to support the financial services sector. This actually exacerbated the financial liquidity situation in the economy.

The issue of coins has also been a challenge in the multi-currency system. Only South African rand coins have been circulating in Zimbabwe during the period 2009-2014. These coins have been in short supply resulting in prices of goods being rounded-up to the nearest

dollar. This resulted in consumers being forced to buy smaller items such as sweets at higher prices or given credit notes in lieu of change. The transacting public was subjected to a fixed exchange rate of US\$1=ZAR10 or US\$1=ZAR8 depending on what would leave the seller at advantage. To solve the change problem, the RBZ introduced, on 18 December 2014, small denomination bond coins of 1c, 5c, 10c and 25c meant to circulate along with US\$ notes and other foreign currencies<sup>11</sup>. According to the central bank, the 'bond coins' are legal tender and are bonded to a US\$ facility hence they give the coins strength of being at par with US cents (RBZ, 2015)<sup>12</sup>. The central bank advised that the coins were also meant to address the problem of competitiveness through a proper pricing system of goods and services. These bond coins have been in circulation and indications have been that the transacting public is gradually embracing the coins following assurances by authorities that the coins do not signify return of the Zimbabwe dollar. Another downside of dollarisation has been limited access to affordable and long-term capital by the productive sectors. The banks have been incapacitated to on-lend since deposits into the banking sector have mainly been demand deposits. As enunciated in the Zimbabwe Industrial Development Policy (2012-2016) and further expounded in the Reserve Bank Monetary Policy Statement of 2015, this compromised the ability of productive sectors to produce goods competitively to counter cheaper imports.

Zimbabwe has gone for six years now with dollarisation but the economy seems to be at cross-roads. The CZI (2014) noted that the economy has failed to sustain the growth trajectory experienced since 2009. The Minister of Finance and Economic Development, Patrick Chinamasa, and the Governor of the Reserve Bank of Zimbabwe, John Mangudya, in their 2015 Fiscal and Monetary Policy Statements, respectively acknowledged that the economy is under-performing and that the myriad of challenges being faced require solutions. Against this background, debate around the possibility of re-introducing the Zimbabwe dollar to capacitate government and improve on financial liquidity has been going on among economic agents, albeit with mixed feelings. However, the authorities have expressed commitment to preserving the multi-currency system until important economic fundamentals are addressed<sup>13</sup>. This is well in line with the recommendation by Chigumira, et al (2009) that the local currency should only be returned after the basic fundamentals that led to the demise

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<sup>11</sup> The 50c coin was later introduced on 31 March 2015

<sup>12</sup> RBZ 2015 Monetary Policy Statement, available at:  
[www.rbz.co.zw/.../2015%20MPS/Monetary%20Policy%20Statement%202015](http://www.rbz.co.zw/.../2015%20MPS/Monetary%20Policy%20Statement%202015)

<sup>13</sup> 2015 National Budget Statement (November, 2014), and Monetary Policy Statement (January 2015).

of the currency are fully addressed. Alternatively, Makochekanwa (2009) proposed the following currency options for Zimbabwe in order of priority; continuation with dollarisation, return of the local currency under a currency board management, joining a currency union (the Common Monetary Area of South Africa, Namibia, Swaziland and Lesotho), or free banking.

## **2.3 TRADE POLICIES AND PRACTICES**

Zimbabwe's trade policies and practices have largely been under the influence of developments at the macroeconomic level. As such, the economic instability explained in the preceding section and the multi-currency system policy to some extent can explain the country's trade performance. In its 2011 report to the WTO<sup>14</sup>, the Government of Zimbabwe advised that macroeconomic stability and effects of sanctions forced the country to adopt an inward-looking development strategy whose policies may have been inconsistent with the country's commitments to the multilateral trading system. The policies are said to have affected inflows of foreign currency into the economy to fund essential import requirements such as raw materials for industry, grain, fuel and electricity. Following the introduction of the multi-currency system in 2009, Zimbabwe adopted an outward-oriented development strategy characterized by liberalisation of exchange controls on imports and exports in line with SADC's Protocol on Exchange Controls (RBZ, 2015). This strategy was meant to promote exports and attract capital account inflows and FDI. The central bank has indicated in its 2015 Monetary Policy Statement that it is necessary for Zimbabwe to liberalise exchange controls further.

Most of Zimbabwe's imports and exports are under the Open General Import/Exports Licence (OGIL/OGEL) scheme and as such do not require licences. However, certain controlled products require import/export licences and/or permits through the Control of Goods Act administered by the Ministries of Industry and Commerce, Agriculture and Health for various reasons including the need to comply with Sanitary and Phyto-Sanitary (SPS) regulations (human, animal and plant health) and for statistical purposes (NTP, 2012). Zimbabwe's tariff policy and system is to some extent guided by the country's commitments under the multilateral trading system of the WTO, and also its regional and bilateral trading arrangements in which the country is party to. The applied import tariffs consist of seven

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<sup>14</sup>Available at: [https://www.wto.org/english/tratop\\_e/tpr\\_e/tp352\\_e.htm](https://www.wto.org/english/tratop_e/tpr_e/tp352_e.htm)

bands namely; 0%, 5%, 10%, 15%, 20%, 25% and 40% (WTO Integrated Database Notifications)<sup>15</sup>. Raw materials and capital goods have lower duties, intermediate goods have moderate duties and final goods have relatively high duty rates. Other taxes (Value Added Tax and Surtax) are charged in some instances over and above the normal customs duties. The tariffs have, however, been reviewed on ad-hoc basis in recent years to protect local industry from cheap imports as acknowledged in the NTP, and also to improve on supply of commodities on the local market in instances of shortages. The Industrial Development Policy (2012-2016) confirms that Zimbabwe's tariff system is influenced by sector specific needs and imperatives. As such, due to import surges during the period of the multi-currency system, the government has been under pressure from industrialists to put in place protectionist measures through higher tariffs on cheap imports. The justification for this has been to address competitiveness challenges under the 'infant industry' argument. But concerns have been raised at regional level as to when the local manufacturers will graduate from being 'infant' and what steps are being taken to address the competitiveness challenges? Tariffs have also been increased on ad-hoc basis necessitated by the need to generate revenue for the fiscus.

Exports of essential goods that could be in short supply in the country such as fertilizers, cement, seed maize, maize among others are prohibited in some instances. There have been attempts to impose export taxes on exports of some raw commodities such as chrome, platinum and hides to allow value addition and beneficiation but incapacity to add value has seen the taxes being reviewed time and again. Exportation of scrap metal is restricted to allow local foundries to reprocess the metals. The NTP advises that export taxes will be introduced on commodities where value addition options are readily available.

## **2.4 TRADE PERFORMANCE**

As earlier noted, international trade has contributed to Zimbabwe's economic growth performance over the years through exports, the major source of foreign currency. The country's trade with the rest of the world steadily increased in the country's favour since 1980 (when the country attained independence) until the early 1990s. Agriculture exports have traditionally been the lead sector given strong backward and forward linkages with other sectors of the economy. According to statistics from UNCTAD Trade Database, Zimbabwe's

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<sup>15</sup> Available at: <http://tariffdata.wto.org/TariffList.asp>

exports to the rest of the world peaked at US\$2.5 billion in 1996 while imports reached a peak then of US\$2.65 billion in 1997. The trade performance started deteriorating from 2000 until 2008 with exports tumbling to an all-time low of US\$1.5 billion in 2008 during the peak of hyper-inflation, while imports increased to US\$2.7 billion. Figure 2.1 below shows Zimbabwe's trade performance from 1995 to 2013.

**Figure 2.1: Zimbabwe Trade Performance (1995-2013) (US\$)**



Source: Author from UNCTAD Trade Data

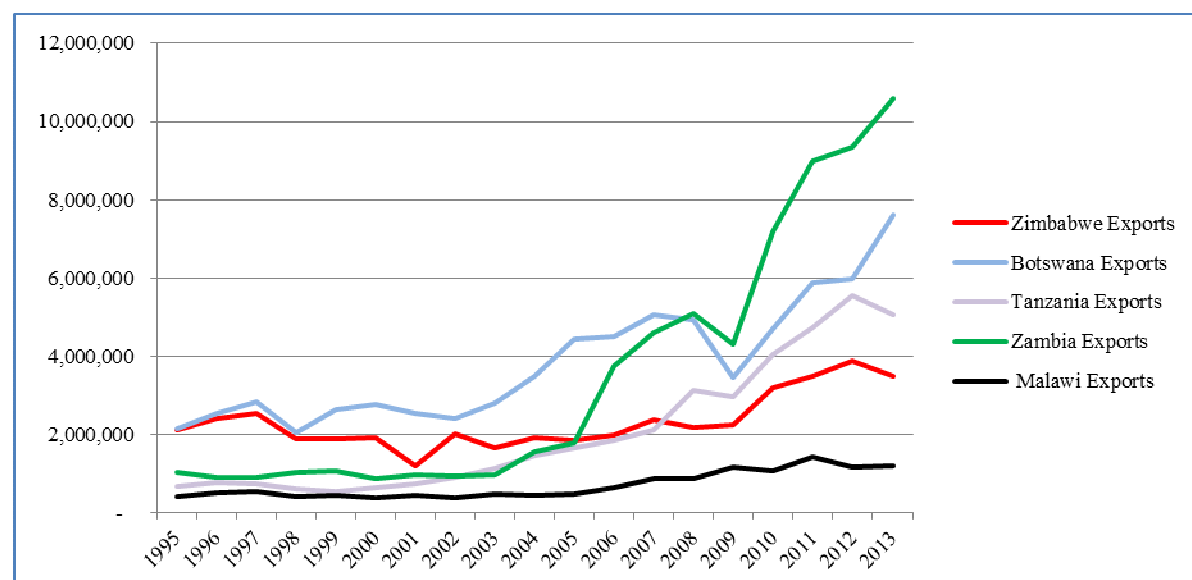
The WTO (2011)<sup>16</sup> flagged Zimbabwe's persistent trade deficits since 1991 which, surprisingly continued to balloon after dollarisation in 2009. As identified by Munoz (2006) in her study on Zimbabwe's export performance post year 2000, exchange controls and exchange rate misalignments gave rise to over-valuation of the Zimbabwe dollar and a high parallel market exchange rate premium. Between 2009 and 2013 Zimbabwe's total trade flows with major trading partners increased largely driven by exponential growth in imports albeit poor export performance. While dollarisation has generally been suggested as an important policy for emerging economies or economies in serious macroeconomic instability, the policy was expected to boost trade flows and preferably in Zimbabwe's favour since 2009. However, the country has experienced poor export performance and a surge in imports resulting in an unsustainable current account deficit.

<sup>16</sup> World Trade Organisation Secretariat Report on Zimbabwe Trade Policy Review (2011), [https://www.wto.org/english/tratop\\_e/tp\\_r\\_e/tp352\\_e.htm](https://www.wto.org/english/tratop_e/tp_r_e/tp352_e.htm)

Pierola, et al (2014)<sup>17</sup> raised concern that despite Zimbabwe's abundant natural resource base, high levels of literacy and the country's strategic regional location in Southern Africa, the country's export performance since the 90s, falls short of its potential to stimulate economic growth. It is observed that dollarisation actually promoted imports given the limited foreign exchange rate risk. On the other hand, local producers were discouraged to export as they found it rather much more profitable to trade on the domestic market than exporting to other countries wherein they would incur extra costs associated with transportation, exchange rate risk, and competition.

In comparison with other regional countries, Munoz (2006), shows that Zimbabwe's export performance in the 1990s was above most African countries' averages. During the period of dollarisation, Zimbabwe's export performance has been overtaken by countries such as Zambia, Botswana and Tanzania which used to export less than one third of what Zimbabwe exported before in value terms. For instance, as observed by Pierola, et al (2014), Zambia is of late exporting twice as much the size of Zimbabwe's exports. Figure 2.2 below gives a reflection of Zimbabwe's export performance in terms of growth in comparison with other countries in the region.

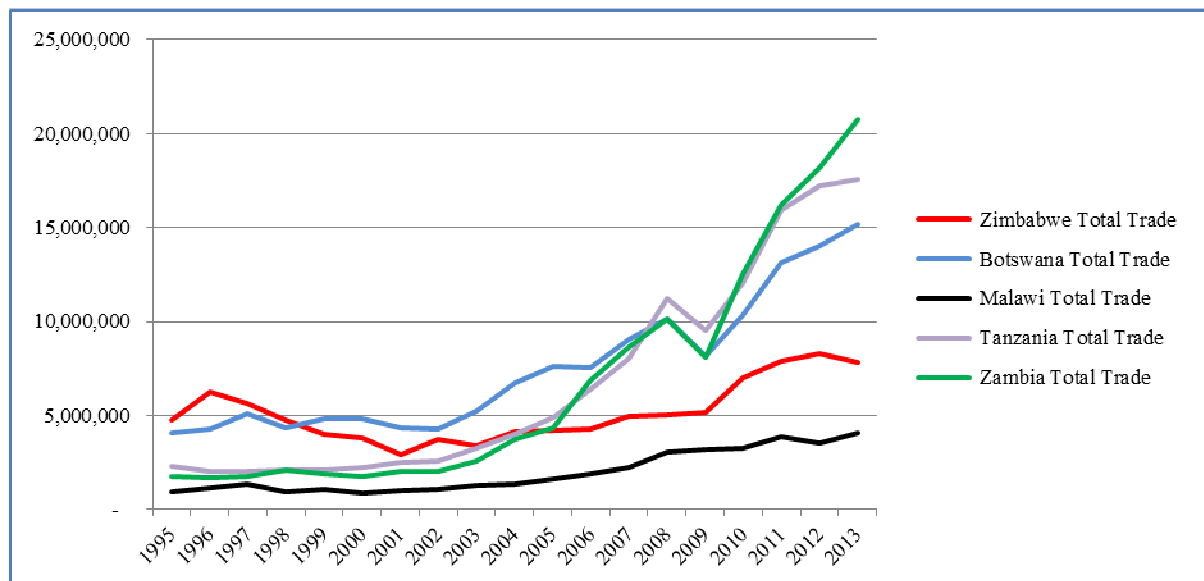
**Figure 2.2: Comparison of Export Performance in the SADC Region**



Source: Author from UNCTAD Trade Data

<sup>17</sup> World Bank Country Report on Zimbabwe Trade and Competitiveness, Seminar Version, March 2014

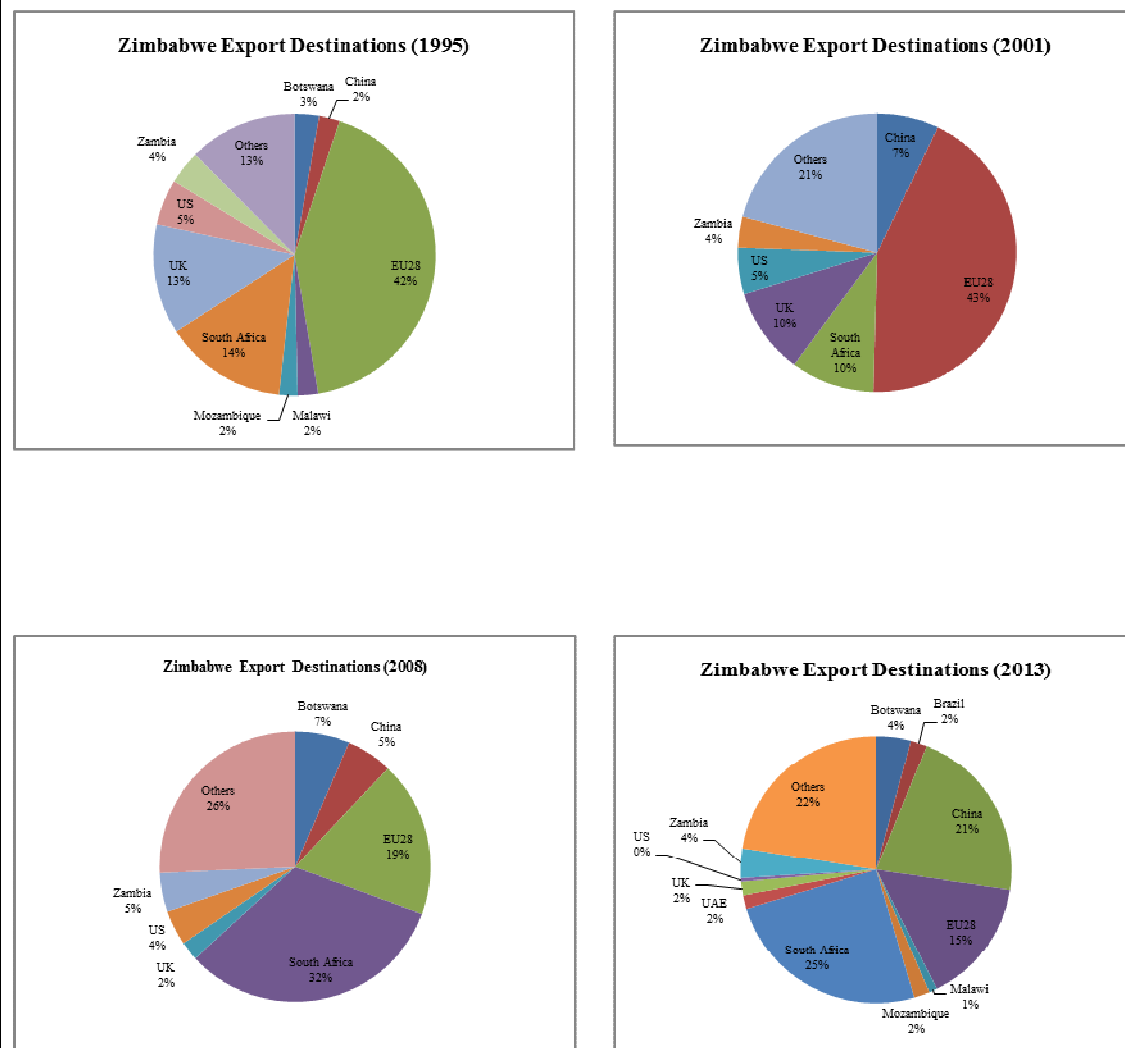
**Figure 2.3: Comparison of Total Trade Performance in the SADC Region**



Source: Author from UNCTAD Trade Data

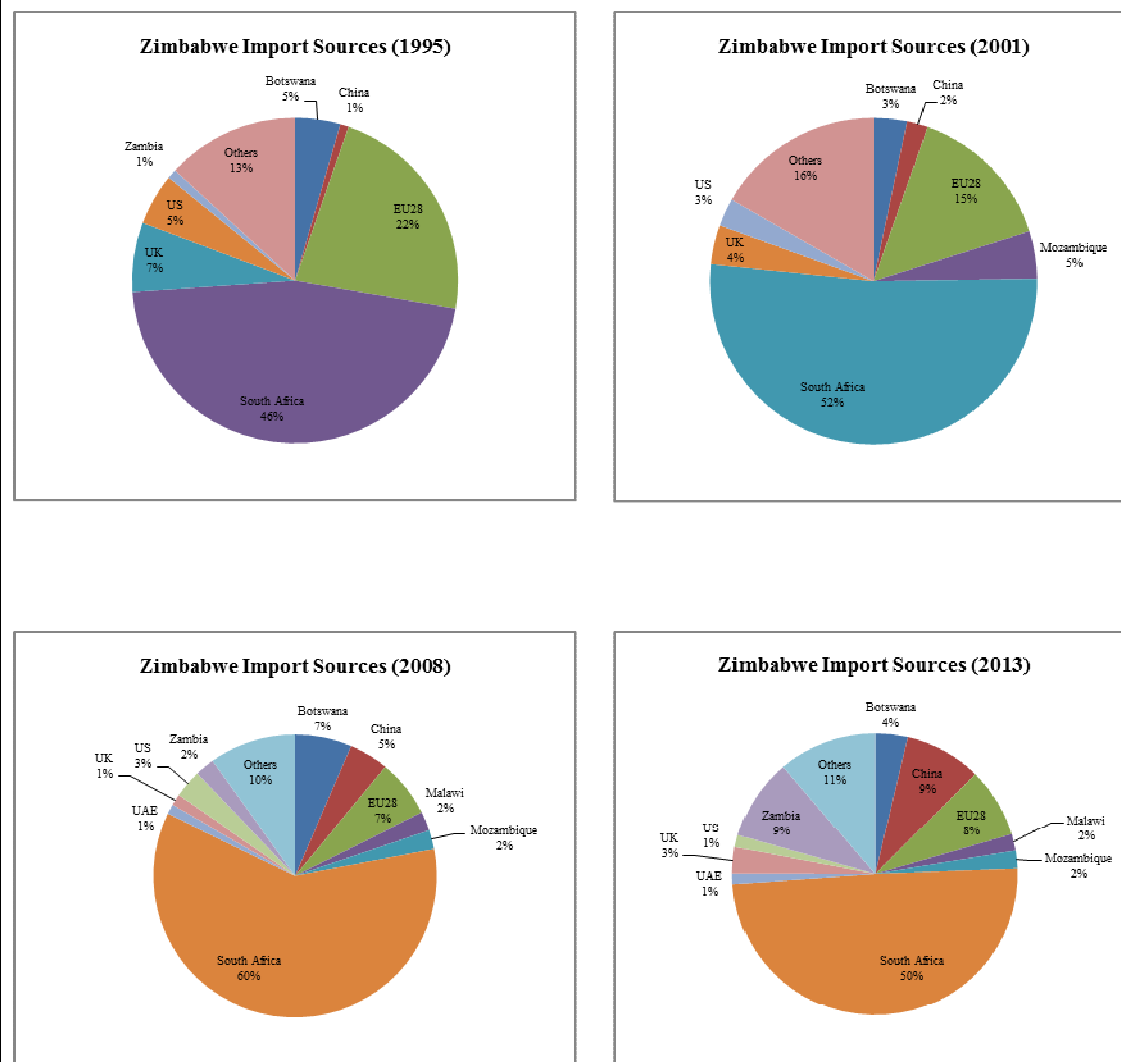
In terms of the direction of trade flows, the EU which used to be the top traditional trading partner of Zimbabwe for both imports and exports accounting for two-thirds of total trade, has since been overtaken by South Africa and China. South Africa is now Zimbabwe's largest trading partner. China has increasingly become a significant trading partner of Zimbabwe in recent years. The CZI Manufacturing Sector Survey for 2014 reflects that Zimbabwe's manufacturing sector is facing 40% competition from South Africa, and Zambia has also been making in-roads into Zimbabwe's market. For manufactured goods, the CZI survey highlights that Zambia remains the country's leading export destination. Figures 2.4 and 2.5 below give a snapshot of the direction and shares of Zimbabwe's total exports to, and imports from major trading partners in selected years, 1995, 2001, 2008 and 2013.

**Figure 2.4: Zimbabwe's Major Export Destinations (1995-2013)**



Source: Author from UNCTAD Trade Data

**Figure 2.5: Zimbabwe's Major Import Sources (1995-2013)**



Source: Author from UNCTAD Trade Data

As reflected above, Zimbabwe's trade has been concentrated on traditional partners although the shares have significantly changed. It is important to note that Zimbabwe-US trade has been insignificant despite dollarisation of the economy in year 2009. In terms of Zimbabwe's export performance by sector, the mining sector has been leading the pace since 2009 accounting for, on average, 51% of national export earnings. Minerals such as diamonds, platinum and gold have been the major exports. Mineral exports have, however, been affected of late by the general global decline in commodity prices on the international market and this has had a negative effect on Zimbabwe's fiscal revenues (MOFED, 2015)<sup>18</sup>. Table 2.3 below shows the mining sector export performance from 2009 to 2014.

**Table 2.3: Zimbabwe's Mineral & Total Export Earnings (US\$ Millions)**

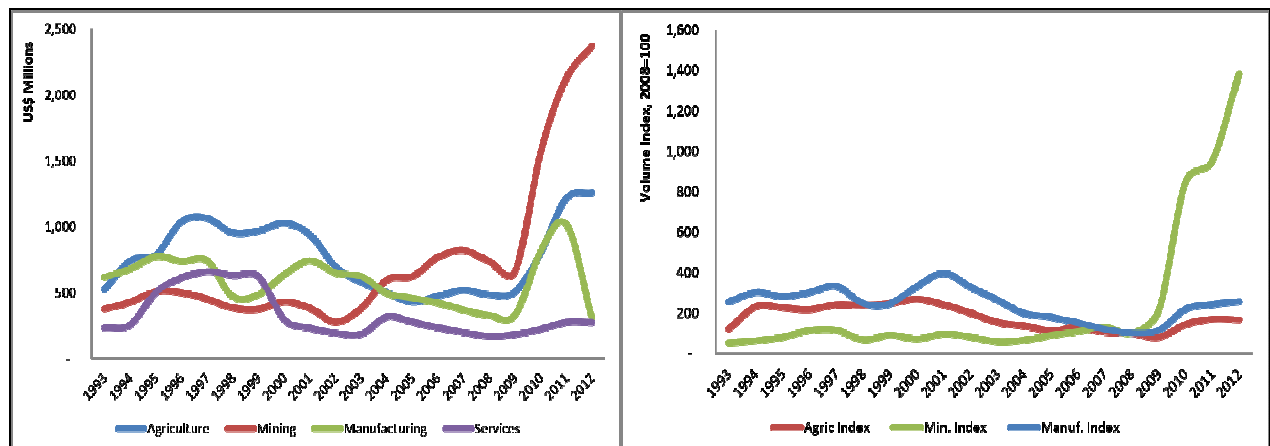
| <b>Year</b>                             | <b>2009</b> | <b>2010</b> | <b>2011</b> | <b>2012</b> | <b>2013</b> | <b>2014</b> | <b>Average Share</b> |
|-----------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------------|
| Mineral Exports                         | 659.5       | 1,569.8     | 1,226.8     | 2,189.1     | 2,055.8     | 1,905.5     |                      |
| Total Exports                           | 1,613.3     | 3,243.7     | 4,416.3     | 3,808.2     | 3,694.2     | 3,621.3     |                      |
| Mineral Exports as %ge of Total Exports | 41%         | 48%         | 48%         | 57%         | 56%         | 53%         | 51%                  |

Source: Reserve Bank of Zimbabwe, Monetary Policy Statement, January 2015

The agricultural sector trailed behind the mining sector with the manufacturing and services sectors performing poorly in terms of exports despite the economic rebound. In the agricultural sector, tobacco contributed significantly to GDP and in terms of export earnings. Overall, in 2014, agriculture contributed 21%, manufacturing (13%) and services (11%) to total export earnings (MOFED, 2015). Figure 2.6 below shows the country's export performance by sector from 1993 to 2012.

<sup>18</sup> National Budget Statement 2015 available at: [www.zimtreasury.gov.zw/203-2015-national-budget](http://www.zimtreasury.gov.zw/203-2015-national-budget)

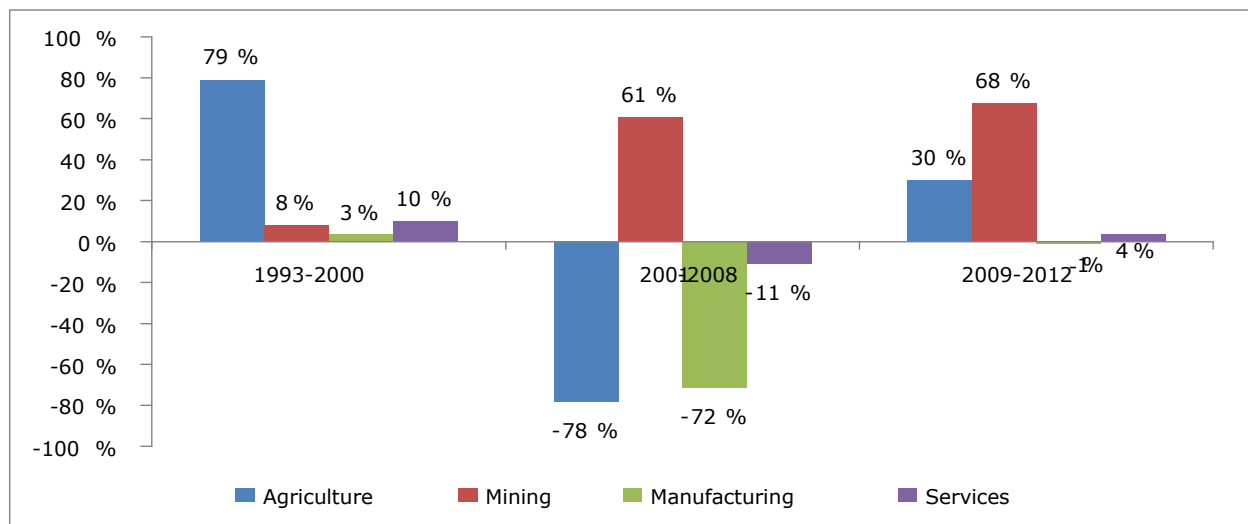
**Figure 2.6: Zimbabwe Export Performance by Sector (1993-2012)**



Source: Pierola, et al (2014)

The above trends show, as concluded by the Pierola, et al (2014) that Zimbabwe's trade engine has been firing on one of the four cylinders during the multi-currency system. Figure 2.7 below also speaks to this conclusion showing the performance of the four sectors, agriculture, mining, manufacturing and services, in terms of export growth during the period 1993 to 2012.

**Figure 2.7: Zimbabwe Export Performance by Sector (1993-2012)**



Source: Pierola, et, al (2014)

On the import side of the trade equation, Zimbabwe has been a net importer of goods since the year 2002 and this scenario even worsened during the period of dollarisation. The country continued to absorb more imports against poor export performance. The country's portfolio structure of imports has been significantly changing from capital goods to more of intermediate and consumption goods. Traditionally, intermediate and capital goods which comprised of raw materials and machinery and equipment accounted for the bulk (more than 60%) of the country's imports well ahead of consumption goods. However, since 2009 when the country adopted the multi-currency system, the country's merchandise imports (excluding fuel, electricity and services), accounted for approximately 60% of the country's import bill (MOFED, 2014).

The National Trade Policy (2012-2016) confirms that the manufactured imports surged during the past decade owing to supply-side challenges of local industry. This explains why the country has continued to experience perennial trade deficits. The RBZ, in its 2015 Monetary Policy Statement, confirmed that the country continues to absorb more imports than exports. The latest trade figures show that the trade deficit however decreased by 14 % from US\$3.9 billion in 2013 to US\$3.3 billion in 2014 due to fall in international oil prices. Chief among the causes of the sustained trade deficits have been cited as subdued export performance, and competitiveness challenges due to high costs of production and capital. The current exchange rate developments between the US dollar and the South African rand are beyond Zimbabwe's control since the economy is dollarised. The strengthening of the US dollar has made imports into Zimbabwe cheaper and at the same time the country's exports to the rest of the world expensive.

### **3 CHAPTER 3: LITERATURE REVIEW**

#### **3.1 INTRODUCTION**

Zimbabwe's experience with dollarisation and sluggish trade performance as outlined in the preceding chapter forms the basis of this chapter which makes effort to review both theoretical and empirical literature on the monetary policy of dollarisation and its impact on trade and other economic growth variables. The first part of the theoretical literature review focuses on theoretical underpinnings of dollarisation, experiences of other countries and its connection with trade. The second part focusses on the theoretical underpinnings of the Gravity Model of Trade Analysis which has been widely used to explain bilateral trade flows in the dollarisation/currency union and trade nexus. The empirical literature review section reviews a number of studies by some renowned researchers on the subject of dollarisation/currency union impact on trade making use of the Gravity Model.

#### **3.2 THEORETICAL LITERATURE REVIEW ON DOLLARISATION**

##### **3.2.1 DOLLARISATION DEFINED**

Dollarisation has generally been defined as an act, by one country, of adopting another country's currency with a view to get rid of exchange rate problems and hyper-inflation. Investopedia dictionary defines dollarisation as a situation when a country uses foreign country's currency as legal tender, officially or unofficially, in their transactions mainly because of the stability of the currency relative to the domestic currency. In other words, Chigumira, et al (2009), define dollarisation as the act of substituting a domestic currency for a foreign currency basically to fulfil the main functions of money, namely; store of value better known as asset substitution, medium of exchange better known as currency substitution and unit of account. Rivera (2007) highlights that under currency substitution, foreign currency is used to make transaction payments; under asset substitution economic agents decide to hold their financial assets and liabilities in foreign currency; and under the unit of account prices and wages are indexed to the value of foreign currency. Other researchers such as Benoni & Lindahl (2014) view dollarisation from an exchange rate regime perspective where they regard it as an extreme hard peg that is characterised by complete abandonment of a national currency. This perspective was also considered by Cukierman, et al (1992), who regarded dollarisation as a fixed exchange rate control option to stabilise inflation.

From literature, dollarisation has come in two main forms namely, full dollarisation or official dollarisation and partial dollarisation or unofficial dollarisation. Official dollarisation has sometimes been referred to as *de jure* dollarisation while unofficial dollarisation has been referred to *de facto* dollarisation. Berg & Borensztein (2000) noted that with full dollarisation, a country completely abandons its domestic currency and officially adopts another country's stronger currency as part of its monetary policy and this can be with or without formal agreement with the country whose currency is adopted.

On the other hand, with partial dollarisation a country can allow foreign currency to circulate in the economy alongside the domestic currency subject to exchange controls. Economic players can also informally transact in foreign currency in some countries that restrict foreign currency. As indicated by Quispe-Agnoli & Whisler (2006) such kind of informal partial or *de facto* dollarisation usually takes place when economic players have lost confidence in their own national currency and opt to keep their money holdings in foreign currency, and the monetary authorities may actually not know the amount of foreign currency in circulation in the economy.

Whichever form dollarisation may come in, full or partial, the move can be unilateral, i.e. without formal agreement with the country whose currency is adopted, as has been the case with Zimbabwe; or with formal agreement. Negotiations for a bilateral agreement on dollarisation are usually centred on modalities of sharing seigniorage revenue and accessing the discount window to control money supply and demand. Curutchet (2001) raises an important advantage of a formal agreement on dollarisation as increased credibility of the policy and as a result it will have a more permanent character than unilateral dollarisation. In the case of Zimbabwe, formal agreement would have meant that the country was to first enter into a series of lengthy bilateral negotiations with each of the countries whose currencies were to be adopted and this could have worsened the economic situation and delayed economic recovery.

It is important to note that dollarisation is not a policy that a country can just decide overnight for the sake of it but is usually considered in situations where a country is faced with serious macroeconomic instability. It is usually regarded as a solution of last resort. Bourguinat &

Dohni (2002) as read in Minda (2005), viewed the adoption of a foreign currency by a country as acknowledgement of failure and credibility loss on domestic economic policies.

Currency unions have also been referred to as another form of dollarisation wherein countries agree to use a common currency under a regional integration setting to facilitate trade and monetary integration. This kind of arrangement can allow member countries to also use their own currencies alongside the common currency at an agreed fixed exchange rate. Common monetary integration has been found to promote and facilitate intra-regional trade and investment because of the eliminated exchange rate risk. Examples of common monetary unions include the Common Monetary Area (CMA) between South Africa, Lesotho, Namibia and Swaziland; the CEMAC and WAEMU CFA-zone of Central and West Africa, the EMU of the European Union and the Eastern Caribbean Currency Union (ECCU).

The term dollarisation has, thus generally been used to mean adopting any of the strong and stable foreign currencies other than just the US Dollar, such as the Euro (euroisation), the Australian dollar or the South African rand (randisation) depending on a country's preferences.

### **3.2.2 BENEFITS AND COSTS OF DOLLARISATION**

A number of researchers have explored some dollarisation experiences and identified benefits and costs with a view to weigh-in whether dollarisation does more good than harm to an economy and the country at large. This has been against the background that decision to dollarise should be considered seriously on its consequences since it does not just perform an economic function but has also socio-political impact on a country's standing by virtue of having abandoned its national currency, a policy which may be very difficult to reverse (Minda, 2005). It is also important to note that the magnitude of benefits and costs of dollarisation usually cannot be the same for all countries because of different idiosyncrasies/peculiarities and relations with the countries whose currencies are adopted (Curutchet, 2001). Generally the main benefits of dollarisation identified so far have revolved around transaction costs reduction and exchange rate stability, and the costs have revolved around loss of monetary policy independence.

### **1) Stability on Inflation and Interest Rates**

The inflation rate of a country that adopts a foreign currency is bound to go down at least to the level of inflation in the anchor currency country and the same applies to interest rates. There is usually convergence of the domestic inflation towards global inflation even without major policy interventions besides dollarisation. Reduced inflation and stable prices will have influence on domestic interest rates on the money market and this can be an incentive for a better environment for business and investment (Jacome & Lonnberg, 2010). Chigumira, et al (2009) assert that an inflation rate that is in tandem with the inflation rate of an anchor country enforces fiscal discipline since a country would be incapacitated to finance inflationary deficits.

### **2) Exchange Rate Stability Benefits**

As indicated earlier on, dollarisation has been found to be a form of pegged exchange rate regime wherein the exchange rate is anchored to a credible currency. As such, currency risk is completely eliminated between the two countries but not necessarily with other countries outside the dollarisation arrangement. As noted by Jacome & Lonnberg (2010), elimination of currency risk leads to stable prices and reduction in interest rates in the domestic market and this again is good for business, in particular trade and investment. In addition, Quispe-Agnoli & Whisler (2006) give credit to full dollarisation for being a credible economic policy that helps to prevent currency and balance of payments crises due to its irreversibility by virtue of it being equivalent to pegging the domestic currency to a strong anchor currency. While lower transaction costs associated with the exchange rate have been found to promote bilateral trade and investment, the latter may not happen in cases of limited commercial and financial integration between the countries due to other factors such as barriers to trade and investment barriers (Curutchet, (2001).

### **3) Loss of Monetary Policy Space**

Dollarisation has been rightly equated to surrendering or delegating monetary policy independence to the monetary authority of the country whose currency is adopted. Since inflation and interest rate trends are bound to follow trends in the anchor currency country the dollarised country is incapacitated to use monetary policy instruments to stabilise its

economy on its own through such facilities as the lender-of-last-resort support to troubled banks (Benoni & Lindahl, 2014; Quispe-Agnoli & Whisler, 2006; Chang & Velasco; 2002). This means that the country will be incapacitated to willy-nilly make use of seigniorage revenues, if it has access to it, to finance fiscal deficits such that fiscal space is constrained to stabilise the economy in times of crises.

#### **4) Irreversibility and Socio-Political Costs**

Indications are that there is high probability of irreversibility of dollarisation once it has been put in place. Reinhart et al (2003) indicated that economic agents remain addicted to dollars even after the economy has stabilised and when the factors that caused the dollarisation in the first place are no longer there. The de-dollarisation process is believed to be very costly and protracted if it can ever happen. On the socio-political front, dollarisation has been found to have a negative impact on the poor. It has been indicated that dollarisation leads to unequal distribution of wealth between the rich and the poor. The rounding up of prices due to problems of change and confusion on money conversion has been cited as costs (Towers & Borzutzky, 2004). The other concern raised by Minda (2005) regarding the costs of dollarisation is about loss of national identity associated with abandoning own national currency in favour of a foreign currency. He seemed to indicate that national identity supersedes any potential economic benefit.

### **3.2.3 COUNTRY EXPERIENCES WITH DOLLARISATION**

According to the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions for 2014, there are currently thirteen (13) countries in the world (who are members of IMF) that are fully dollarised with no separate legal tender. Of these, nine (9) use the US dollar as the anchor currency and these are Ecuador (since 2000), El Salvador (2001), Marshall Islands (1944), Micronesia (1944), Palau (1944), Panama (1904)<sup>19</sup>, Timor Leste (East Timor) (2000) and Zimbabwe (2009). Kosovo, Montenegro and San Marino have the euro as their anchor currency, while Kiribati and Tuvalu use the Australian dollar. Among these countries, Zimbabwe excluded, Ecuador and El Salvador are the only slightly bigger countries by population which stand at 13.1 million and 6.5 million people respectively. The

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<sup>19</sup> The Panama Balboa coins co-exist with the US dollar.

rest of the countries are very small, the least being Marshal Islands and Palau with 61,000 and 19,000 people respectively of which to assess the impact of dollarisation on trade on these countries can be very difficult (Minda, 2005).

After experiencing high rates of inflation in the 1990s and financial crises that affected the banking sector, Ecuador dollarised its economy in January 2000. Before the official dollarisation, de facto dollarisation was already taking place accounting for at least 50% of bank deposits. It is reported that dollarisation in Ecuador managed to boost its exports but on the inflation front it took the country more than four years to bring the domestic inflation to convergence with the inflation rate of the anchor currency country, the US (Jacome & Lonnberg, 2010).

Following the footsteps of Ecuador, El Salvador adopted the US dollar as its legal tender in 2001. It is however noted that unlike Ecuador, El Salvador dollarised its economy in order to lower interest rates so as to be able to enhance a series of structural reforms that the country had put in place to support economic stability. The policy was also intended to attract foreign direct investment and lower transaction costs so as to promote trade and facilitate economic growth. Quispe-Agnoli & Whisler (2006) noted that the inflation rate level in El Salvador was very low and stable unlike in Ecuador and the economy was much stable to warrant dollarisation. The duo indicates that the results of dollarisation in El Salvador's were quite positive as the economy managed to stabilise and experience growth with diversified exports increasing.

In Africa, most countries are engaged in partial dollarisation, where foreign currencies circulate alongside national currencies either officially or unofficially. The only country that fully officially dollarised in Africa in the new millennium is Zimbabwe. Some countries are members to regional currency unions and include South Africa, Swaziland, Lesotho and Namibia, who are members to the Common Monetary Area (CMA) and are using the South African rand as anchor currency. The other countries' currencies are allowed to circulate alongside and at par with the rand. In West and Central Africa there is the CFA-zone monetary union composed of two regional integration groupings, namely, the West African Economic and Monetary Union (WAEMU) and the Economic and Monetary Community of Central Africa (CEMAC). The CFA-zone uses CFA franc which is pegged to the euro.

Most African countries outside currency unions are engaged in one way or the other in partial dollarisation or currency substitution and notable countries include Angola, Mozambique, Zambia, Liberia and Tanzania, which have higher ratios of dollarisation in excess of 25%. In Tanzania for example, there is high prevalence of financial dollarisation as observed by Kessy (2011) who found that the share of the country's bank deposits denominated in US dollars was higher than in other countries in the East African Community including Kenya. Tanzania's policy of opening up to FDI, export orientation, liberalisation of foreign exchange controls has been observed to be behind the country's high levels of partial dollarisation (Kessy, 2011)

### **3.3 THEORETICAL LITERATURE REVIEW ON THE GRAVITY MODEL**

This section attempts to give theoretical underpinnings of gravity model as it relates to measuring the impact of dollarisation on trade. Traditional trade theories are reviewed briefly in terms of their theoretical foundations in explaining why countries trade and thereafter the gravity model of trade analysis which has found favour with researchers and policy makers in trying to measure the extent of the impact various policy measures on trade. The gravity model has been dubbed the 'workhorse' of international trade analysis because of its strong empirical predictive power, and has been used extensively to analyse the impact of dollarisation on trade performance. The theoretical background and evaluation of the gravity model is connected with the empirical literature review of the next section on the impact of dollarisation on trade flows.

#### **3.3.1 Classical Trade Theories**

A number of trade theories have been put forward to substantiate why countries engage in trade and the two main one are David Ricardo's theory of comparative advantage and Heckscher-Ohlin's theory of factor-proportions. Ricardo's theory of comparative advantage asserts that countries trade internationally because of differences in the productivity of labor. It is suggested that because of technological differences (differences in the techniques used to turn inputs into outputs), and assuming a single factor of production (labour), constant labour productivity and perfect competition, countries would gain from trade by specialising in producing goods in which they have comparative advantage in and trade for the activities in which they have comparative disadvantage in (Krugman & Obstfeld, 2003).

While the Ricardian model assumed comparative advantage could arise only because of international differences in labor productivity, economists Eli Heckscher and Bertil Ohlin followed and built on Ricardo's theory to highlight that comparative advantage is influenced by the interaction between countries' resources (the relative abundance of factors of production) and the technology of production which influences the relative intensity with which different factors of production are used in the production of different goods (Krugman & Obstfeld, 2003). This theory implied that differences in countries' relative endowments in the factors of production such as labour, land, capital and natural resources are the main reasons why countries trade, and countries would specialise in producing goods in which they have abundant factors of production or specialise in producing goods which they can do best for export and import those goods with which they do not have abundant factors of production and therefore cannot do best.

These main classical trade theories have not been able to justify all observed trade patterns especially of developed or industrialised countries which do not differ substantially in their technologies or their factor endowments, and also the existence of intra-industry trade. The models have also been found wanting in terms of taking into account aspects of income differences, economies of scale as well as trade or transaction costs which in reality do influence trade or affect trade patterns (WTO&UNCTAD, 2012). These short-comings, among others, led to the emergence of new trade theories such as Linder's 1961 hypothesis on existence of intra-industry trade between countries with similar factor endowments and other theories by Krugman (1980) on existence of monopolistic competition and Chaney (2008) and Helpman et al (2008) on existence of heterogeneous firms and selection into markets. For purposes of this study, detailed attention is paid on the gravity model including evaluating its theoretical underpinnings.

### **3.3.2 The Gravity Model of Trade Analysis**

The Gravity Model on international trade was developed following Isaac Newton's 1687 theory on the 'force of gravity' or 'law of universal gravitation' which postulated that any object in the universe attracts any other body with a force whose intensity is directly proportional to the product of their mass and inversely proportional to the square of their distance (Mele & Baistrocchi, 2012). In trade flow analysis, the gravity model got prominence following the seminal work of Jan Tinbergen in 1962 who postulated that the

flow of trade between two countries is proportional to the size of the two countries' economies measured by the respective Gross Domestic Products (GDPs), and inversely proportional to the distance between them (the two countries). This implies that the volume of trade of larger countries tends to be proportionally more than is the case with smaller economies, and also that the greater the distance between countries (trading partners) the lesser trade is conducted between them because of trade costs associated with distance.

The Gravity Model has gained popularity and much favour ahead of the classical trade models such as the Ricardian and Heckscher-Ohlin Models because of its ability to be modelled empirically both ex-post and ex-ante to conduct analysis of effects of trade policies such as the effect of regional trade agreements in terms of trade creation and trade diversion (WTO&UNCTAD, 2012). While the classical trade models (the Heckscher-Ohlin and the Ricardian models) are somewhat silent on the aspect of trade costs, as well as the size of the country's economy to explain trade patterns, the gravity model has been credited for its ability to comfortably capture trade-enhancing and trade-restricting factors in explaining bilateral trade flows through distance and economic size proxies (WTO&UNCTAD, 2012). A number of variables have been used in the gravity model to capture bilateral trade costs (Anderson & van Wincoop, 2003)

### 3.3.3 Specification of the Gravity Model

The theoretical Gravity Model that explains trade flows is specified as follows, in its standard form;

$$F_{ij} = G \frac{M_i M_j}{D_{ij}^2}$$

Where;

$F$  = Trade flows between countries  $i$  and  $j$  measured by trade flows from country of origin  $i$  to destination country  $j$  (exports) or vice versa (imports);

$M$  = Size of the economies of countries  $i$  and  $j$  as measured by their GDPs;

$D$  = Distance between countries  $i$  and  $j$  measured by the distance between the capitals of the two countries and represents trade costs or barriers/incentives to trade; and;

$G$  = Constant.

To estimate the gravity model the natural logarithms of all the variables are considered except for dummy variables in order to establish a log-linear equation which can be estimated using the Ordinary Least Squares (OLS) regression method. In this case, the natural logarithm of the value of trade between two countries is related to the natural logarithm of their respective GDPs and other variables representing barriers and/or incentives to trade between them. Under the gravity model, the estimated parameters in the log-linear equation come out as elasticities but not for dummy variables. Elasticities will thus measure the extent of the relationship between the independent variables (GDP, distances and others) and the dependant variables (total trade, total exports and total imports). The elasticities will give an indication of the variation in trade in percentage terms (or exports/imports) resulting from a 1 per cent change (increase or decrease) in each of the independent variables, GDP for example.

In the case of measuring the effect of dollarisation on exports between two countries, the specification of the gravity model in the log-linear format would thus appear as follows;

$$\log X_{ij} = c + b_1 \log GDP_i + b_2 \log GDP_j - b_3 \log \tau_{ij} + e_{ij} \text{ Where;}$$

$$\log \tau_{ij} = \log(Dist_{ij})$$

$X_{ij}$  = exports from country i to country j;

GDP = each country's gross domestic product;

$\tau_{ij}$  = trade costs / barriers and/or incentives between the two countries;

$Dist_{ij}$  = geographical distance between the two countries and also acts as proxy for other trade costs;

$e_{ij}$  = random error term

$c$  = regression constant

$b$  = coefficients to be estimated

In the context of the impact of dollarisation on trade, the gravity model has been extensively used mainly in the context of the impact of common currency unions (a form of dollarisation) on bilateral trade between countries that use common currency as is detailed in the next section on empirical literature review.

### **3.3.1 Theoretical Underpinnings of the Gravity Model**

The gravity model got prominence based on empirical analysis without any theoretical underpinnings. The model's theoretical foundations were only developed after the works of Tinbergen (1962), Poyhonen (1963) and Linnemann (1966) of which the model's predictive power to explain trade flows prompted the search for a theoretical explanation for it (WTO&UNCTAD, 2012). Anderson & van Wincoop (2003) assert that the model's lack of theoretical foundation, then, in a way compromised its credibility as it introduced some degree of subjectivity in interpreting estimated results. According to Deardorff, (1998), a number of academics including those that had earlier criticised the model for not having theoretical basis, have contributed to the development of theoretical foundations of the gravity model from a range of trade theories. Anderson (1979) is regarded as the first to offer theoretical foundation of the model assuming product differentiation by country of origin (the Armington assumption) and constant elasticity of substitution (CES) expenditures where consumers have preferences defined over all differentiated products (WTO&UNCTAD, 2012). So with whatever the price, a country is assumed to consume some of every good from every country, all goods being traded, all countries trading and in equilibrium, national income becomes the sum of home and foreign demand for the unique good that each country produces and for this reason, larger countries import and export more (WTO&UNCTAD, 2012).

In 1995, Deardorff was able to obtain a gravitational equation theory for international trade through the use of Hecksher-Ohlin's neoclassical model or the traditional factor-proportions explanation of trade (Mele & Baistrocchi, 2012). Deardorff (1998) asserts that Hecksher-Ohlin model (and other models based solely on comparative advantage and perfect competition) is examined only for its implications on trade flows without impediments of which there should be no reason for trade to be small but to be larger. This, he says, would fall naturally into a gravity-equation configuration, in a frictionless form without a role for distance, assuming producers and consumers are indifferent.

According to Anderson (2010), the Eaton-Kortum model (2002) derived the gravity model from the Ricardian model from the supply side while Anderson and van Wincoop (2003) derived the gravity model from the Armington-Constant Elasticity of Substitution model

which was earlier developed by Anderson (1979) with emphasis on the importance of the general equilibrium effects of trade costs. Helpman et al. (2008) and Chaney (2008) obtained the gravity model from a theoretical model of international trade in differentiated goods with firm heterogeneity, where firms face fixed and variable costs of exporting such that they vary productivity and only the more productive firms will find it profitable to export (WTO&UNCTAD, 2012)

### 3.4 EMPIRICAL LITERATURE REVIEW

The trade-dollarisation connection briefly explained in the preceding section directs this study into reviewing empirical literature to unpack the impact of dollarisation on trade between countries that use the same currency. A number of empirical studies have been conducted in this regard and the results have been quite interesting with some finding positive impact while others finding otherwise. There has, however, been general and common finding that dollarisation indeed has a positive effect on inflation as noted by Edwards & Magendzo (2004).

One of the internationally acclaimed academics to study the effect of a common currency on trade flows is Andrew Rose (2000) who found large and statistically significant effect on bilateral trade between countries within the same currency union. Rose estimated this effect using data of a large number of countries for a period of 20 years from 1970 and 1990. His finding was that bilateral trade between countries that shared the same currency was higher than between countries with their own individual currencies. Using the gravity model the currency union dummy coefficient was positive and statistically significant with its natural logarithm value at least 1.2 implying that bilateral trade would increase by 300%, i.e.  $e^{1.2}$ , *ceteris paribus*.

Glick & Rose (2001) went on to estimate the effect of joining a currency union on trade on a number of countries using a dataset for the period 1948 to 1997. A number of the countries that were included in the dataset had actually opted out of currency unions and thereafter experienced declines in trade flows. Using an augmented gravity model and a number of different panel techniques, the study again found economically and statistically significant effect on trade for pairs of countries that were party to a currency union. The actual result was a 100% increase in trade and this was consistent with the results of Rose (2000) although

slightly less. Frankel & Rose (2002) looked at the impact of a common currency on trade and per capita income on cross-section data of selected countries for the period 1970 to 1990 at intervals of five years. They found positive results for both trade and per capita income, with trade found to increase at least three times as a result of the common currency. The positive impact on per capita income was found to be as a result of the increase in trade. The result on trade was also consistent with Rose (2000)'s finding.

Rose and co-authors' results have been questioned for being too high and this prompted Nitsch (2002) to revisit Rose and co-authors' data by correcting for mistakes and estimating the model. The result was that currency unions can increase trade by doubling it not tripling it as found by the former. Thereafter, Rose (2004) carried out a meta-analysis on thirty four studies that estimated the effect of common currencies on trade and his findings were that currency unions increase trade by between 30% and 90%. But the bottom line has been that dollarisation promotes trade.

Following the studies of Rose (2000), Rose & Glick (2001) and Frenkel & Rose (2002), Klein (2002) carried a similar study using the same gravity model to find the trade-enhancing effects of common currency on six countries of the Western Hemisphere that dollarised their economies. Klein's data was obtained from Glick & Rose (2001) dataset. Contrariwise, Klein (2002) found that a currency union did not significantly promote trade between the Western Hemisphere countries and neither did it promote bilateral trade with the country whose currency was being used. In light of the contrary results of Klein (2002), Lin and Ye (2007), made a revisit to Klein's study and using Glick & Rose (2001) data they re-evaluated the dollarisation treatment effects on trade. Using data of 165 countries between 1948 and 1997, Lin & Ye (2007) found statistically significant evidence that dollarisation significantly increases US trade with dollarised countries and also promotes trade between countries that use the same currency (the US dollar) therefore suggesting substantial trade-enhancing effects.

Another study of interest, not necessarily related to the above studies was on El Salvador, which was done by Rivera (2007). As highlighted earlier on in the literature review, El Salvador dollarised in 2001 to consolidate its macroeconomic stability. The study by Rivera (2007) on the impact of dollarisation on the country with regards to its bilateral trade post dollarisation found statistically significant positive effect of dollarisation on bilateral trade

flows between El Salvador and its thirteen trading partners. The gravity model was used in this study. Related to El Salvador, Benoni & Lindahl (2014) studied the impact of dollarisation on two countries, Ecuador and El Salvador, on trade and on three other important economic variables namely; inflation, interest rates, GDP growth. The duo also used the gravity model of international trade, and to the contrary they found no significant effect of dollarisation on trade. The coefficient of the dollarisation dummy variable was very small and actually became smaller and smaller upon inclusion of additional control variables. On inflation, they found statistically significant positive impact. On GDP, the duo concluded that dollarisation does not directly increase growth but has an indirect influence through lower inflation and interest rates.

For the Eurozone, Ilirjani (2005) carried out a study on the effect of 'Euroisation' or joining the euro currency area on trade and growth for three Europe's Western Balkans countries of Albania, Macedonia and Serbia. These countries were considering joining the Eurozone to speed up economic growth through trade. The study used the gravity model on three equations namely the Poisson maximum likelihood regression model, the ordinary least square model, and the coefficient of a meta study of 30 independent studies on this subject. With the Poisson maximum likelihood regression model he found trade between Albania and the Eurozone to increase by 11% and for Serbia and Macedonia, total trade was expected to increase by 5% and 5.5% respectively. On GDP, the effect was very small on all the three countries at less than 2% (1.5% increase for Albania and Macedonia and less than 1% for Serbia). Surprisingly, Ilirjani (2005) results for the three countries were in deep contrast with Rose (2000) findings on the effect of adopting the Euro by the same countries. Rose predicted that Albania's trade would actually increase by 217% and real GDP by 83%, for Serbia trade was expected to increase 100% and GDP by 18%; while for Macedonia trade was expected to increase by 110% with GDP expected to increase by 30%. The two findings, although they varied significantly, they pointed to the same conclusion that currency unions promote trade and GDP.

The financial services sector is important in facilitating trade and investment and the policy of dollarisation can actually impact on the performance of the sector as has been the case in Zimbabwe. A study focussing on the dollarisation-bank performance connection was done by Quispe-Agnoli & Whisler (2006) who tried to find out whether dollarisation had an effect on the performance of Ecuador and El Salvador's banking sectors. They used the multiple

regression equation on panel data for all Ecuador and El Salvador banks for the period 1995-2004, and found statistically significant evidence that dollarisation had a positive impact on the two countries' bank performances. This means that the improved bank performance due to dollarisation can enable banks to mobilise financial resources and on-lend at affordable interest rates and for reasonable tenure, of which this can help promote trade in a way.

### **3.5 CONCLUSION**

It is clear from the empirical studies conducted that the findings on the impact of dollarisation or currency unions on trade have been mixed and in some cases contradictory or ambiguous for different studies undertaken on same countries using somehow same data. The mixed results have been attributed by some researchers to methodologies used in modelling and also in some cases to lack of data for some countries. Issue has been taken with regards to the number of countries included in some of the studies as very small to bring about dependable and unbiased results. Despite the mixed results, both the theoretical and empirical literature review generally point to the conclusion that currency unions or dollarisation can positively impact on trade.

On the costs and benefits of dollarisation, the literature review of this study can safely conclude that the benefits actually outweigh the costs. Not only has dollarisation been found to improve on trade performance but also has positive impact on other economic variables including inflation, interest rates and exchange rate which all facilitate economic growth through trade and investment. The cost related to loss of monetary independence and national identity can be a cause of much concern to those countries that embark on dollarisation just for the sake of trying to consolidate macroeconomic stabilisation. For those countries that get into dollarisation after experiencing severe macroeconomic instability characterised by hyperinflation, they would not have any other option besides dollarisation as has been the case with Zimbabwe. The issue of national identity and pride will not be a priority under such difficult circumstances.

## **4 CHAPTER 4: METHODOLOGY**

### **4.1 INTRODUCTION**

This chapter presents the methodology used in analysing the extent of the impact of dollarisation on Zimbabwe's trade flows with its twelve (12) major trading partners during the period 2009 and 2013 in comparison with the period before dollarisation, 2000 to 2008. The aim is basically to examine whether the introduction of the multi-currency system had an influence on trade flows in particular between Zimbabwe and countries whose currencies were officially adopted into the legal tender basket, and if so, to what extent in relation to other factors under consideration? The impact on exports, imports and total trade is estimated using the Gravity Model which has been used extensively in international trade analysis in both theoretical and empirical work as observed in the literature review. Specifically, this study estimates using an Augmented Gravity Model with additional control variables to the standard model. The study essentially follows the works of acclaimed scholars, Rose et al (2000, 2001 & 2004) and Klein (2002), among others.

### **4.2 AUGMENTED GRAVITY MODEL SPECIFICATION**

The expanded or augmented gravity model includes additional control variables to capture trade costs which are represented by the proxy of bilateral distance in the equation. Dummy variables can represent other factors that affect trade which can be factored into the model to capture these various costs. Therefore, for purposes of this study on Zimbabwe, the augmented gravity model incorporates the dollarisation, exchange rate, free trade area, and language factors in the form of dummy variables except for the exchange rate. A number of gravity model estimations on trade have commonly used these variables to analyse the effect their effect on trade (Rose et al, 2000). This researcher has found the variables critical for Zimbabwe as they have generally been cited often by policy makers and captains of industry and commerce in Zimbabwe as having impact on trade (National Trade Policy, CZI Manufacturing Sector Surveys & Monetary and Fiscal Policy Statements). The next section explains in detail the selected variables as to how they influenced trade in addition to the standard economic size (GDP) and distance variables of the gravity equation.

The Augmented Gravity Model for Zimbabwe is thus specified as follows for total trade, exports and imports, considered separately as dependent/explained variables:

$$\ln\left(\text{Exports/Imports}_{zw,j}\right)_t = \alpha + \beta_1 \ln\left(GDP_{zw} * GDP_j\right)_t + \beta_2 \ln\left(Dist_{zw,j}\right) + \beta_3 \ln\left(Xrate_{zw}\right)_t + \beta_4 \left(FTA_{zw,j}\right) + \beta_5 \left(Lang_{zw,j}\right) + \gamma_1 \left(Dollar_{zw,j}\right)_t + \mu_{(zw,j)t}$$

$t = 2000, \dots, 2013$

$j \in N = 1, \dots, 12$

Where;

$\text{Exports/Imports}_{zw,j}$  = Total exports/ imports between Zimbabwe and country  $j$  i.e. exports from Zimbabwe (zw) to country  $j$  at time  $t$  being one dependent variable, and imports from  $j$  to zw at time  $t$  being another dependent variable.

$GDP_{zw,j}$  = Gross Domestic Product of Zimbabwe and that of country  $j$  (the product of the GDPs).

$Dist_{zw,j}$  = Distance between Harare (the capital of Zimbabwe) and the capital city of country  $j$  measured in kilometres.

$Xrate_{zw}$  = Exchange rate of the Zimbabwe currency against the US dollar at time  $t$ .

$Dollar_{zw,j}$  = Binary variable indicating if Zimbabwe and Country  $j$  use the same currency at time  $t$ .

$Lang_{zw,j}$  = Binary variable indicating if Zimbabwe and country  $j$  speak the same language, English.

$FTA_{zw,j}$  = Binary variable indicating whether or not Zimbabwe and country  $j$  belong to or have a Free Trade Agreement such as SADC, COMESA, EPA<sup>20</sup>;

$\mu_{(zw,j)t}$  = Other influences on bilateral trade, assumed to have a mean of zero and constant variance error term.

The time period covered by the data is from 2000 to 2013 (14 years) covering the pre-dollarisation period (2000-2008) and the post dollarisation period (2009-2013). The year 2014 was excluded from the study due to data unavailability at the time of the study.

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<sup>20</sup> Duty-Free Quota-Free Interim Economic Partnership Agreement with the European Union

### 4.3 DATA DESCRIPTION

The panel data, incorporating both time-series and cross-sectional data, for the model is composed of total bilateral trade figures including imports and exports, GDPs for Zimbabwe and its trading partners, distance between Harare and capitals of the trading partners, and Zimbabwe-US exchange rates for the period 2000 to 2013. Other variables are dollarisation/common currency, free trade agreements, and common language, which are captured through dummies. The time frame is 14 years with 12 cross-sections of Zimbabwe's bilateral trading partners namely; Botswana, China, the EU27<sup>21</sup>, Namibia, Kenya, Malawi, Mozambique, South Africa, United Arab Emirates (UAE), United Kingdom (UK), United States (US), and Zambia. The EU27 representing 27 countries of the EU is treated as one country for the purposes of this study otherwise total individual countries in the study sums up to 38. The selected countries constituted Zimbabwe's major trading partners accounting for, on average, 90% of Zimbabwe's global trade during the period 2000 to 2013.

### 4.4 DESCRIPTION OF MODEL VARIABLES

The identified six variables are of significance in the context of Zimbabwe and appear to have direct influence on trade in terms of enhancing or restricting trade. Generally, as highlighted by Head (2003), according to economic theory GDP or income, transaction costs, and the presence or absence of trading agreements affect bilateral trade of a country in one way or the other. As such, the six variables under consideration in this study are briefly explained in the following section at least to inform the basis of their inclusion.

#### 1) Economic Size ( $GDP_{zw,j}$ )

The gravity model considers economic size, as measured by GDP, as the main factor influencing bilateral trade between two countries,  $i$  and  $j$ . The theoretical understanding has been that there is a positive correlation between trade flows and GDPs of countries implying that trade is expected to increase when GDP increases and the opposite should be true. In essence, countries with higher GDPs will tend to trade more than smaller countries. In other words if a small country in terms of GDP engages in bilateral trade with a larger country, the flow of trade is expected to be proportional to the size of their economies. In this case a larger

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<sup>21</sup> 27 member countries of the EU excluding the UK which is treated separately in the study

country would export more to the smaller country than what the smaller country would export to the larger country. It is assumed, the higher the GDP, the higher the consumers' incomes and as such they (consumers) would tend to buy another country's goods. In the gravity equation, the natural logarithm of the value of trade (total trade, export or imports) between two countries is thus related to the countries GDPs. The estimated parameter is elasticity of trade to GDP which reflects the percentage variation in trade resulting from a 1% increase in GDP. On the positive correlation between trade and GDP, Head (2003) reflects that the estimated coefficient of GDP to trade in the gravity model is usually close to the predicted value of one but he indicates that it is unusual to obtain values ranging from 0.7 and 1.1.

## **2) Bilateral Distance (Dist)**

Bilateral distance between two countries is empirically used to capture trade costs in the gravity model. As noted by Baxter & Kouparitsas (2006), the greater is the distance between two countries, the higher are the costs associated with transporting goods, thereby reducing the gains from trade and reducing trade itself. This means that the further away countries are, the less trade they are expected to experience due mainly to transport costs, barriers to trade and other logistics bottlenecks associated with trading with distant countries such as time lost at borders and communication costs (Frankel, 1998). As such the first option for any country is to trade with countries within its vicinity. The distance factor is thus expected to have a negative correlation with trade. A number of other variables can be incorporated through the distance proxy to capture trade costs in the gravity model. Zimbabwe is thus expected to trade more with neighbouring countries than it does with distant countries. Head (2003) indicates that the distance factor correlation effect is 0.6 on trade, typically. For purposes of this study the distance between Harare (Zimbabwe's capital) and Brussels<sup>22</sup> is taken to stand for bilateral distance between Zimbabwe and the EU.

## **3) Common Language (Lang)**

Common language is usually associated with colonial and cultural links and is known to have a positive effect on trade. This implies that countries that speak the same language are expected to trade more between themselves than countries that have different languages and

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<sup>22</sup> Brussels, Belgium is the Headquarters of the EU and, all the same, there has been more trade between Zimbabwe and Belgium than any other EU countries (the UK excluded) due to diamond exports to Antwerp.

colonial links. Head (2003) advises that it has been found that countries that speak the same language trade two or three times more than country pairs that do not speak the same language. This would mean that Zimbabwe is expected to trade more with South Africa, the UK, US and Zambia more than it does with China and Mozambique, for example. The language factor is associated with information costs barriers and marketing challenges. A dummy variable stands for common language and is equal to unity (1) for country pairs that share a common official language, and zero otherwise.

#### **4) Free Trade Agreement (FTA)**

Free Trade Agreements (FTAs) can be bilateral (country to country) or regional trade agreements (RTAs) which are aimed at boosting trade between the partners through preferential trade preferences such as duty-free and quota-free market access opportunities. The FTAs in essence aim to promote trade by reducing or eliminating tariff and non-tariff barriers to trade and this is expected to have a positive impact on trade flows among members within a trading bloc. Zimbabwe has FTA arrangements with COMESA, SADC, the EU under the interim Economic Partnership Agreement (EPA) and functional preferential bilateral trade agreements with South Africa, Malawi, Mozambique, Namibia and Botswana (NTP, 2012). Frankel & Rose (2001) found that FTAs can increase trade by as much as three times between trading partners while Head (2003) indicates that on average FTAs seem to increase trade by about 50%. Zimbabwe is therefore expected to trade more with countries it has FTAs with than those it does not have FTAs with such as China and the US.

The estimation of the FTA effect is done cognisant of the problem of endogeneity because FTAs are not purely exogenous as they can be influenced by trade flows for them to be set up, while they can also influence trade when they are in place, a case of FTA effect on trade and trade effect on FTA. So the estimation result on the FTA variable could be ambiguous.

#### **5) Dollarisation (Dollar)**

Mixed results have been found in previous studies regarding the effect of dollarisation on trade. Rose and his co-authors (2000, 2001 and 2004) and proponents of dollarisation have found a significant positive correlation between trade and dollarisation. This implies that countries that are dollarised or that use the same currency are expected to trade more between

themselves than countries that have different currencies which would result in extra transaction costs arising from the exchange rate factor. The *Dollar* variable in the gravity model specified for this study therefore will show the effect of common currency on trade between Zimbabwe and its trading partners and this is the major focus of attention of this study. By sharing a common currency, this means that Zimbabwe is sharing with trading partners a common currency amongst the five currencies that were adopted as legal tender in 2009 namely, the US dollar, the Botswana pula, the South African rand, the EU euro and the British pound. For the purposes of this study, this would mean that from 2009 to 2014 Zimbabwe, among the twelve (12) selected countries, was sharing common currency with the US, UK, South Africa, Namibia, Botswana and the EU27, and was not sharing common currency with the rest including China, Zambia, Malawi, Mozambique, Kenya and UAE. The *Dollar* dummy variable is a binary variable equal to one (1) if Zimbabwe and country  $j$  use the same currency at time  $t$  and equal to zero (0) if otherwise. This means that from 2000 to 2008 the variable would be zero for all countries and differ for the period 2009 to 2014 when the new currency regime has been in place. Overall, the correlation coefficient of the *Dollar* variable will indicate the extent of the impact.

## **6) Exchange Rate Factor (Xrate)**

There is a large body of empirical research which finds that higher exchange rate volatility is associated with lower trade volumes depending on the source of exchange rate fluctuations implying that the level of exchange rate volatility has a statistically significant negative relationship with trade flows (Baxter & Kouparitsas, 2006). As also noted by Jacome & Lonnberg (2010), elimination of currency risk promotes trade and investment, holding other factors constant. For purposes on this study on Zimbabwe, another important variable, the exchange rate, is used to measure the extent of the impact of dollarisation on trade since dollarisation is regarded as form of hard currency exchange rate peg. In the case of Zimbabwe, during the period 2000 to 2008 the Zimbabwe dollar to US dollar exchange rate was unstable due to exchange controls and hyperinflation. This discouraged both exports and imports in a significant way. Since 2009 when the country started using the US dollar the exchange rate risk was completely eliminated on the US\$ to US\$ transactions with trading partners. The model captures nominal exchange rate volatility / variability of the Zimbabwe dollar against the US dollar during the period 2000 to 2008 and during the multicurrency period 2009 to 2013. Since the Zimbabwe currency from 2009 to 2013 was now the US

dollar it means that the Zimbabwe dollar to US dollar exchange rate stabilised at 1:1. The exchange rate variable is in a way capturing the dollarisation factor of the study as it is a good indicator of the dollarisation effect.

#### **4.5 DATA COLLECTION AND SOURCES**

Various data sources for the explanatory variables have been used. The data set on total trade, imports and exports were obtained from UNCTAD Trade Database<sup>23</sup> recorded in US dollars; and GDP figures for all the countries were obtained from the 2014 World Development Indicators database of the World Bank<sup>24</sup> and distance between Zimbabwe and its trading partners were obtained from CEPII database for 2014<sup>25</sup>. IMF's International Financial Statistics (2014) exchange rate data was obtained from the World Bank's World Development Indicators database<sup>26</sup> on official exchange rates calculated as an annual average based on monthly averages (Local Currency Unit per US\$ period average). Information on regional trade agreements (RTAs) was retrieved from the WTO website<sup>27</sup>.

#### **4.6 ECONOMETRIC PROCEDURES**

The study uses E-views Version 8 Statistical Software Package for econometric analyses to estimate the augmented gravity model. Panel data (a combination of cross sectional data and time series data) is used to run Pooled OLS regression gravity equations on total trade, exports and imports. Why panel data? The gravity model is run on panel data because of more degrees of freedom and less collinearity which may result in the estimated coefficients having small *t* statistics and large standard errors. Panel data also has strong ability to identify effects that cannot easily be detected through just cross-sectional data.

Two sets of gravity equations for imports and exports are estimated using the Pooled OLS method so as to determine the effect of dollarisation and other factors on trade flows between

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<sup>23</sup>

[http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sRF\\_ActivePath=p,15912&sRF\\_Expanded=p,15912](http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sRF_ActivePath=p,15912&sRF_Expanded=p,15912)

<sup>24</sup> <http://data.worldbank.org/products/wdi>

<sup>25</sup> [http://www.cepii.fr/cepii/en/bdd\\_modele/bdd.asp](http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp)

<sup>26</sup> <http://data.worldbank.org/indicator/PA.NUS.FCRF>

<sup>27</sup> <http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx>

Zimbabwe and its trading partners. Because of the multiplicative nature of the gravity equation, natural logarithms are used for all variables except dummy variables.

#### 4.7 EXPECTED RESULTS

The expected results of the gravity model estimation are summarised in Table 4.1 below showing the expected signs of the coefficients of the independent variables in the estimation namely; GDP ( $gdp_{zw,j}$ ), Distance ( $dist$ ), Exchange Rate ( $xrate$ ), Dollarisation ( $Dollar$ ), Free Trade Agreement ( $fta$ ) and Common Language ( $lang$ ). The dependent variables are Exports ( $exports$ ) and Imports ( $imports$ ).

**Table 4.1: Expected Results of Model Variables**

| Variable       | Description                                                                 | Expected Sign |
|----------------|-----------------------------------------------------------------------------|---------------|
| $lnexports_j$  | Natural logarithm of Zimbabwe exports to country $j$                        |               |
| $lnimports_j$  | Natural logarithm of Zimbabwe imports from country $j$                      |               |
| $C$            | Constant/intercept                                                          | +/-           |
| $lngdp_{zw,j}$ | Natural logarithm of the product of Zimbabwe GDP with country $j$ 's GDP    | +             |
| $Indist$       | Natural logarithm of distance between Harare and the capital of country $j$ | -             |
| $lnxrate$      | Natural logarithm for the Zimbabwe-US\$ exchange rate                       | +             |
| $Lang$         | Dummy variable for common language                                          | +             |
| $Fta$          | Dummy variable for Free Trade Agreement                                     | +             |
| $Dollar$       | Dummy variable for dollarisation (common currency)                          | +             |

## **5 CHAPTER 5: PRESENTATION AND INTERPRETATION OF RESULTS**

### **5.1 INTRODUCTION**

This chapter presents the results of the gravity model estimates on the effects of various variables on Zimbabwe's exports to, and imports from, its twelve (12) major trading partners. The descriptive statistics and correlation test results are first presented and thereafter results of the Pooled OLS gravity equation estimates are presented, analysed and interpreted. It is important to note that gravity equations in this study were estimated under two scenarios. The first scenario included all trading partners and the second scenario excluded China because China seemed to be kind of an outlier due to the fact that it does not have common currency and common language with Zimbabwe, and the two countries do not have a free trade agreement. By pooling the twelve (12) trading partners together the study disregarded heterogeneity that may exist among the trading partners.

### **5.2 DESCRIPTIVE STATISTICS**

The descriptive statistics used in the aggregate analysis is here presented in Tables 5.1 below. The variables of much relevance for the analysis include total trade, exports, imports, distance, free trade agreement and language. The summary shows a comparison of mean values of total trade, exports, imports, and distance for Zimbabwe and its trading partners during the full period under review (2000-2013), period after dollarisation, and comparison between common currency and non-common currency countries during the period of dollarisation 2009-2013. The full descriptive statistics for the four scenarios showing the number of observations, the median, minimum and maximum values, standard deviations, kurtosis, and skewness of the data distributions are detailed in Appendix 2.

Table 5.1 Summary Mean Statistics with Trading Partners (2000-2013)

| Variable        | Mean – with all partners (2000-2013) | Mean – with all partners after dollarisation (2009-2013) | Mean-with common currency partners after dollarisation (2009-2013) | Mean-with non-common currency partners after dollarisation (2009-2013) |
|-----------------|--------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------------------------|
| Total Trade     | 350578.5                             | 491318.3                                                 | 718560.1                                                           | 645219.4                                                               |
| Exports         | 149603.3                             | 202798.9                                                 | 273943.7                                                           | 226372.8                                                               |
| Imports         | 200975.5                             | 288519.4                                                 | 444616.4                                                           | 418846.5                                                               |
| Distance        | 4468.496                             | 4468.496                                                 | 5598.503                                                           | 3173.877                                                               |
| Free Trade Area | 0.750000                             | 0.750000                                                 | 0.833333                                                           | 0.714286                                                               |
| Language        | 0.666667                             | 0.666667                                                 | 0.833333                                                           | 0.571429                                                               |

Note: Trade figures are in millions of US dollars.

It can be observed from Table 5.1 that the mean values of total trade between Zimbabwe and its trading partners is larger during the period of dollarisation (2009-2013) and in particular with multi-currency countries or countries with whom their currencies were adopted as part of dollarisation. The same trend is true with Zimbabwe exports to, and imports from, its trading partners. This means that during dollarisation, Zimbabwe traded more with countries it shares common currency with than it did with countries it does not share common currency with. This is somewhat a true reflection of Zimbabwe's trade with South Africa and the EU combined. It can be noted also that imports actually more than doubled during the period 2009-2013 and more so with common currency countries. The mean of exports increased marginally and the increase is more pronounced on exports to the common currency countries as well. The trade difference between exports and imports (trade deficit) consequently increased more in the same set up. Despite the increased mean total trade, exports and imports, the average distance is more within common currency countries than non-common currencies. The dummy variable statistics show that Zimbabwe shares common language and free trade agreements more with common currency countries than non-common currency countries.

### 5.3 CORRELATION TEST

A correlation test is conducted to find if there are some linear causal relationships among the independent variables and also to determine the likely signs of the variables' coefficients in explaining Zimbabwe's exports to, and imports from its trading partners. This test bears in mind that correlation does not necessarily imply a causal relationship but may mean that

some variables just move in the same direction in some different way. Table 5.1 below shows the correlation tests found using the Excel Data Analysis Tool on the logarithm values of the variables.

Table 5.2: Correlation Test Results

|           | LNEXPORTS | LNIMPORTS | LNGDP_ZWJ | LNDIST  | LNEXRATE | FTA    | LANG  |
|-----------|-----------|-----------|-----------|---------|----------|--------|-------|
| LNEXPORTS | 1.000     |           |           |         |          |        |       |
| LNIMPORTS | 0.8019    | 1.000     |           |         |          |        |       |
| LNGDP_ZWJ | 0.5197    | 0.4015    | 1.000     |         |          |        |       |
| LNDIST    | -0.2572   | -0.1231   | 0.9067    | 1.000   |          |        |       |
| LNEXRATE  | -0.09713  | -0.1236   | -0.1298   | 7.7429  | 1.000    |        |       |
| FTA       | -0.0281   | -0.0030   | -0.5193   | -0.6370 | -3.124   | 1.000  |       |
| LANG      | -0.1531   | -0.1242   | -0.3069   | -0.3667 | 4.4239   | 0.4082 | 1.000 |

The results show a positive correlation between GDP and trade (exports and imports). The expected distance variable coefficient in relation to exports and imports is negative implying negative correlation. These two test results are in line with expectation of the gravity model to be estimated. The correlation tests for the dummy variables, free trade area and language, are negative with respect to exports and imports. This is rather strange as these, according to theory should have positive impact on trade. The expected relationship between exchange rate and almost all the variables is negative which also does not make sense.

## 5.4 POOLED OLS GRAVITY EQUATION ESTIMATES

The following section gives separate gravity equation estimates for exports, imports and total trade of which the full or detailed results are annexed as Appendix 3.

### 1) GRAVITY EQUATION FOR TOTAL EXPORTS [LNEXPORTS]

Table 5.3: Gravity Equation for Exports to All Trading Partners

| Variable                       | Coefficient | Std. Error | t-Statistic | Prob.  |
|--------------------------------|-------------|------------|-------------|--------|
| LNGDP_ZWJ                      | 0.347736    | 0.032300   | 10.76575    | 0.0000 |
| LNDIST                         | -0.707129   | 0.180280   | -3.922384   | 0.0001 |
| LNEXRATE                       | 0.002422    | 0.023647   | 0.102442    | 0.9185 |
| DOLLAR                         | 0.230268    | 0.299952   | 0.767683    | 0.4438 |
| FTA                            | 0.108165    | 0.293412   | 0.368644    | 0.7129 |
| LANG                           | -0.577881   | 0.221573   | -2.608081   | 0.0100 |
| No. of Obs=168, R-Squared=0.38 |             |            |             |        |

The gravity panel least squares estimates on the effect of the various variables on Zimbabwe's exports to its major trading partners are rather interesting in explaining exports with a good number being not statistically significant. The results show that the GDP (LNGDP\_ZWJ) is positive as expected at 0.35 and statistically significant at 5% level with a probability value of zero ( $p < .05$ ). This means that as GDP increases by 1%, Zimbabwe exports are expected to increase by 0.35%.

The distance (LNDIST) has the expected negative coefficient of -0.7 and statistically significant at 5% level with a probability value of 0.0001 which is also less than  $p < .05$ . This means a 1% increase in distance between Zimbabwe and its trading partners reduces exports by 0.7%. Alternatively this means that Zimbabwe exports more to countries that are nearer in terms of distance than to those countries that are further away. The results on GDP and distance are quite consistent with postulations of the gravity model. The exchange rate variable has a zero coefficient although it is not statistically significant at 5% level of significance with a p-value of 0.92 ( $p > .05$ ). This implies that the exchange rate factor has no influence in explaining Zimbabwe's exports. It should be noted that the exchange rate factor considered in this study is not between currencies within the multi-currency system but the exchange rate between the Zimbabwe currency and the US dollar from 2000-2013. The

Zimbabwe currency between 2009 and 2013 has been the US\$. The result could have been different if the exchange rate factor was between the multi-currencies exchange rates, for example between the US dollar and the South African rand.

The free trade agreement variable (FTA) coefficient value of 0.11 ( $e^{.11}=0.3$ ) implies that Zimbabwe exports reduce by 70% to countries with whom it has free trade agreements with i.e.  $100(e^{.11}-1) = -70\%$ . Again, this estimate is not statistically significant at 5% per cent level with a p-value of 0.71, so we can conclude with certainty that free trade agreements have had no effect or no impact on Zimbabwe's exports. The language factor (LANG) has an unexpected negative sign with a coefficient of -0.58 which is statistically significant at 5% level. This implies that language has a negative effect on Zimbabwe's exports, with the country exporting less to countries with which it shares common language with than it exports to countries that it does not share common language with. This is rather strange and does not make sense and this could be an underestimate as a result of omitted variable bias.

The dollarisation variable (*DOLLAR*) estimate is not statistically significant at  $e^{.23}=0.63$ . This estimate is not statistically significant at 5% level of significance implying that dollarisation had no effect on Zimbabwe exports to countries with whom it shared common currency with. The result is rather consistent with Klein (2002) and Nitsch (2005) findings on the Western Hemisphere that dollarised currency unions do not significantly promote trade.

## 2) GRAVITY EQUATION FOR TOTAL IMPORTS [LNIMPORTS]

Table 5.4: Gravity Equation for Imports from All Trading Partners

| Variable                    | Coefficient | Std. Error | t-Statistic | Prob.  |
|-----------------------------|-------------|------------|-------------|--------|
| LNGDP_ZWJ                   | 0.439011    | 0.035672   | 12.30677    | 0.0000 |
| LNDIST                      | -1.241725   | 0.199102   | -6.236633   | 0.0000 |
| LNEXRATE                    | 0.022526    | 0.026115   | 0.862572    | 0.3896 |
| DOLLAR                      | 0.820232    | 0.331267   | 2.476044    | 0.0143 |
| FTA                         | -0.365366   | 0.324044   | -1.127520   | 0.2612 |
| LANG                        | -0.726614   | 0.244706   | -2.969339   | 0.0034 |
| No. of Obs.=168; $R^2=0.37$ |             |            |             |        |

The model estimates on imports as shown in Table 5.4 above also reflect interesting results with the GDP (LNGDP\_ZWJ) coefficient being positive as expected at 0.44 which is statistically significant at 5% level with a p-value zero. This means that as GDP increases by 1%, Zimbabwe imports are expected to increase by 0.44%. Distance (LNDIST) has the expected negative sign and much bigger value of -1.24 implying that a 1% increase in distance would reduce imports by 1.24%. This is statistically significant at 5% level. This would mean that Zimbabwe's imports are to a greater extent influenced by the distance implying that the country imports more from nearer countries than distant countries and this could be due to transport and logistics issues. Again, both the GDP and distance estimates are consistent with the gravity model postulations. As with exports, the exchange rate coefficient is almost zero at 0.02 although not statistically significant at 5% level of significance. This also implies that exchange rate volatility factor has had no influence on Zimbabwe's imports and this could be due to use of hedging instruments by importers thereby rendering the effect of exchange rate volatility immaterial.

The free trade agreement variable (FTA) has a negative coefficient value -0.37 ( $e^{-0.37}=1.45$ ) implying that Zimbabwe imports reduce by 45% from countries with whom it has free trade agreements with. In a free trade area imports are actually expected to increase but the results are indicating otherwise although not statistically significant at 5% level. Again language (LANG) has an unexpected negative sign which is statistically very significant at 5% level. This does not make economic sense and this, again, could be an underestimate as a result of omitted variable bias.

The variable of much interest, dollarisation, has a very positive and significant effect on Zimbabwe imports. The DOLLAR estimate is 0.82 ( $e^{0.82}=2.23$ ) and is very significant at 5% level (p-value equal to 0.01). This means that Zimbabwe imports increased by 123% from countries with which it shares common currency with i.e.  $100(e^{0.82}-1) = 122.9\%$ , including South Africa, EU and the US. This result reflects that Zimbabwe imported two times more from countries with which it shares common currency with (multi-currency basket countries). This is somewhat a better reflection of what Zimbabwe has actually experienced with dollarisation on imports as they have more than doubled during the period of dollarisation and the bulk of these imports were coming from multi-currency basket countries. This estimate is almost similar to the result of Rivera (2007) who found  $100(e^{0.91}-1) = 148\%$  increase for El Salvador's trade with countries it shared common currency with. As indicated

in the literature review, Glick & Rose (2002) found the currency union effect on bilateral trade being three times more ( $e^{1.3}=3.7$ ) i.e. 270% increase (triple effect) and statistically significant.

### 3) GRAVITY EQUATION FOR TOTAL EXPORTS [LNEXPORTS] EXCL. CHINA

Table 5.5: Gravity Equation for Exports to all Trading Partners Excluding China

| Variable                    | Coefficient | Std. Error | t-Statistic | Prob.  |
|-----------------------------|-------------|------------|-------------|--------|
| LNGDP_ZWJ                   | 0.336669    | 0.032537   | 10.34719    | 0.0000 |
| LNDIST                      | -0.712227   | 0.180962   | -3.935774   | 0.0001 |
| LNEXRATE                    | 0.016514    | 0.025192   | 0.655529    | 0.5131 |
| DOLLAR                      | 0.417802    | 0.308084   | 1.356129    | 0.1771 |
| FTA                         | 0.426140    | 0.309036   | 1.378935    | 0.1700 |
| LANG                        | -0.404450   | 0.228351   | -1.771175   | 0.0786 |
| No. of Obs.=154; $R^2=0.39$ |             |            |             |        |

Table 5.5 above shows the second scenario results of the gravity equation estimates on exports excluding China. As indicated earlier on, the 'China effect' could have had an influence on the result since China has no common currency, common language and free trade agreement with Zimbabwe like many of the countries in the panel. The gravity estimates are not at all much different from the first case scenario implying that the 'China effect' does not hold on Zimbabwe's exports to its major trading partners. Table 5.6 below gives a comparison of the results of the two scenarios.

#### **Comparison of Gravity Equation Estimates for Total Exports Incl. & Excl. China**

Table 5.6: Comparison of Estimates on Exports Including and Excluding China

| Variable  | Coefficient on Zimbabwe exports to all countries | P-Value | Coefficient on Zimbabwe all countries excluding China | P-Value |
|-----------|--------------------------------------------------|---------|-------------------------------------------------------|---------|
| LNGDP_ZWJ | 0.347736                                         | 0.0000  | 0.336669                                              | 0.0000  |
| LNDIST    | -0.707129                                        | 0.0001  | -0.712227                                             | 0.0001  |
| LNEXRATE  | 0.002422                                         | 0.5131  | 0.016514                                              | 0.9185  |
| DOLLAR    | 0.230268                                         | 0.1771  | 0.417802                                              | 0.4438  |
| FTA       | 0.108165                                         | 0.1700  | 0.426140                                              | 0.7129  |
| LANG      | -0.577881                                        | 0.0786  | -0.404450                                             | 0.0100  |

The p-values are slightly different but still pointing to the same significance. Therefore the analysis and explanations given under the first case scenario above hold under this 'China effect' scenario.

#### 4) GRAVITY EQUATION FOR TOTAL IMPORTS [LNIMPORTS] EXCL. CHINA

Table 5.7: Gravity Equation on Imports from all Trading Partners Excluding China

| Variable  | Coefficient | Std. Error | t-Statistic | Prob.  |
|-----------|-------------|------------|-------------|--------|
| LNGDP_ZWJ | 0.429256    | 0.036846   | 11.65011    | 0.0000 |
| LNDIST    | -1.227974   | 0.204924   | -5.992330   | 0.0000 |
| LNEXRATE  | 0.029079    | 0.028528   | 1.019325    | 0.3097 |
| DOLLAR    | 0.918928    | 0.348878   | 2.633950    | 0.0093 |
| FTA       | -0.147224   | 0.349956   | -0.420691   | 0.6746 |
| LANG      | -0.611632   | 0.258588   | -2.365274   | 0.0193 |

No. of Obs.=154; R<sup>2</sup>=0.37

Table 5.7 above shows the second scenario results of the gravity equation estimates on imports excluding China. Table 5.8 below gives a comparison of the results of the first and this second scenario.

#### Comparison of Gravity Equation Estimates for Total Imports Incl. & Excl. China

Table 5.8: Comparison of Estimates on Imports Including and Excluding China

| Variable  | Coefficient on Zimbabwe Imports from all countries | P-Value | Coefficient on Zimbabwe Imports from all countries excluding China | P-Value |
|-----------|----------------------------------------------------|---------|--------------------------------------------------------------------|---------|
| LNGDP_ZWJ | 0.439011                                           | 0.0000  | 0.429256                                                           | 0.0000  |
| LNDIST    | -1.241725                                          | 0.0000  | -1.227974                                                          | 0.0000  |
| LNEXRATE  | 0.022526                                           | 0.3896  | 0.029079                                                           | 0.3097  |
| DOLLAR    | 0.820232                                           | 0.0143  | 0.918928                                                           | 0.0093  |
| FTA       | -0.365366                                          | 0.2612  | -0.147224                                                          | 0.6746  |
| LANG      | -0.726614                                          | 0.0034  | -0.611632                                                          | 0.0193  |

Again, the gravity estimates are almost the same with the first case scenario implying that the 'China effect' does not hold to disregard the result of the first case scenario. This means that

GDP, Distance and dollarisation had significant effect on Zimbabwe's imports from all its major trading partners.

## 5.5 CONCLUSION

The Pooled OLS Gravity Equations have shown that GDP had a positive and statistically significant effect on all explained variables namely; exports and imports as rightly postulated by the gravity model. Consistent results have also been found with regards to distance indicating a negative and statistically significant effect on Zimbabwe's exports and imports. The trade-enhancing results of the dollarisation variable (Dollar) on exports, imports and total trade are had positive throughout in the sense of increasing trade but however the positive effect is statistically significant on imports and statistically insignificant on exports. A 147% increase on imports is quite a significant increase although this is a lesser effect as compared to the findings on Glick & Rose of times increase on total trade. This implies that dollarisation attracted relatively more imports into Zimbabwe than exports to trading partners which is kind of a reflection of the situation on the ground as identified in Chapter 2 on the synopsis of Zimbabwe's trade performance.

The study also revealed that exchange rate volatility had no impact on exports and imports although this result has not been statistically significant. This result augurs well with Silvana Tenreyro (2006)'s finding that nominal exchange rate variability has no significant impact on trade flows. The exchange rate volatility that was under consideration is between the Zimbabwe currency and the US\$ only. The result could be explained by the fact that after dollarisation in 2009 there was no exchange rate volatility problem to talk about since the exchange rate stabilised at 1:1. However, the exchange rate issue that could matter and which can be looked into in future studies is that between currencies within the multi-currency basket particularly the US dollar and the South African rand (the major traded currencies) exchange rate which has not been stable.

The results on free trade agreements and language are surprisingly ambiguous. They actually do not make economic sense as they reflect a negative effect on trade. This could mean that these variables are not an issue at all under the current Zimbabwe situation.

Attempting to balance out the results of the gravity equations on exports and imports leads to the conclusion of this researcher that dollarisation has had to a greater extent a negative impact on the balance of trade. This is due to the fact that dollarisation increased exports by 147% yet it had no significant effect on imports implying that the trade deficit gap was increasing or widening with a margin of more 100 percentage points. It can be concluded with certainty that dollarisation had a negative impact on the balance of trade through the imports component.

The overall results show an  $R^2$  for all the three gravity equations averaging 0.4 indicating that only 40% of the variations in Zimbabwe's total exports and total imports from its major trading partners are explained by the gravity equations. This leads this researcher to conclude that there are certainly other very critical factors that could have been affecting Zimbabwe's trade performance besides the factors identified for this study. These variables could be linked to productive capacity for local producers, barriers to trade and other institutional factors which can be areas for consideration in future researches.

## **6 CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 INTRODUCTION**

This chapter summarises the research findings relating to the fundamental objectives of the study which basically sought to assess the extent to which dollarisation impacted on Zimbabwe's trade performance during the period 2009 and 2013 when the policy regime has been in place so far. The chapter makes conclusions and recommendations for policy consideration and interventions guided by research findings. The chapter signs off with suggestions for further research on the dollarisation-trade nexus.

### **6.2 SUMMARY CONCLUSIONS**

The study examined, using the gravity model, the extent of the impact of various variables on Zimbabwe's international trade flows during the period 2009 to 2013 when the country adopted dollarisation currency regime (multi-currency system) and comparing it with the period prior to dollarisation 2000 to 2008 when the country was still using its own currency, the Zimbabwe dollar. The study was also meant to find out if the trade performance was as a result of other factors besides dollarisation, economic size (GDP), distance, exchange rate volatility, language and free trade agreements with trading partners (factors included in the gravity model) or other factors.

The results of the study are quite mixed depending on which dimension and explained variable is under consideration. With regards to export flows, we accept the null hypothesis that dollarisation did not have an impact on Zimbabwe's exports to major trading partners and reject the alternative hypothesis that it had an impact. The results show that dollarisation had no effect on export performance. With regards to imports performance, the results show a statistically significant doubling effect of dollarisation impact on imports (147% increase). On the balance of trade, the fact that dollarisation increased exports by 147% yet on exports it had no significant effect implies that the trade deficit gap was increasing or widening with a margin of more 100 percentage points. It can be concluded with certainty that dollarisation had a negative impact on the balance of trade through the imports component.

The findings on the impact of dollarisation on Zimbabwe's trade are not quite consistent with Rose et al (2000, 2001 & 2004) and Rivera (2007) results on El Salvador which found an

increase of 3 to times on trade. This difference can be due to the fact that this researchers considered analysing the effects separately on total imports and total exports while the other researchers looked at total trade without distinguishing between exports and imports. Otherwise the results on imports agree to the trade-enhancing effects of dollarisation, while the results on exports point to the conclusion of Klein (2005) and Nitsch (2005) that dollarisation does not have significant trade-enhancing effects.

For Zimbabwe, it is during the period of dollarisation (2009-2013) that total trade more-than-doubled driven mainly by imports compared to the period before dollarisation. Dollarisation actually became an incentive although towards the end of 2013 the total trade values were shrinking implying that even though dollarisation was in place, there were other significant factors at play which were behind the poor performance. We can safely conclude that dollarisation had no effect on exports as the export performance remained sluggish while import performance was rising exponentially.

Although there have been arguments against a negative trade balance in an economy, with some saying that it does not necessarily point to poor performance of an economy as evidenced by the US which has posted negative trade balances for many years, the situation obtaining in Zimbabwe is rather a cause for concern given that more of the country's limited foreign currency has been going out of the country to purchase imports and yet there have not been enough exports to generate more of the foreign currency into the economy to balance the equation. As a result the country has been faced with financial liquidity challenges that have hampered productive sectors of the economy to secure affordable and long-term capital. The situation has also been worsened by limited inflows of capital through FDI, limited external support from multilateral financial institutions and dwindling remittances from Zimbabweans in the diaspora.

As earlier indicated, the model results reveal that on only 40% of the variations in Zimbabwe's total exports and total imports from its major trading partners is explained by the gravity equations. This points to the fact that there are important country-specific explanatory variables precluded in the estimation which could have important partial effects on trade. These variables, from the qualitative analysis of the researcher, include policy and institutional factors that affect the ease-of-doing business. Infrastructure also plays an important role and as such it is recommended that future studies on the impact of various

factors on trade in the Zimbabwe context take into account other salient and important factors into consideration. In as much as other factors such as distance, economic size, and common language and free trade agreements have gotten attention, the role of institutions is beginning to have a deep influence on all the factors.

From the findings of this study, it appears there was false impression or mistaken belief among economic agents that the economy was to fully recover by default by virtue of dollarisation, yet this researcher, based and guided by the results of this study is of the view that dollarisation is just a necessary but not sufficient condition to drive the country's trade performance which is an important variable in the economic growth model.

### **6.3 POLICY RECOMMENDATIONS**

#### **1) Balance of Trade**

The study has found that dollarisation to a greater extent resulted in increased imports into Zimbabwe and had no effect on exports. This resulted in an unsustainable balance of trade and current account deficits, which have been linked to with foreign currency liquidity challenges Zimbabwe has faced after dollarisation off the economy. It is recommended that export development programmes and incentives be put in place to inculcate an export culture amongst entrepreneurs to boost exports, the most important and sustainable source of foreign currency. This is against the background of limited fiscal space and incapacitation to generate seigniorage revenue following dollarisation. There is also need for appropriate and less excessive exchange control measures to stem out unnecessary and luxury imports which have constrained the country's current account position.

#### **2) Productive Capacity**

While the study has found no effect of dollarisation on exports and statistically significant impact on imports, with production capacity constraints Zimbabwe could continue incentivising imports thereby compromising the country's balance of trade and its ability to sustain the dollarisation through foreign exchange liquidity. Increasing productive capacity and competitiveness of local industry by controlling the major cost drivers associated with dollarised economies will be an important step to boost demand for domestically produced goods. Effort in this direction is necessary to curb influx of low priced imports from least cost

producing trading partners. Measures to improve on competitiveness to a greater extent contribute sustainable trade performances for the country.

### **3) Macroeconomic Stability**

The study has noted that with the introduction of the multi-foreign currency system in Zimbabwe, economic agents were in the line of thinking that dollarisation was the ultimate solution to all challenges the country was faced with. This was in light of the drastic fall in inflation rates from hyper levels to single-digit levels of below 5%. It seems this steady economic recovery experienced between 2009 and 2013 was by default as this is expected anyway in an economy that adopts dollarisation policy in the face of hyper-inflation and macro-economic instability. For long-run stabilisation of the economy, dollarisation needs to be buttressed by a variety of economic policies that can stimulate investment and export-oriented economic growth. In the short-to-medium term, Zimbabwe has limited options to re-introduce the local currency and should maintain the multi-currency system for a reasonable period of time until the basic macroeconomic fundamentals get into place. This is in light of the current economic stagnation, otherwise the situation could easily culminate into the pre-2009 era.

### **4) Free Trade Agreements**

The study has generally revealed no effect of free trade agreements (FTAs) on Zimbabwe's trade performance during the multicurrency period. While it is widely acknowledged that FTAs contribute to increased trade flows between countries, supply-side challenges could be the major hindrance for Zimbabwe to meaningfully benefit out its membership to bilateral and regional trading blocs. This also supports the recommendation above to work out on policies to boost productive capacity and competitiveness otherwise the country would continue absorbing imports from trading partners such as South Africa that are making use of existing free trade agreements.

## **6.4 SUGGESTIONS FOR FUTURE RESEARCH**

The scope of this study was limited to analysing the extent of the impact of dollarisation on Zimbabwe's international trade flows, and in particular exports and imports. The findings of this study are comparable and consistent with other renowned academics that dollarisation

increases trade. However, the study did not include all other salient factors that have been seen to influence trade and economic performance such as tariff and non-tariff barriers, policy and institutional factors. Therefore, this study can be a good starting point for further studies to determine the extent of the impact of these other variables on Zimbabwe trade flows. A different methodology can also be used so as to compare the results of the impact of dollarisation on trade in Zimbabwe. This study only focused on trade in goods, so it can also be extended to trade in services, which of late have been contributing at least 50% to GDP of Zimbabwe, although less is being realised in terms of exports.

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## 8 APPENDICES

### APPENDIX 1: DATASET FOR PANEL REGRESSION ANALYSIS (IN LOG FORM EXCEPT FOR DUMMY VARIABLES)

|               | LNTRADE   | LNEXPORTS | LNGDP_ZWJ | LNDIST   | LNEXRATE | DOLLAR | FTA | LANG |
|---------------|-----------|-----------|-----------|----------|----------|--------|-----|------|
| Botswana - 00 | 12.056045 | 11.03705  | 45.10298  | 6.841264 | 3.641264 | -      | 1   | 1    |
| Botswana - 01 | 11.21111  | 9.768816  | 45.06299  | 6.841264 | 4.007333 | -      | 1   | 1    |
| Botswana - 02 | 11.56477  | 10.73671  | 44.98731  | 6.841264 | 4.007333 | -      | 1   | 1    |
| Botswana - 03 | 11.45943  | 10.56609  | 45.20827  | 6.841264 | 6.714171 | -      | 1   | 1    |
| Botswana - 04 | 12.03887  | 10.77994  | 45.39784  | 6.841264 | 8.165648 | -      | 1   | 1    |
| Botswana - 05 | 12.1211   | 10.46677  | 45.49232  | 6.841264 | 8.692322 | -      | 1   | 1    |
| Botswana - 06 | 12.53446  | 11.7328   | 45.45623  | 6.841264 | 11.5049  | -      | 1   | 1    |
| Botswana - 07 | 12.90377  | 11.81815  | 45.50506  | 6.841264 | 12.42922 | -      | 1   | 1    |
| Botswana - 08 | 12.69843  | 11.8746   | 45.33982  | 6.841264 | 12.42922 | -      | 1   | 1    |
| Botswana - 09 | 12.73325  | 12.06642  | 45.85863  | 6.841264 | 0        | 1      | 1   | 1    |
| Botswana - 10 | 12.88635  | 12.29207  | 46.31407  | 6.841264 | 0        | 1      | 1   | 1    |
| Botswana - 11 | 12.77029  | 12.22093  | 46.57255  | 6.841264 | 0        | 1      | 1   | 1    |
| Botswana - 12 | 12.89662  | 12.50258  | 46.64678  | 6.841264 | 0        | 1      | 1   | 1    |
| Botswana - 13 | 12.62405  | 11.88816  | 46.74207  | 6.841264 | 0        | 1      | 1   | 1    |
| China – 00    | 11.79883  | 11.4857   | 50.43594  | 9.296346 | 3.641264 | -      | 0   | 0    |
| China – 01    | 11.71315  | 11.36922  | 50.54914  | 9.296346 | 4.007333 | -      | 0   | 0    |
| China – 02    | 11.88749  | 11.64827  | 50.5757   | 9.296346 | 4.007333 | -      | 0   | 0    |
| China – 03    | 12.6738   | 12.54999  | 50.59486  | 9.296346 | 6.714171 | -      | 0   | 0    |
| China – 04    | 12.3701   | 11.75519  | 50.77148  | 9.296346 | 8.165648 | -      | 0   | 0    |
| China – 05    | 12.39921  | 11.76313  | 50.91839  | 9.296346 | 8.692322 | -      | 0   | 0    |
| China - 06    | 12.11899  | 11.32441  | 51.04682  | 9.296346 | 11.5049  | -      | 0   | 0    |
| China - 07    | 12.6659   | 11.6705   | 51.27154  | 9.296346 | 12.42922 | -      | 0   | 0    |
| China - 08    | 12.42351  | 11.70133  | 51.34837  | 9.296346 | 12.42922 | -      | 0   | 0    |
| China - 09    | 12.76618  | 12.15541  | 52.06066  | 9.296346 | 0        | 0      | 0   | 0    |
| China - 10    | 13.41997  | 12.81651  | 52.38113  | 9.296346 | 0        | 0      | 0   | 0    |
| China - 11    | 13.70087  | 13.16962  | 52.73906  | 9.296346 | 0        | 0      | 0   | 0    |
| China - 12    | 13.91911  | 13.47347  | 52.98553  | 9.296346 | 0        | 0      | 0   | 0    |
| China - 13    | 13.93249  | 13.5258   | 53.17981  | 9.296346 | 0        | 0      | 0   | 0    |
| EU - 00       | 13.48301  | 13.11414  | 52.23727  | 8.996654 | 3.641264 | -      | 1   | 0    |
| EU - 01       | 13.28151  | 12.90141  | 52.26665  | 8.996654 | 4.007333 | -      | 1   | 0    |
| EU - 02       | 13.39101  | 13.13263  | 52.28717  | 8.996654 | 4.007333 | -      | 1   | 0    |
| EU - 03       | 12.99625  | 12.53393  | 52.39313  | 8.996654 | 6.714171 | -      | 1   | 0    |
| EU - 04       | 13.20742  | 12.8735   | 52.54672  | 8.996654 | 8.165648 | -      | 1   | 0    |
| EU - 05       | 13.0332   | 12.67928  | 52.58093  | 8.996654 | 8.692322 | -      | 1   | 0    |
| EU - 06       | 13.05086  | 12.75481  | 52.59038  | 8.996654 | 11.5049  | -      | 1   | 0    |
| EU - 07       | 13.19491  | 12.83611  | 52.70832  | 8.996654 | 12.42922 | -      | 1   | 0    |
| EU - 08       | 13.14502  | 12.7978   | 52.62447  | 8.996654 | 12.42922 | -      | 1   | 0    |
| EU - 09       | 13.15767  | 12.86865  | 53.14102  | 8.996654 | 0        | 1      | 1   | 0    |
| EU - 10       | 13.50349  | 13.19958  | 53.27517  | 8.996654 | 0        | 1      | 1   | 0    |

|                 |          |          |          |          |          |   |   |   |
|-----------------|----------|----------|----------|----------|----------|---|---|---|
| EU - 11         | 13.56941 | 13.26852 | 53.50186 | 8.996654 | 0        | 1 | 1 | 0 |
| EU - 12         | 13.64029 | 13.29821 | 53.55883 | 8.996654 | 0        | 1 | 1 | 0 |
| EU - 13         | 13.4422  | 13.06619 | 53.68409 | 8.996654 | 0        | 1 | 1 | 0 |
| Kenya - 00      | 9.444934 | 9.06224  | 45.88916 | 7.574309 | 3.641264 | - | 1 | 1 |
| Kenya - 01      | 8.695411 | 8.089898 | 45.924   | 7.574309 | 4.007333 | - | 1 | 1 |
| Kenya - 02      | 10.36249 | 9.581894 | 45.86999 | 7.574309 | 4.007333 | - | 1 | 1 |
| Kenya - 03      | 9.239954 | 8.870359 | 45.89349 | 7.574309 | 6.714171 | - | 1 | 1 |
| Kenya - 04      | 8.846243 | 8.414643 | 45.98388 | 7.574309 | 8.165648 | - | 1 | 1 |
| Kenya - 05      | 9.016343 | 7.767934 | 46.12719 | 7.574309 | 8.692322 | - | 1 | 1 |
| Kenya - 06      | 8.206125 | 7.495781 | 46.39239 | 7.574309 | 11.5049  | - | 1 | 1 |
| Kenya - 07      | 9.322999 | 8.973253 | 46.57715 | 7.574309 | 12.42922 | - | 1 | 1 |
| Kenya - 08      | 8.518422 | 7.855528 | 46.5123  | 7.574309 | 12.42922 | - | 1 | 1 |
| Kenya - 09      | 9.650359 | 9.166218 | 47.15692 | 7.574309 | 0        | 0 | 1 | 1 |
| Kenya - 10      | 10.01012 | 9.479887 | 47.38215 | 7.574309 | 0        | 0 | 1 | 1 |
| Kenya - 11      | 10.49742 | 9.895295 | 47.57704 | 7.574309 | 0        | 0 | 1 | 1 |
| Kenya - 12      | 10.43184 | 9.581787 | 47.88875 | 7.574309 | 0        | 0 | 1 | 1 |
| Kenya - 13      | 10.37203 | 9.474087 | 48.06022 | 7.574309 | 0        | 0 | 1 | 1 |
| Malawi - 00     | 10.83661 | 10.69734 | 43.90304 | 6.258371 | 3.641264 | 1 | 1 | 1 |
| Malawi - 01     | 9.854454 | 9.572342 | 43.90041 | 6.258371 | 4.007333 | 1 | 1 | 1 |
| Malawi - 02     | 11.22567 | 11.17369 | 44.27401 | 6.258371 | 4.007333 | 1 | 1 | 1 |
| Malawi - 03     | 10.6295  | 10.41553 | 44.07752 | 6.258371 | 6.714171 | 1 | 1 | 1 |
| Malawi - 04     | 10.94226 | 10.75293 | 44.17048 | 6.258371 | 8.165648 | 1 | 1 | 1 |
| Malawi - 05     | 10.86021 | 10.774   | 44.21005 | 6.258371 | 8.692322 | 1 | 1 | 1 |
| Malawi - 06     | 11.06706 | 9.896602 | 44.27783 | 6.258371 | 11.5049  | 1 | 1 | 1 |
| Malawi - 07     | 11.62549 | 10.14764 | 44.40685 | 6.258371 | 12.42922 | 1 | 1 | 1 |
| Malawi - 08     | 11.36161 | 10.14613 | 44.3849  | 6.258371 | 12.42922 | 1 | 1 | 1 |
| Malawi - 09     | 11.45762 | 10.50167 | 45.16096 | 6.258371 | 0        | 0 | 1 | 1 |
| Malawi - 10     | 11.64184 | 10.62077 | 45.37941 | 6.258371 | 0        | 0 | 1 | 1 |
| Malawi - 11     | 11.71482 | 10.41396 | 45.56818 | 6.258371 | 0        | 0 | 1 | 1 |
| Malawi - 12     | 11.68309 | 10.46011 | 45.41473 | 6.258371 | 0        | 0 | 1 | 1 |
| Malawi - 13     | 11.66442 | 10.45424 | 45.35827 | 6.258371 | 0        | 0 | 1 | 1 |
| Mozambique - 00 | 11.58021 | 9.960205 | 44.8081  | 6.823225 | 3.641264 | - | 1 | 0 |
| Mozambique - 01 | 11.35778 | 8.507152 | 44.76501 | 6.823225 | 4.007333 | - | 1 | 0 |
| Mozambique - 02 | 11.748   | 10.3549  | 44.72915 | 6.823225 | 4.007333 | - | 1 | 0 |
| Mozambique - 03 | 11.16127 | 9.726393 | 44.73217 | 6.823225 | 6.714171 | - | 1 | 0 |
| Mozambique - 04 | 11.06556 | 9.58724  | 44.94547 | 6.823225 | 8.165648 | - | 1 | 0 |
| Mozambique - 05 | 11.41041 | 10.26221 | 45.08045 | 6.823225 | 8.692322 | - | 1 | 0 |
| Mozambique - 06 | 11.6859  | 10.88295 | 45.10055 | 6.823225 | 11.5049  | - | 1 | 0 |
| Mozambique - 07 | 11.80333 | 10.90636 | 45.33115 | 6.823225 | 12.42922 | - | 1 | 0 |
| Mozambique - 08 | 11.25992 | 9.646623 | 45.33198 | 6.823225 | 12.42922 | - | 1 | 0 |
| Mozambique - 09 | 11.64947 | 10.25264 | 45.91815 | 6.823225 | 0        | 0 | 1 | 0 |
| Mozambique - 10 | 11.58353 | 10.10936 | 46.01225 | 6.823225 | 0        | 0 | 1 | 0 |
| Mozambique - 11 | 11.63203 | 10.17168 | 46.42405 | 6.823225 | 0        | 0 | 1 | 0 |
| Mozambique - 12 | 11.84202 | 10.86687 | 46.67496 | 6.823225 | 0        | 0 | 1 | 0 |

|                   |          |          |          |          |          |   |   |   |
|-------------------|----------|----------|----------|----------|----------|---|---|---|
| Mozambique - 13   | 11.94153 | 11.09266 | 46.79769 | 6.823225 | 0        | 0 | 1 | 0 |
| Namibia - 00      | 10.10847 | 9.797474 | 44.71033 | 7.34503  | 3.641264 | - | 1 | 1 |
| Namibia - 01      | 9.496455 | 8.902746 | 44.62617 | 7.34503  | 4.007333 | - | 1 | 1 |
| Namibia - 02      | 9.88937  | 9.775056 | 44.50605 | 7.34503  | 4.007333 | - | 1 | 1 |
| Namibia - 03      | 9.798034 | 9.740285 | 44.78743 | 7.34503  | 6.714171 | - | 1 | 1 |
| Namibia - 04      | 9.730886 | 9.597762 | 45.09346 | 7.34503  | 8.165648 | - | 1 | 1 |
| Namibia - 05      | 9.690599 | 9.548587 | 45.1792  | 7.34503  | 8.692322 | - | 1 | 1 |
| Namibia - 06      | 9.312454 | 9.05341  | 45.2178  | 7.34503  | 11.5049  | - | 1 | 1 |
| Namibia - 07      | 9.087113 | 8.699291 | 45.28073 | 7.34503  | 12.42922 | - | 1 | 1 |
| Namibia - 08      | 9.366932 | 8.927518 | 45.07018 | 7.34503  | 12.42922 | - | 1 | 1 |
| Namibia - 09      | 8.98765  | 7.995149 | 45.72876 | 7.34503  | 0        | 1 | 1 | 1 |
| Namibia - 10      | 9.384839 | 8.300539 | 46.11647 | 7.34503  | 0        | 1 | 1 | 1 |
| Namibia - 11      | 9.220989 | 7.708994 | 46.35913 | 7.34503  | 0        | 1 | 1 | 1 |
| Namibia - 12      | 9.800038 | 8.099326 | 46.53787 | 7.34503  | 0        | 1 | 1 | 1 |
| Namibia - 13      | 9.835496 | 8.143645 | 46.62209 | 7.34503  | 0        | 1 | 1 | 1 |
| South Africa - 00 | 13.93388 | 12.34047 | 48.26245 | 7.689923 | 3.641264 | - | 1 | 1 |
| South Africa - 01 | 13.82315 | 11.67274 | 48.16017 | 7.689923 | 4.007333 | - | 1 | 1 |
| South Africa - 02 | 13.9859  | 12.59472 | 48.04286 | 7.689923 | 4.007333 | - | 1 | 1 |
| South Africa - 03 | 14.14687 | 12.93375 | 48.35808 | 7.689923 | 6.714171 | - | 1 | 1 |
| South Africa - 04 | 14.35429 | 13.12465 | 48.6373  | 7.689923 | 8.165648 | - | 1 | 1 |
| South Africa - 05 | 14.16854 | 13.26918 | 48.74872 | 7.689923 | 8.692322 | - | 1 | 1 |
| South Africa - 06 | 14.22741 | 13.10628 | 48.7455  | 7.689923 | 11.5049  | - | 1 | 1 |
| South Africa - 07 | 14.50675 | 13.59229 | 48.81456 | 7.689923 | 12.42922 | - | 1 | 1 |
| South Africa - 08 | 14.70024 | 13.47967 | 48.59038 | 7.689923 | 12.42922 | - | 1 | 1 |
| South Africa - 09 | 14.62824 | 13.11515 | 49.23557 | 7.689923 | 0        | 1 | 1 | 1 |
| South Africa - 10 | 14.87    | 13.48048 | 49.62112 | 7.689923 | 0        | 1 | 1 | 1 |
| South Africa - 11 | 15.03383 | 13.70765 | 49.87256 | 7.689923 | 0        | 1 | 1 | 1 |
| South Africa - 12 | 14.96552 | 13.8093  | 49.95497 | 7.689923 | 0        | 1 | 1 | 1 |
| South Africa - 13 | 14.91282 | 13.67641 | 49.95127 | 7.689923 | 0        | 1 | 1 | 1 |
| UAE - 00          | 11.28849 | 11.19536 | 47.99477 | 8.584326 | 3.641264 | - | 0 | 0 |
| UAE - 01          | 9.111174 | 7.853555 | 47.99787 | 8.584326 | 4.007333 | - | 0 | 0 |
| UAE - 02          | 10.00808 | 8.809654 | 47.99255 | 8.584326 | 4.007333 | - | 0 | 0 |
| UAE - 03          | 9.778865 | 8.736868 | 48.0149  | 8.584326 | 6.714171 | - | 0 | 0 |
| UAE - 04          | 10.78326 | 9.316634 | 48.20138 | 8.584326 | 8.165648 | - | 0 | 0 |
| UAE - 05          | 10.68076 | 9.438419 | 48.39302 | 8.584326 | 8.692322 | - | 0 | 0 |
| UAE - 06          | 10.47344 | 9.478238 | 48.54418 | 8.584326 | 11.5049  | - | 0 | 0 |
| UAE - 07          | 10.59467 | 9.398728 | 48.66535 | 8.584326 | 12.42922 | - | 0 | 0 |
| UAE - 08          | 10.74239 | 9.580145 | 48.68578 | 8.584326 | 12.42922 | - | 0 | 0 |
| UAE - 09          | 10.88306 | 10.13413 | 49.08097 | 8.584326 | 0        | 0 | 0 | 0 |
| UAE - 10          | 11.94278 | 11.59425 | 49.34943 | 8.584326 | 0        | 0 | 0 | 0 |
| UAE - 11          | 11.99563 | 11.70233 | 49.69107 | 8.584326 | 0        | 0 | 0 | 0 |
| UAE - 12          | 11.91122 | 11.47865 | 49.88979 | 8.584326 | 0        | 0 | 0 | 0 |
| UAE - 13          | 11.61382 | 10.95955 | 50.04578 | 8.584326 | 0        | 0 | 0 | 0 |
| UK - 00           | 12.4753  | 12.09451 | 50.69229 | 9.023108 | 3.641264 | - | 1 | 1 |

|             |          |          |          |          |          |   |   |   |
|-------------|----------|----------|----------|----------|----------|---|---|---|
| UK - 01     | 12.14228 | 11.70446 | 50.69255 | 9.023108 | 4.007333 | - | 1 | 1 |
| UK - 02     | 12.35201 | 12.04504 | 50.71696 | 9.023108 | 4.007333 | - | 1 | 1 |
| UK - 03     | 11.95362 | 11.46758 | 50.76418 | 9.023108 | 6.714171 | - | 1 | 1 |
| UK - 04     | 12.15024 | 11.67358 | 50.9452  | 9.023108 | 8.165648 | - | 1 | 1 |
| UK - 05     | 11.91332 | 11.55881 | 50.9849  | 9.023108 | 8.692322 | - | 1 | 1 |
| UK - 06     | 11.56314 | 11.02182 | 50.99766 | 9.023108 | 11.5049  | - | 1 | 1 |
| UK - 07     | 11.59778 | 11.01754 | 51.10677 | 9.023108 | 12.42922 | - | 1 | 1 |
| UK - 08     | 11.36717 | 10.80647 | 50.86616 | 9.023108 | 12.42922 | - | 1 | 1 |
| UK - 09     | 11.87515 | 11.60564 | 51.28996 | 9.023108 | 0        | 1 | 1 | 1 |
| UK - 10     | 11.70738 | 11.23052 | 51.47979 | 9.023108 | 0        | 1 | 1 | 1 |
| UK - 11     | 12.11649 | 11.57321 | 51.70057 | 9.023108 | 0        | 1 | 1 | 1 |
| UK - 12     | 12.07031 | 10.48894 | 51.83905 | 9.023108 | 0        | 1 | 1 | 1 |
| UK - 13     | 12.13996 | 10.96652 | 51.94148 | 9.023108 | 0        | 1 | 1 | 1 |
| USA - 00    | 12.13642 | 11.5737  | 52.58556 | 9.437646 | 3.641264 | - | 0 | 1 |
| USA - 01    | 11.63107 | 11.08285 | 52.63079 | 9.437646 | 4.007333 | - | 0 | 1 |
| USA - 02    | 11.99938 | 11.56065 | 52.59735 | 9.437646 | 4.007333 | - | 0 | 1 |
| USA - 03    | 11.31304 | 10.4899  | 52.54286 | 9.437646 | 6.714171 | - | 0 | 1 |
| USA - 04    | 11.67446 | 11.07791 | 52.62067 | 9.437646 | 8.165648 | - | 0 | 1 |
| USA - 05    | 11.89254 | 11.51503 | 52.67652 | 9.437646 | 8.692322 | - | 0 | 1 |
| USA - 06    | 12.05991 | 11.40663 | 52.67749 | 9.437646 | 11.5049  | - | 0 | 1 |
| USA - 07    | 12.04258 | 11.06556 | 52.69308 | 9.437646 | 12.42922 | - | 0 | 1 |
| USA - 08    | 12.11855 | 11.43568 | 52.52857 | 9.437646 | 12.42922 | - | 0 | 1 |
| USA - 09    | 11.80323 | 10.37755 | 53.1217  | 9.437646 | 0        | 1 | 0 | 1 |
| USA - 10    | 12.14329 | 11.36553 | 53.3067  | 9.437646 | 0        | 1 | 0 | 1 |
| USA - 11    | 11.83039 | 10.98662 | 53.49019 | 9.437646 | 0        | 1 | 0 | 1 |
| USA - 12    | 11.83708 | 11.09235 | 53.66054 | 9.437646 | 0        | 1 | 0 | 1 |
| USA - 13    | 11.22732 | 9.651869 | 53.77571 | 9.437646 | 0        | 1 | 0 | 1 |
| Zambia - 00 | 11.45181 | 11.15819 | 44.62825 | 5.983443 | 3.641264 | - | 1 | 1 |
| Zambia - 01 | 11.04987 | 10.67994 | 44.76975 | 5.983443 | 4.007333 | - | 1 | 1 |
| Zambia - 02 | 11.85379 | 11.74602 | 44.72736 | 5.983443 | 4.007333 | - | 1 | 1 |
| Zambia - 03 | 11.69965 | 11.37931 | 44.78144 | 5.983443 | 6.714171 | - | 1 | 1 |
| Zambia - 04 | 12.18269 | 11.53186 | 45.0333  | 5.983443 | 8.165648 | - | 1 | 1 |
| Zambia - 05 | 13.33464 | 11.53327 | 45.31673 | 5.983443 | 8.692322 | - | 1 | 1 |
| Zambia - 06 | 13.25637 | 12.38896 | 45.6871  | 5.983443 | 11.5049  | - | 1 | 1 |
| Zambia - 07 | 12.13874 | 11.50682 | 45.75583 | 5.983443 | 12.42922 | - | 1 | 1 |
| Zambia - 08 | 12.02075 | 11.5446  | 45.81712 | 5.983443 | 12.42922 | - | 1 | 1 |
| Zambia - 09 | 12.08698 | 11.38245 | 46.27512 | 5.983443 | 0        | 0 | 1 | 1 |
| Zambia - 10 | 12.3554  | 11.60335 | 46.70218 | 5.983443 | 0        | 0 | 1 | 1 |
| Zambia - 11 | 12.6897  | 11.55055 | 47.00726 | 5.983443 | 0        | 0 | 1 | 1 |
| Zambia - 12 | 13.21785 | 11.73096 | 47.18651 | 5.983443 | 0        | 0 | 1 | 1 |
| Zambia - 13 | 13.17771 | 11.74982 | 47.33766 | 5.983443 | 0        | 0 | 1 | 1 |

## APPENDIX 2: DESCRIPTIVE STATISTICS FOR AGGREGATE DATA ANALYSIS

### 1) Summary Statistics with all Partners (2000-2013)

|              | TRADE    | EXPORTS  | IMPORTS  | DIST_ZW  | FTA       | LANG      |
|--------------|----------|----------|----------|----------|-----------|-----------|
| Mean         | 350,578  | 149603.3 | 200975.5 | 4468.496 | 0.750000  | 0.666667  |
| Median       | 138,629  | 65677.20 | 72165.61 | 2066.861 | 1.000000  | 1.000000  |
| Maximum      | 3381505  | 993813.3 | 2483750. | 12552.13 | 1.000000  | 1.000000  |
| Minimum      | 3663.320 | 1800.430 | 1009.943 | 396.8041 | 0.000000  | 0.000000  |
| Std. Dev.    | 595865.1 | 205800.1 | 422064.6 | 4219.874 | 0.434307  | 0.472814  |
| Skewness     | 3.172154 | 2.044854 | 3.604150 | 0.701580 | -1.154701 | -0.707107 |
| Kurtosis     | 13.62630 | 6.668358 | 16.16571 | 1.950737 | 2.333333  | 1.500000  |
| Observations | 168      | 168      | 168      | 168      | 168       | 168       |

### 2) Summary Statistics with All Partners after Dollarisation (2009-2013)

|              | TRADE    | EXPORTS  | IMPORTS  | DIST_ZW  | FTA       | LANG      |
|--------------|----------|----------|----------|----------|-----------|-----------|
| Mean         | 491318.3 | 202798.9 | 288519.4 | 4468.496 | 0.750000  | 0.666667  |
| Median       | 157874.7 | 87031.55 | 88437.59 | 2066.861 | 1.000000  | 1.000000  |
| Maximum      | 3381505. | 993813.3 | 2483750. | 12552.13 | 1.000000  | 1.000000  |
| Minimum      | 8003.625 | 2228.300 | 5037.094 | 396.8041 | 0.000000  | 0.000000  |
| Std. Dev.    | 797959.3 | 263277.7 | 575843.2 | 4242.801 | 0.436667  | 0.475383  |
| Skewness     | 2.560547 | 1.528881 | 2.915078 | 0.701580 | -1.154701 | -0.707107 |
| Kurtosis     | 8.618535 | 4.154495 | 10.02088 | 1.950737 | 2.333333  | 1.500000  |
| Observations | 60       | 60       | 60       | 60       | 60        | 60        |

### 3) Summary Statistics with Common Currency Partners after Dollarisation (2009-2013)

|              | TRADE    | EXPORTS  | IMPORTS  | DIST_ZW  | FTA       | LANG      |
|--------------|----------|----------|----------|----------|-----------|-----------|
| Mean         | 718560.1 | 273943.7 | 444616.4 | 5598.503 | 0.833333  | 0.833333  |
| Median       | 245803.6 | 127624.1 | 129970.7 | 5131.112 | 1.000000  | 1.000000  |
| Maximum      | 3381505. | 993813.3 | 2483750. | 12552.13 | 1.000000  | 1.000000  |
| Minimum      | 8003.625 | 2228.300 | 5037.094 | 935.6708 | 0.000000  | 0.000000  |
| Std. Dev.    | 1045316. | 303781.4 | 778625.1 | 4385.264 | 0.379049  | 0.379049  |
| Skewness     | 1.686574 | 1.018688 | 1.819804 | 0.339875 | -1.788854 | -1.788854 |
| Kurtosis     | 4.243477 | 2.771827 | 4.462118 | 1.594319 | 4.200000  | 4.200000  |
| Observations | 30       | 30       | 30       | 30       | 30        | 30        |

### 4) Summary Statistics with Non-Common Currency Partners after Dollarisation (2009-2013)

|              | TRADE    | EXPORTS  | IMPORTS  | DIST_ZW  | FTA       | LANG      |
|--------------|----------|----------|----------|----------|-----------|-----------|
| Mean         | 645219.4 | 226372.8 | 418846.5 | 3173.877 | 0.714286  | 0.571429  |
| Median       | 153512.0 | 87768.21 | 86560.76 | 1947.515 | 1.000000  | 1.000000  |
| Maximum      | 3381505. | 993813.3 | 2483750. | 10898.12 | 1.000000  | 1.000000  |
| Minimum      | 15527.37 | 9568.367 | 5959.001 | 396.8041 | 0.000000  | 0.000000  |
| Std. Dev.    | 1000129. | 304136.9 | 727893.4 | 3570.591 | 0.458349  | 0.502096  |
| Skewness     | 1.824826 | 1.379963 | 1.985774 | 1.366105 | -0.948683 | -0.288675 |
| Kurtosis     | 4.835020 | 3.357780 | 5.246965 | 3.464738 | 1.900000  | 1.083333  |
| Observations | 35       | 35       | 35       | 35       | 35        | 35        |

## APPENDIX 3: DETAILED GRAVITY MODEL RESULTS

### 1) Estimation on Exports to All Trading Partners

Dependent Variable: LNEXPORTS

Method: Panel Least Squares

Date: 04/27/15 Time: 12:00

Sample: 2000 2013

Periods included: 14

Cross-sections included: 12

Total panel (balanced) observations: 168

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.    |
|--------------------|-------------|-----------------------|-------------|----------|
| LNGDP_ZWJ          | 0.347736    | 0.032300              | 10.76575    | 0.0000   |
| LNDIST             | -0.707129   | 0.180280              | -3.922384   | 0.0001   |
| LNEXRATE           | 0.002422    | 0.023647              | 0.102442    | 0.9185   |
| COM_CURR           | 0.230268    | 0.299952              | 0.767683    | 0.4438   |
| FTA                | 0.108165    | 0.293412              | 0.368644    | 0.7129   |
| LANG               | -0.577881   | 0.221573              | -2.608081   | 0.0100   |
| R-squared          | 0.380394    | Mean dependent var    |             | 10.99309 |
| Adjusted R-squared | 0.361270    | S.D. dependent var    |             | 1.499406 |
| S.E. of regression | 1.198334    | Akaike info criterion |             | 3.234802 |
| Sum squared resid  | 232.6326    | Schwarz criterion     |             | 3.346372 |
| Log likelihood     | -265.7234   | Hannan-Quinn criter.  |             | 3.280083 |
| Durbin-Watson stat | 0.309775    |                       |             |          |

### 2) Estimation on Imports from All Trading Partners

Dependent Variable: LNIMPORTS

Method: Panel Least Squares

Date: 04/27/15 Time: 12:12

Sample: 2000 2013

Periods included: 14

Cross-sections included: 12

Total panel (balanced) observations: 168

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.    |
|--------------------|-------------|-----------------------|-------------|----------|
| LNGDP_ZWJ          | 0.439011    | 0.035672              | 12.30677    | 0.0000   |
| LNDIST             | -1.241725   | 0.199102              | -6.236633   | 0.0000   |
| LNEXRATE           | 0.022526    | 0.026115              | 0.862572    | 0.3896   |
| COM_CURR           | 0.820232    | 0.331267              | 2.476044    | 0.0143   |
| FTA                | -0.365366   | 0.324044              | -1.127520   | 0.2612   |
| LANG               | -0.726614   | 0.244706              | -2.969339   | 0.0034   |
| R-squared          | 0.372881    | Mean dependent var    |             | 10.97585 |
| Adjusted R-squared | 0.353525    | S.D. dependent var    |             | 1.645996 |
| S.E. of regression | 1.323441    | Akaike info criterion |             | 3.433408 |
| Sum squared resid  | 283.7423    | Schwarz criterion     |             | 3.544978 |
| Log likelihood     | -282.4063   | Hannan-Quinn criter.  |             | 3.478689 |
| Durbin-Watson stat | 0.154576    |                       |             |          |

### 3) Estimation on Exports to all Trading Partners Excluding China

Dependent Variable: LNEXPORTS

Method: Panel Least Squares

Date: 04/27/15 Time: 12:31

Sample: 2000 2013

Periods included: 14

Cross-sections included: 11

Total panel (balanced) observations: 154

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.    |
|--------------------|-------------|-----------------------|-------------|----------|
| LNGDP_ZWJ          | 0.336669    | 0.032537              | 10.34719    | 0.0000   |
| LNDIST             | -0.712227   | 0.180962              | -3.935774   | 0.0001   |
| LNEXRATE           | 0.016514    | 0.025192              | 0.655529    | 0.5131   |
| COM_CURR           | 0.417802    | 0.308084              | 1.356129    | 0.1771   |
| FTA                | 0.426140    | 0.309036              | 1.378935    | 0.1700   |
| LANG               | -0.404450   | 0.228351              | -1.771175   | 0.0786   |
| R-squared          | 0.385335    | Mean dependent var    |             | 10.88591 |
| Adjusted R-squared | 0.364569    | S.D. dependent var    |             | 1.504290 |
| S.E. of regression | 1.199128    | Akaike info criterion |             | 3.239248 |
| Sum squared resid  | 212.8105    | Schwarz criterion     |             | 3.357571 |
| Log likelihood     | -243.4221   | Hannan-Quinn criter.  |             | 3.287311 |
| Durbin-Watson stat | 0.333244    |                       |             |          |

### 4) Estimation on Imports to all Trading Partners Excluding China

Dependent Variable: LNIMPORTS

Method: Panel Least Squares

Date: 04/27/15 Time: 12:32

Sample: 2000 2013

Periods included: 14

Cross-sections included: 11

Total panel (balanced) observations: 154

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.    |
|--------------------|-------------|-----------------------|-------------|----------|
| LNGDP_ZWJ          | 0.429256    | 0.036846              | 11.65011    | 0.0000   |
| LNDIST             | -1.227974   | 0.204924              | -5.992330   | 0.0000   |
| LNEXRATE           | 0.029079    | 0.028528              | 1.019325    | 0.3097   |
| COM_CURR           | 0.918928    | 0.348878              | 2.633950    | 0.0093   |
| FTA                | -0.147224   | 0.349956              | -0.420691   | 0.6746   |
| LANG               | -0.611632   | 0.258588              | -2.365274   | 0.0193   |
| R-squared          | 0.370011    | Mean dependent var    |             | 10.91063 |
| Adjusted R-squared | 0.348728    | S.D. dependent var    |             | 1.682633 |
| S.E. of regression | 1.357909    | Akaike info criterion |             | 3.487951 |
| Sum squared resid  | 272.8998    | Schwarz criterion     |             | 3.606274 |
| Log likelihood     | -262.5722   | Hannan-Quinn criter.  |             | 3.536014 |
| Durbin-Watson stat | 0.155123    |                       |             |          |