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DECLARATION

I Smart Manda declare that this dissertation is my original work. All the sources used have been indicated and acknowledged. The dissertation has not been previously submitted for assessment or completion of any post graduate qualification to another university or for another qualification.
DEDICATION

I dedicate this work to the almighty God and to my lovely wife.
ACKNOWLEDGEMENT

It is almost impossible for me to produce an excellent paper without the support of other people. This work is certainly not entirely from my own hands, but a product of many hands that have supported me from the initial stages to this date. I am particularly grateful to Professor A. Chakravarti, my supervisor for his mentorship and insightful comments. Prof. Chakravarti took his time to look at my preliminary work, taking note of every detail and providing detailed comments and suggestions. I also want to appreciate Mr. C. Pindiriri for his guidance especially on the methodology. Other lecturers whom I cannot mention by name have also supported me in various ways. It will be a huge omission if I don’t mention the United States Agency for International Development (USAID) and Zimbabwe Economic Analysis and Research Unit (ZEPARU) who sponsored me in my studies and provided a laptop which I used in this project. I also want to thank Mr. N. Mupunga from the Reserve Bank of Zimbabwe who accepted to review my work. I am forever indebted to Felix Mufunda for the fruitful discussion on the dissertation. Last but not least, I want to thank my wife for his moral support through out my studies.
ACRONYMS

ADF   Augmented Dickey-Fuller
AIC   Information Criterion
AfDB  African Development Bank
ARMA  Auto Regressive Moving Average
CA    Current Account
CT    Current Transfers
DF GLS Dickey-Fuller Generalized Least Square (DF GLS)
ECM   Error Correction Model
ESF   Exogenous Shocks Facility
FDI   Foreign Direct Investment
GDP   Gross Domestic Product
IBC   Intertemporal Budget Constraints
IMF   International Monetary Fund
KPSS  Kwiatkowski-Phillips-Schmidt-Shin test
LTC   Long Term Capital
NFA   Net Foreign Assets
NFL   Net Foreign Liabilities
OECD  Organization for Economic Co-operation and Development
OI    Other Investments
PI    Portfolio Investments
PP    Phillips-Perron test
RBZ   Reserve Bank of Zimbabwe
REER  Real Effective Exchange Rate
SADC  Southern Africa Development Community
SDRs  Special Drawing Rights
SIC   Schwarz Information Criterion
STC   Short term Capital
USAID United States Agency for International Development
WB    World Bank
ZEPARU Zimbabwe Economic Analysis and Research Unit
ABSTRACT

This study analyzed capital flows and current account dynamics in Zimbabwe from 1990 to 2013. The primary objective of the study was to determine whether Zimbabwe’s current account deficit is sustainable or not. The study involved investigating whether the current account deficits violates the intertemporal budget constraints (IBC) or not, investigating the causal relationship between capital flows and current account deficits, and whether there is evidence of speculative capital inflows into the economy which are subject to sudden stops and reversal. When a country runs persistent current account deficits, questions are raised on the ability of a country to generate future current account surpluses to meet its external debt obligations created by past current account deficits.

The study applied the intertemporal balance model developed by Liu and Tanner, (1996) to assess sustainability of the current account deficit. The analysis involved testing the stationarity of current account to GDP ratio. Unit root tests were initially conducted by applying the ADF test. However, given its inability to discriminate clearly between non-stationary and stationary series with a higher degree of autocorrelation and sensitivity to breaks, the study also used second generation stationarity tests, notably the Dickey-Fuller Generalized Least Square (DF GLS), the semi-parametric Phillips-Perron test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. In addition, cointegration a test was conducted which also give way to the Error Correction Model (ECM). The study concluded the analysis with Granger Causality Tests on the current and current and capital account balance and the respective sub-components.

The results of the unit root tests amply demonstrated that the current account deficits violated the IBC implying that Zimbabwe’s current account deficit were unsustainable. The exports and imports of goods and services were co integrated but the Wald Coefficient Restriction tests results indicated that the current account deficits followed an explosive path. The study also took into account the errors and omissions in the analysis. The results confirmed that the current account deficit is unsustainable even when the errors and omission are subtracted from the current account deficit.
The ECM model indicated that 3% of the errors are corrected in the next period. The granger causality test results indicated that there is a unidirectional causality from the current account to the capital account deficit implying the existence of underlying challenges in the economy. The results indicate that there is no causality between FDI and the current account deficit. However, the results indicated a unidirectional causality from current account deficit to both short term and long term debt implying that the country is financing its current account deficits by accumulating debt.

The study, however, found no evidence of speculative investment. As such, the study concluded that there is no basis for capital controls. The study recommended that the composition of capital inflows needs to move from short debt to long term debt or preferably FDI. This is important to reduce external sector vulnerabilities in the economy since short term debt is subjected to sudden stops and reversal. Moreover FDI can help the country to expand its productive capacity and achieve sustainable economic growth, improve the country’s competitiveness, and lessen reliance on imports. This is the only way to make the current account deficit sustainable in the medium to long term since the country cannot implement policies such as currency devaluation under the multiple currency arrangement.
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CHAPTER ONE

1. INTRODUCTION

Current account dynamics and capital flows have become topical issues in both policy debate and in the academia in the recent years. This has been largely due to the fact that following the collapse of the Bretton Woods system, there has been a gradual removal of trade barriers and increased freedom of international capital flows which made it easier for countries to engage in international trade and borrow or lend across borders (Kaminsky et al, 1998).

During the same period, however, there has been high incidence of currency crises across different regions. This is largely because increasing current account deficits have often resulted in deep financial crises in many countries (Cecen and Xiao, 2012). According to Edwards (2001), currency crises of the 1990s shocked investors, the academia, international civil servants and policy makers and instigated increased attention to the analysis of capital flows and current account dynamics in many countries across the globe.

Analysis of current account dynamics typically involves assessing whether the debtor country is solvent and whether the current account balance is sustainable or not. The major concern in world capital markets is the ability of debtor countries to continue to run current account deficits. Persistent current account deficits generally lead to a rise in a country’s net external indebtedness and a growing risk premium on its debt. In addition, if foreign capital inflows cannot fully offset the current account deficit, this triggers wide swings in interest rates, exchange rates, and other economic variables resulting in economic instability. Moreover, reversal of capital inflows can plunge the balance of payment position into a huge deficit with potentially huge macroeconomic costs.

It is often difficult to distinguish between current account deficits which are a consequence of growth inducing capital inflows and current account deficits that are due to debt accumulation. Most developing economies experience large current account deficits which are a result of structural bottlenecks which lead to pronounced supply side gaps in the economy. The current account deficits are usually financed through foreign aid, foreign borrowing, and foreign direct investment (FDI). However, there can be consequences when
the amount a country spends on imports is persistently and extensively different from the amount generated through export receipts.

High and persistent current account deficits can also be outcomes of speculative-led economic growth induced by high capital inflows (Onaran, 2006). The liberalization of financial markets stimulates speculative investments and deters the financially hedged investments, by increasing interest rates and creates a speculative-led economic development-growth (Grabel, 1995). An upsurge in capital inflows increases demand for financial assets and hence leads to real exchange rate appreciation. Real exchange rate appreciation makes imported goods cheaper and exports more expensive. This would gradually make a country to become dependent on cheap imports, thus exacerbating the current account deficit.

Capital inflows and speculative-led economic growth are also sustained by the possibility of financial arbitrage revenues, mainly from interest and exchange rate gains. However, the challenge with speculative capital inflows is that there are prone to reversals and sudden stops. Reversal or sudden stops in capital flows forces current account imbalances to adjust. During the adjustment period, economic growth decreases dramatically due to import dependency of growth.

The size of the current account deficit, however, does not matter. The financing part is what makes a country to have a huge current account deficit. If the foreign capital inflows are used to build productive capacity in the economy, this can increase economic growth and make the country’s current account deficit sustainable. The key characteristic of the current account deficits is not necessarily their size but whether they are sustainability or not.

The composition of capital inflows required to finance a current account deficit is also an important element of sustainability of the current account deficit. Current account deficits financed through FDI are considered more sustainable than those financed from debt creating capital flows. In the same vein, FDI investment inflows are more preferable to portfolio investment inflows as the latter is subject to reversals and sudden stops.
1.1 Background to the Study

Zimbabwe has been running current account deficits since the early 1990s except for 1999 when a surplus was registered. From the year 2000, however, the current account deficits maintained an upward trajectory reaching a peak of US$2.7 billion or 33% as a ratio of GDP in 2011, (RBZ, 2012). The country’s persistent current account deficits were largely explained by strong import growth against a background of weak export performance.

Zimbabwe’s precarious external sector position was a culmination of a decade long economic downturn experienced between 1999 and 2008. The economic downturn severely reduced the country’s productive capacity and affected export performance. The country’s economic base started shrinking from the year 2000 following the land reform programme which saw the government repossessing white owned farms and reallocating it to the black majority. The land reform programme was characterized by political violence which severely disturbed farming operations resulting in poor agriculture output. The poor agriculture output had a ripple effect on the manufacturing sector given that it was agro based. As a result, the whole economy was plunged into a downward spiral resulting in high unemployment, escalating inflation and social unrest.

The economic decline experienced between 1999 and 2008, resulted in shortages of basic commodities causing an escalation of the country’s import bill to about US$8.1 billion in 2011 compared to exports of US$4.5 billion over the same period. Higher food and fuel prices in 2008, and increases in volumes of donor-financed humanitarian aid, led to a significant rise in imports. Moreover, the tentative 2009 recovery increased the demand for imports, boosted by public spending and the expansion of credit to the private sector mainly from off shore credit lines. In addition, the high propensity to import was also attributed to supply gaps in the economy, given that the economy was coming from a more than decade long economic crisis.

On the contrary, the export performance was subdued due to low industrial capacity utilization as a result of the unfavourable macroeconomic environment. Agriculture output declined substantially following the fast track land reform programme enunciated by government as well as the unstable political environment from the year 2000. Moreover, the over reliance on a few commodities such as gold, diamond, copper, platinum, tobacco, and
sugar exposed the country to external sector vulnerabilities as a result of the high incidence of global financial crisis. These commodities were susceptible to high price volatility which adversely affected the country’s export earnings. Investment in key export sectors was also handicapped by inadequate infrastructure, high operational costs exacerbated by wage pressures, and the poor business climate. As a result, agriculture’s share in exports declined substantially following the land reform programme.

Against this backdrop, the country’s current account deficit became precarious hence the growing concerns over its long run sustainability. From 1999, the current account deficit to gross domestic product (GDP) ratio was deteriorating. Since the year 2004, the current account deficit to GDP ratio was above the Southern Africa Development Community (SADC) macroeconomic convergence target of at most 9%. In 2013, the current account deficit to GDP ratio increased to a peak of 28.1%. Figure 1 below shows how the current account deficit has been growing since the year 2000 on account of the developments described above.

![Figure 1: Current Account Balance to GDP Ratio (Source: RBZ)](image)

### 1.2 Capital Account Developments

The capital account registered surpluses, but this has mainly been driven by debt creating short term capital inflows with subdued FDI inflows on account of the unfavourable business operating environment. As such, the country faced significant capital account vulnerabilities since it is not sustainable to continue to finance the current account deficits mainly through
short term capital flows since these are subject to sudden stops and reversal. Moreover, the country can not continue to borrow in perpetuity because lenders can start to question the ability of the country to service its debt obligation.

The country was unable to attract significant FDI due to an unstable political environment and more recently due to the unfavourable investment climate in the country in light of the enactment of the indigenization and economic empowerment legislation which requires foreign investors to hold at most 49% stake in local companies. As a result of this requirement, coupled with political uncertainty, the country was unable to attract significant inflows of FDI. Figure 2 below indicates that debt creating capital flows grew in importance compared to FDI. From 2009, following the abandonment of the local currency and the introduction of the multiple currency system, the country witnessed an increase in off shore loans as reflected by the increase in debt creating capital flows.

![Figure 2: Capital Account Developments in US$ million (Source: RBZ)](image)

Although the capital account enjoyed surpluses over the years, this could not sufficiently offset the current account deficits. As a result, the overall balance was in the negative territory as shown in figure 3 below.
Over the years, Zimbabwe was financing the current account deficits through external borrowing, including borrowing from the IMF Exogenous Shocks Facility (ESF) window for balance of payment purposes. As a result, the country’s external debt was on an upward trajectory over the years. However, from the year 2000 onwards, the debt level spiraled due to more domestic borrowing in the absence of adequate external support.

The growth in total debt was also a reflection of penalty charges for accumulating external payment arrears as well as new short-term loan facilities contracted by the central bank on behalf of Government in the absence of official development assistance. The country’s external debt to GDP ratio grew over the years breaching the SADC maximum target of 60%. In 2008, the debt to GDP ratio reached a peak of 141.7%. However, from 2009, the debt to GDP ratio declined somewhat on account of the nascent economic recovery during the period 2009 to 2012. As at the end of 2013, the debt to GDP ratio was above 80% implying that the country was still facing the problem of a huge debt overhang. This means that continuing to run current account deficits presented serious challenges to the economy since there is a limit to the extend to which the country can borrow. Figure 4 below depicts the debt dynamics in Zimbabwe from 1999 to 2013.
The country also witnessed a general shift in the composition of public debt from long term debt to short term debt thus expositing the country to refinancing challenges. The composition of public debt increased sharply from 2000 as the government tried to steer the economy through more domestic borrowing against the imposition of economic sanctions on the country. Domestic debt, however, declined progressively due to erosion of the value of the Zimbabwean dollar as a result of an escalation in inflation levels.

Inflation reached a peak of more than 231 million percent in July 2008, resulted in investors resisting long term Government paper in preference for short term and high rewarding treasury bills. Steadily, the debt portfolio structure began to move towards the shorter end of the market, exposing Government to refinancing risk. By 2006, the debt portfolio was 99% short term and 1% long term, compared to 96% long term recorded in 1990 (RBZ, 2009).

Due to the precarious external sector performance, Zimbabwe was unable to honor her international obligations. In 2000, the government defaulted on international obligations owed to the multilateral lending institutions, namely the African Development Bank (AfDB), World Bank (WB) and International Monetary Fund (IMF) leading to accumulation of external payment arrears (IMF, 2003). As a result, the country was placed under sanctions implying that the country was no longer eligible for further funding from the multilateral lending institutions. This development left the country without any recourse to any balance of payment support. As a result, the country resorted to printing of money in order to finance its
operations. This resulted in increased quasi-fiscal activity by the central bank culminating to escalation of inflation to hyper inflation levels in 2007 and 2008.

The country’s international reserves position was also precarious in light of the adverse external sector developments from the year 2000 to 2013 (see figure 5 below). International reserves as measured in months of imports were precarious at less than one month of import cover except for 2009 and 2010 on account of the Special Drawing Rights (SDRs) received by the country from the International Monetary Fund (IMF). The precarious reserve position in the country implies that in the event of a crisis, the monetary authorities will be unable to intervene in the market. Since the economy is dollarized, this implies that the only expedience for the country to cushion itself against any external sector vulnerabilities is through the budget. However, the government was also facing limited fiscal space due to subdued revenues against a bloated expenditure in light of the adverse economic developments. The capital expenditure was crowded out by an increase in recurrent expenditure.

![Figure 5: International Reserves in Months of Imports (Source: RBZ)](image)

The country’s inability to meet international payment obligations implied that the country was now accumulating external payment arrears. As a result, the country’s external payment arrears grew from zero in 1998 to more than US$6 billion in 2013 as depicted in figure 6 below.
The country also witnessed an increase in net errors and omission implying that there were some significant transactions which were not accounted for in the country’s balance of payment statistics. For instance in 2010 and 2011, the country’s net errors and omissions increased to nearly US$1 billion (see figure 7 below). It is possible that the huge current account deficit could have been financed by transactions which were not accounted for as reflected in the huge errors and omissions. The errors and omissions were attributed to revenue from smuggled minerals, understatement of remittances, under invoicing of exports as well as over invoicing of imports, among other things. These transactions cannot be traced, but they still reflected in the form of an increase in errors and omissions in the balance of payment statistics.
The adverse external sector developments which obtained in the economy in the recent years led to the growing concern over the ability of the country to persistently run current account deficits without necessarily destabilizing the economy. Given the huge external debt overhang resulting from running current account deficits, the concern was that the country may not be in a position to bridge the saving-investment gap by attracting foreign capital inflows. This was in light of negative repercussions of the rising external debt resulting from offshore borrowing to finance current account deficits. Large current account deficits and rising indebtedness can potentially make a country vulnerable to adverse external shocks, including a change in sentiment on the part of foreign creditors.

Zimbabwe’s case, however, is a bit unique in the sense that the country does not have a domestic currency of its own and, therefore, the issue of exchange rate falls out of question. If the country had a currency of its own, any adverse developments on the external sector would result in currency depreciation and economic instability. Under the multiple currency system, the country has limited mechanisms to manage the external sector since the option of devaluation to make exports competitive is not feasible. The problems associated with the current account deficit are, therefore, likely to reflect in the country’s levels of liquidity since money supply in the economy is a function of the external sector performance.

Figure 7: Errors and Omissions in US$ million (Source: RBZ)
If the current account deficit continues to be financed through borrowing, the country’s indebtedness to the rest of the world would also increase. Currently, the country’s external debt position is estimated at US$10.7 billion, (RBZ, 2012). The persistent current account deficits will eventually affect the country’s ability to generate employment and this will negatively affect economic performance of the country. The country’s current account balance is thus an important barometer for macroeconomic performance given that it is closely related to components of national savings and investment, the fiscal balance as well as private savings.

The aim of this study is to shed light on the long run dynamics of the current account deficits in the Zimbabwean economy. More specifically, the study assesses the long run sustainability of Zimbabwe’s current account deficits. In an effort to determine how the current account is financed, the study also analyses the causal relationship between capital flows and the current account deficits. This is particularly important since the sustainability of the current account deficit is closely related to the composition of capital inflows required to finance the current account deficit.

1.4 Problem Statement

When a country runs persistent current account deficits, questions are raised on the ability of a country to generate future current account surpluses in order to amortize external debt created by past current account deficits. The major concerns is that the country could be on a path to insolvency, building up excessive net foreign debt, raising the prospects of default or a sharp reversal in capital flows, which might need an abrupt and costly adjustment.

This is largely because at a given point in time, a combination of the inability to earn sufficient foreign capital, an increase in foreign debt and the recurrent current account deficits might cause lenders to question the ability of the country to service and repay its debt. The question that is of major concern is whether the country’s current account deficit is sustainable or not. At the same time, the nature of capital flows is important to the extent that it affects the country’s solvency problem. This is because capital flows are subject to sudden stops or reversals and this may have far reaching effects on the sustainability of the current account deficit.
A current account deficit can be a result of structural challenges in the economy which can have a toll on economic growth if not addressed. In addition, a current account deficit can be induced by speculative-led economic growth which exposes the economy directly to unproductive profit seeking investments. Reversal in capital flows forces current account imbalances to adjust. During the adjustment period of current account imbalances, economic growth rate decreases dramatically due to the import dependency of growth.

Given Zimbabwe’s continued widening current account deficit and the recent surge in debt creating capital inflows, it would be interesting to also investigate the current account dynamics in Zimbabwe. In addition, it is also necessary to understand how the capital flows affect the behavior of the current account. This is important to determine whether the country is sustainable or not so that changes can be initiated timely without rendering costly adjustment on the economy. Analysis of the current account dynamics is thus of paramount importance to enable the government to determine whether to take appropriate steps to ensure that the country moves towards a sustainable path in which the current account deficit is not so large that it will lead to an excessive build-up in foreign indebtedness. In addition, it provide the basis for capital controls in order to deal with speculative-led capital investment which are subject to reversals and sudden stops as these can potentially destabilize the economy and lead to a currency crisis.

1.5 Objectives of the study

Given the problem statement discussed above, the objectives of the study are as follows:

The primary objective of the study is to determine whether the current account deficit in Zimbabwe is sustainable or not.

To achieve this objective, the following secondary objectives are pursued:

a) To investigate whether Zimbabwe will be able to satisfy its long run intertemporal budget constraint (IBC) or not.

b) To determine the causal relationship between the capital flows and current account deficit in Zimbabwe.

c) To investigate whether the current account deficit in Zimbabwe is due to speculative capital inflows or not.
1.6 Research Questions

a) Will Zimbabwe be able to generate future current account surpluses sufficient enough to amortize the external debt being created by the present current account deficits?

b) In what way is Zimbabwe’s current account balance affected by behaviour of the capital flows?

c) Is Zimbabwe’s current account deficit induced by speculative capital inflows or not?

1.7 Hypothesis of the Study

The hypothesis of the study is as follows:

\[ H_0 \quad \text{Zimbabwe’s current account deficit is not sustainable.} \]

\[ H_1 \quad \text{Zimbabwe’s current account deficit is sustainable.} \]

1.8 Justification of the study

The rising external imbalances in many countries across the globe have generated great interest on the sustainability of the current account deficit among policy makers and the academia. Whilst there are numerous studies on the determinants, sustainability of the current account deficit and the effect of capital flows on current account deficit in developed countries, there has been no formal examination of the sustainability of current account deficits in most transition economies and developing countries (Roubini and Wachtel, 1998).

Early studies that investigate the sustainability of the current account deficit have largely concerned the Organization for Economic Co-operation and Development (OECD) countries. This has been largely due to limited data in most developing countries. Across most transition economies, the earliest data concerning current account balances started in the early 1990s. As a result, very few studies have been undertaken on the sustainability of current account in most developing countries particularly in Africa.

This study will be of interest in the sense that it looks at the causal link between the capital inflows and the current account deficit as well as the sustainability of the current account
deficit in Zimbabwe. The sustainability of the current account deficit is very critical as it has a bearing on the sustainability of long run growth. Moreover, it will inform the policy making process.

1.9 Organization of the Study

The remainder of the study is organized as follows: Chapter two presents the literature review of the current account dynamics and capital flows, Chapter three presents the methodological issues pursued in this study, whilst chapter four conducts the empirical tests of the basic model developed in chapter three and proceeds to discuss the results of the model. Chapter five concludes the study and discusses the policy implications of the research findings and proffers the policy recommendations based on the research findings.
CHAPTER TWO

2. LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature on current account dynamics and capital flows. The chapter identifies the difference between the current account oriented view and the capital account oriented view to current account dynamics and balance of payments. The chapter also addresses the question whether the current account matters or not. Further, the chapter explores the concept of sustainability as it relates to current account imbalances, the different models of assessing sustainability, the causal relationship between the current and capital account as well as the empirical findings from various researches.

2.2 Conceptual Issues

The current account is a key component of the country’s balance of payment accounts. The balance of payment is a statement that summarizes economic transactions between residents and non residents during a specific time period, usually a year (IMF, 1993). The Current Account balance is the sum of the balance of net exports of goods (visible trade), the balance of net export of services (invisible trade), investment income and other current (unilateral or unrequited) transfers, (Sodersten and Reed, 1994). The trade balance is the major component of the current account. It is the difference between the merchandise exports and imports. The current account balance can also be regarded as the difference between savings and investment (Roubini and Watchel, 1997). A country that is running current account surpluses is accumulating Net Foreign Assets (NFA), while a country that is running a current account deficit is increasing its Net Foreign Liabilities (NFL). The current account balance is usually presented as follows:

\[ \text{CAB} = X - M + NY + NCT \]  

Where: \( X - M \) = Balance of Trade,  
NY = Net Income from Abroad,  
NCT = Net Current Transfers.
The other important component of the balance of payments account is the capital account which shows movement of capital into and out of the country. The capital account components are foreign direct investment, portfolio investment, as well as the debt creating capital flows notably, short and long term external debt. Of these capital flows, short-term flows such as renewable loans and portfolio investments are quite volatile and highly liquid since they can easily and quickly be reversed. As such, they are viewed as the most problematic since they are subject to sudden stops and reversals. The sum of the current and capital account balances gives the net lending in the case of a surplus or net borrowing in the case of a deficit.

The last account is the official settlements balance and mainly covers the financing items including the country’s reserve position. The overall balance of payments is the sum of credits and debits in these three accounts. A positive official settlements balance implies that the balance of payments is in deficit while a negative official settlements balance implies that the balance of payments is in surplus. The current account is the most important component of the balance of payments as it is directly related to the economic performance of a country.

2.3 Theoretical Conceptions of Current Account Dynamics

The literature on current account dynamics is quite broad and mainly divided between two major theoretical conceptions, notably the current account oriented view and capital account oriented view. The current account oriented view’s theoretical foundation is based on the Keynesian approach to balance of payment whilst the capital account oriented view is based on the monetary approach to balance of payment. Each of the two approaches provides distinct explanations on how the current account could lead to either an equilibrium or disequilibrium of the balance of payments account.

The current account oriented view assumes that the goods account is the most important determinant of the current account imbalances. The theory emphasizes how expenditure on domestic goods changes relative to domestic output. In other words, the balance of trade is viewed as the difference between what the economy produces and what it consumes or absorbs in the domestic economy (Melvin, 1992). This school of thought assumes a world without capital flows. This approach argues that high and persistent current account deficits
are a result of some structural vulnerabilities of the domestic economy emanating from trade deficits, budget deficits, and the saving-investment gap.

The capital account oriented view represented a major paradigm shift in macroeconomic thinking as current account dynamics began to be viewed more as a monetary phenomenon. This was due to the growing importance of capital flows as economies were becoming more open particularly in the 1980s. The capital account oriented view asserts that high and persistent current account deficits are the main outcomes of speculative-led economic growth and current account deficits which are induced by high capital inflows, (Onaran, 2006). Capital flows are thus important determinants of the current account dynamics. The current account balance is seen as a function of domestic saving and investment decisions of the forward-looking optimizing agents. This contrasts with the Keynesian approach which emphasized demand for exports and imports. Periods of large capital inflows are generally accompanied by increased rates of investment. If international capital inflows are used to finance investment, this may contribute to an increase in the current account deficit.

According to the monetary theory, the balance of payments imbalances arise when there is no equality between the demand and supply of money in the economy. An excess of money supply results in increased outflows of money to other countries. In the same vein, excess demand for money is catered for by inflows of money from other countries. The balance of payment equilibrium is achieved through the inflows and outflows of money in the economy. This approach explains the elimination of payments disequilibrium in terms of factors bringing the demand and supply of money into equality. It treats the supply of money as endogenous by assuming a feedback mechanism from the balance of payments through movements in international reserves to changes in the liabilities of the central bank and government.

The fundamental difference between the Keynesian and monetary approach is that the later concentrates on the money account whilst the former focuses on the balance of trade. It is argued that prices, rate of interests, levels of income, exchange rates and the supply of money have a direct impact on the balance of trade. What happens in the balance of trade then determines the behaviour of the overall balance of payments. This means that it’s the real variables which determine the overall payment imbalances (Wanniski, 1975). The Keynesian approach focuses on the real factors which are considered autonomous. The monetary
approach, however, posits that the disequilibrium is due to disequilibrium in money supply factors. In other words, the money account is autonomous and the real account is the accommodating account. However, both approaches are relevant for a complete understanding of current account dynamics in an economy. Whilst the trade balance is considered as the most important in the current account approach since economic policies can directly influence its performance, the capital oriented view remains a key component to explain the current account dynamics given its growing influence as well as its impact on monetary policy.

2.4 Does a Current Account Deficit Matter?

The question of whether a current account deficit matters is as old as economic theory itself. The mercantilist believed that a balance of payments deficit was bad for the economy. As such, they believed that a nation could benefit by accumulating monetary reserves by maintaining a positive balance of trade. David Hume’s price-specie-flow mechanism challenged the mercantilist idea that balance of payments surpluses were desirable in the economy (Obstfeld, 2012).

David Hume argued that net exporting in exchange for gold currency could not enhance wealth. Hume’s argument was essentially the monetarist quantity theory of money that prices in a country change directly with changes in money supply. Hume explained that as net exports increased and more gold flowed into a country to pay for them, the prices of goods in that country would rise. Thus, an increase in domestic prices due to the gold inflow would discourage exports and encourage imports, thus automatically limiting the amount by which exports would exceed imports.

In the recent years, the dynamics of current account deficits and capital flows have come to be of considerable interest among researchers, particularly in light of their relationship with currency crises (Edwards, 2001). During the late 1970s, most countries in the world experienced large swings in their current account balances as a result of the oil price shocks. These developments generated significant concern among policy makers and analysts and prompted a number of experts to analyze the dynamics of current account imbalances and capital flows.
The crises experienced in Asia and South America in the 1990s underlined the need for further investigations into the dynamics of current account imbalances. Moreover, the persistent and growing current account deficit in the United States of America from the 1990s and the corresponding surpluses of its counterparts, particularly in emerging market countries instigated a large body of research on why this global imbalance occurs, when it will adjust, and how the adjustment will unravel (Bernanke, 2005).

Following these crises, there has been growing interest and increased focus on the current account dynamics in many countries across the globe. This is largely because of the potential impact a current account deficit can have on the economy on account of the deeply intertwined linkages between the current account balance and overall economic developments. Moreover, the current account imbalances also convey information about the actions and expectations of all economic agents. For this reason, policy makers are increasingly focusing on the current account as an important macroeconomic variable to explain its dynamics, assess its sustainability and seek to induce changes in the current account balance through policy action.

This is also due to the fact that high and persistent current account deficits are a reflection of major vulnerabilities of the domestic economy which may be sourced from internal and external factors (Milesi-Ferreti and Razin, 1996; Edwards, 2001). Running a current account deficit usually entails borrowing from the external sources. This is considered less dangerous if it is financing new capital investment compared to consumption which results in lower savings. This is primarily because an increase in investment results in an increase in productive capacity and potentially higher future export receipts that will be available to service the foreign debt.

Generally speaking, a current account deficit which is accompanied by a fall in savings rates is considered to be more problematic compared with a deficit accompanied by rising investment rates. Besides, certain types of investment are more likely to be accompanied with sustainable deficits than others. For instance, private sector investment in productive capital, particularly in traded goods industries, will make a current account deficit more sustainable, as opposed, for example, to borrowing from abroad in order to make real estate investments (Roubini and Wachtel, 1998)
The growing interest in current account dynamics also stems from the concern over the stability of capital flows. Recent trends of international capital flows to the developing countries indicate that large capital flows that were directed to emerging markets were easily reversible, suggesting that these flows were highly volatile, (Bacchetta and Wincoop, 1998). Sharp capital outflows or sudden stops to emerging markets have been commonly observed characteristics of several recent financial crises. Such extreme volatility is often associated with severe consequences on the economy, (Hutchinson and Noy, 2002). For instance, a sudden reversal of foreign capital inflows may trigger a sharp drop in domestic investment, domestic production as well as employment. Besides the loss of output caused by sudden stops of international capital flows, volatility of international capital flows creates instability by introducing uncertainty to the economy. For this reason, economists are interested with the factors that may contribute to volatility in international capital flows.

The importance of the current account is also demonstrated by its wide use in early warning indicators of currency crises. Aziz et al, (2000) analyzed the macroeconomic and financial conditions common to financial crises in the period spanning from 1975 to 1997. They found that a large external deficit especially one that is associated with a fiscal deficit is closely linked to banking crises. While the building up of vulnerability is mostly due to internal imbalances such as inflation, credit growth, fiscal deficit, and external shocks, current account imbalances are also critical to the extend that they affect the exchange rates and trigger currency crisis.

There are, however, two main criticisms on the importance of the current account balance. The first one concerns the increasing fluidity and depth of global financial markets. The argument is that in the contemporary world, countries have extensively diversified their idiosyncratic risks in sophisticated, well-functioning markets for contingent securities. In a world of virtually complete Arrow-Debreu asset markets, extensive global financial markets can enable countries to pool their risks to the maximum feasible extent. Except when current account imbalances arise because of excessive government deficits, they represent optimizing household and firm decisions that support intertemporally efficient resource allocations and thus do not raise policy concerns, (Obstfeld, 2012).

Secondly, the contribution of current account balances to stability is relatively small when compared with total capital flows which eventually finance the balance of payment.
transactions. Thus the current account deficits/surplus is easily offset by capital inflows/outflows into the economy.

Nonetheless, it remains important for policymakers to continue to monitor current account developments, given the potential economic repercussions of persistent current account imbalances. To effectively monitor the current account developments, there is need for an in-depth understanding of capital flows and current account dynamics.

Basically, the arguments that current account deficits are not all that important is premised on the notion that the current account balance is self-correcting and that huge cross-border financial flows promote efficient risk sharing, and that private-sector self-interest leads to socially efficient allocations. However, this argument is implausible given the distortions and the imperfect capital market.

The interest in current account deficits also stems from two main factors, firstly the fact that the current account is a symptom of emerging problems in the economy and secondly the undesirable macroeconomic impact associated with current account imbalances. Numerous crises are known to have been preceded by large current account deficits. These include Chile in 1981, Finland in 1991, Mexico in 1994, Thailand in 1997, United States in 2007, and Greece in 2010, to name just a few. Whilst external deficits may not be the true sources of the problem, nonetheless the huge current account deficits make it imperative for policy makers to keep a kin eye on current account deficits since they can be viewed as early warning systems for emerging crisis.

The current account balance also plays a key role as a component of a country’s aggregate demand given that it is also highly correlated with net exports. The main risk of incurring persistently high current account deficit is that, it entails running down the foreign reserves and borrowing externally to finance the deficit. Continuous borrowing, however, results in a huge debt overhang which may prompt foreigners to worry about the ability of the country to service the international obligation in future. Once the foreign lenders become unwilling to lend to the country, this would result in a drastic adjustment to reduce domestic demand. The adjustment results in sudden stops or reversals in the capital flows (Calvo and Reinhart, 2000). Any problems associated with a given country’s current account imbalances are likely
to hurt its economy. A sudden stop can result in currency depreciation. This will in turn raise the real value of foreign liabilities thereby tightening financial constraints.

The costly adjustment in the country’s current account can spill over into other countries given the interconnectedness of financial systems in the world. Milesi-Ferretti et al., (2011) distinguished between systemic and national risks. A deficit can trigger a reversal or sudden stop in the capita inflows into the country and this can spread to other countries by way of contagion as happened in Mexico in 1994, Thailand in 1997, and recently in the euro area.

2.5 Is a Current Account Deficit Good or Bad?

Whether a current account deficit is good or bad depends fundamentally on the factors driving it. If the deficit originates from the trade deficit, that is, an excess of imports over exports, this is either a sign of underlying competitiveness challenges in an economy. However, because the current account deficit also implies an excess of investment over savings, it can also point to a highly productive, growing economy. If the deficit is due to low savings rather than high investment, this could be caused by huge fiscal deficits or a consumption binge. A current account deficit which is a result of an increase in consumption or large fiscal deficits rather than a surge in the more productive investment spending, requires an adjustment process which might be more painful as this might weigh down on economic activity. In such a case, the current account deficit becomes a bad thing. Thus the deficit reflects underlying economic trends, which may be desirable or undesirable for a country at a particular point in time.

The size of the deficit, however, does not matter (Lachler and Nunnenkamp, 1987). What is important is whether the deficit is sustainable or not. This is primarily because when a country persistently runs current account deficits, it is essentially accumulating foreign debt. However, the ability of a country to run a current account deficit also depends on the extent of its foreign liabilities and whether the borrowing will finance investment that has a high up turn than the rate of interest. But even if the country is intertemporary solvent, its current account may become unsustainable if it is unable to secure the necessary funding.

The composition of the current account balance is also critical in the determination of sustainability of a current account deficit. A current account deficit is considered to be a
problem if it caused by a huge balance of trade deficit than one caused by a huge deficit in net factor income from abroad. Persistently large balance of trade deficits reflect the presence of structural rigidities and competitiveness challenges in the economy. On the contrary, a huge deficit in net foreign factor incomes may be due to past incurred external debt. Another important element is the size of the exports relative to the country’s national income. This is mainly because exports are an indicator of the country’s ability to generate foreign currency and service its debt.

The composition and size of the capital inflows necessary to finance a given current account deficit is also a key factor in determining whether a current account deficit is good or bad and in particular in assessing the current account sustainability. Short-term capital inflows are more dangerous compared to long-term capital inflows. Equity inflows are considered to be more stable than debt-creating inflows (Claessens et al., 1995). As such, a current account deficit financed by large foreign direct investment (FDI) is more sustainable than a deficit financed by short-term capital flows or “hot money” flows which are prone to sudden stops or reversals as a result of changes in market conditions and sentiments.

### 2.6 Determinants of Current Account Deficits

Many empirical studies have been carried out on the current account determinants. However, each of them gives different predictions about the elements contributing to the current account position.

Sophocles et al., (2010) found out that the current account deficit will tend to narrow as real GDP per capita income increases. In addition, they also established that appreciation of the Real Effective Exchange Rate (REER) adversely affects the current account not only through the trade channel by worsening international competitiveness and reducing net exports, but also through reducing the savings as a result of a higher purchasing power in terms of imported goods and increased value of the accumulated financial and real assets. Further more, they established that an increase in the fiscal deficit is only partially offset by an increase in private saving, thus culminating to the widening of the current account deficit. Consequently, a rise in private investment would tend to increase the current account deficit.
It was also found that the relaxation of the borrowing constraints for the private sector following financial liberalisation and the falling interest rates, also partly due to the process of monetary integration, have led to a sizeable deterioration of the current account balance during the last decade in some European countries as consumption increased and saving fell. Finally, inflation volatility, which is a proxy for macroeconomic uncertainty, surprisingly was found to affect negatively the current account by reducing saving (Sophocles et al., ibid).

Ang H. Y. and Sek K. S., (2010) studied the determinants of current account imbalances in two groups of countries, firstly countries with current account surpluses and secondly those with current account deficits. They found out that in countries with current account deficits, the major determinants of current account movements include oil price, international foreign exchange reserves, interest rates, exchange rates as well as the past current account balances. Inflation, terms of trade, trade openness and productivity had no impact on current account patterns in few economies within this first group of economies.

In the second group of economies, that is countries enjoying current account surpluses, they found out that the main determinants of current account movements include oil prices, productivity, trade openness, exchange rate movements, and past current account movements. International foreign exchange reserves had no impact on current account movements in all countries from the second group. Other factors such as inflation, terms of trade and interest rate had an impact on current account movements in some of these countries.

The results imply that countries with persistent current account deficits tend to be affected by their reserve accumulation while the surpluses of current account of second group economies tend to be affected by productivity. On the other hand, exchange rate, oil price and previous current account levels have significant impact on current account movements in majority economies from these two groups of economies.

In summary, oil prices, international foreign exchange reserves, interest rates, exchange rates, past current account balances, inflation, terms of trade, trade openness and productivity can explain current account dynamics depending on the nature of the economy. In addition, the fiscal balance as well as the savings and investment behaviour of economic agents are also key variables in the determination of the current account dynamics.
2.7  Causality between Current Account and Capital Account

There is no straightforward answer to the issue of causality between current and capital account balances. However, the explanation mainly revolves around the theoretical dichotomy between the current account oriented view and capital account oriented view. According to the current account oriented view, the problem of high and persistent current account deficits is attributed to the existence of some structural bottlenecks in the domestic economy, typified by trade deficits, budget deficits, and saving-investment gap. On the other hand, the capital account oriented view argues that high and persistent current account deficits are just a reflection of massive capital inflows into the domestic economy which manifest in the form of a high financial account surplus. The surplus status of the financial account is what ultimately enables a country to attain current account sustainability.

A number of studies have tried to analyze the direction of causal relationship between the current and capital account balances. Some of these studies found unidirectional causality which runs from capital account to current account or vice versa whilst others found bidirectional causality. Other studies found no causality between the current and capital account balances. Morande, (1988) established that there is a unidirectional causality from capital account to current account for Chile. Forogue and Veloce, (1990) found a bidirectional causality between the financial and the current accounts for Canada. Fry et al. (1995), however, found that some developing countries have unidirectional, bidirectional whilst others do not have causality between the capital and the current accounts. However, in Argentina, Mexico, Philippines and Thailand, financial inflows were found to Granger-cause current account deficits.

Guerin, (2003) suggested that the causality is mainly from current account to net capital inflows in developed countries and from net capital inflows to current account in developing countries. Yan, (2007) also finds that there are different causal relationship between the current account and the financial account components of FDI, portfolio investment and other investment between countries. He attributed this to the level of sophistication in the financial system in terms of absorbing the foreign capital inflows, the ‘pull’ or ‘push’ factors behind the capital inflows and the adjustment process of the current account reversals which are abrupt for developing countries and rather moderate for the developed world.
The findings of Yan and Yang (2009) are also in line with Chinn and Prasad (2003), who found that the depth and sophistication of the financial system has an impact on current account in developing countries whilst in the developed world no significant impact is evidenced. This implies that capital inflows to an unsophisticated, shallow financial market in a developing country can potentially lead to current account deterioration.

The direction of causality can also be explained in terms of the savings and investment gap. Current account imbalances are caused by a mismatch between savings and investment. Large private capital inflows can influence the behaviour of the current account through their effect on savings and investments. Periods of high capital inflows are generally accompanied by increased rates of investment. According to the intertemporal current account balance model, advocated by Obstfeld and Rogoff (1996) among others, capital flows to finance the current account deficit, which by definition is the negative difference between domestic savings and investments. This is how current account causes financial inflows.

The direction of causality remains important in the determination of sustainability as this can point to the source of the problem in the economy. If the causality is from the current to the capital account, this implies that the country has some underlying structural challenges which are reflected either in the large fiscal deficit and the trade deficit. However, it is less problematic if it is from the capital to the current account particularly when it is driven by an increase in foreign direct investment. Notwithstanding this, the nature of the capital inflows is also paramount. In instances where the current account deficit is a result of hot money which comes in the form of short term debt or portfolio investment which can reverse abruptly, there is a danger of destabilising the economy as a sharp and costly adjustment will be required either in the form of exchange rate devaluation or reduction in absorption. This can weigh down on economic activity. Countries may be tempted to intervene in the event of a surge in capital flows, especially those driven by speculative motives to make quick returns before reversing within a short time frame. As such, the concept of causality forms the basis for determining whether to implement capital controls or not.
2.8 The Concept of Sustainability

The concept of sustainability is now a hot topic in policy discourse. Several authors have come up with different measures of sustainability. Mann, (1999) defines current account deficit as being sustainable when continuation of the current policy stance will not require a drastic shift or sudden stop such as sudden tightening of monetary or fiscal policy resulting in sharp increases in interest rates, a sudden depletion of reserves, or an exchange rate collapse. Milesi-Ferretti and Razin, (1996) argued that the “sustainable” level of the current account is that level consistent with solvency. Solvency is defined theoretically in relation to an economy’s present value budget constraint. An economy is said to be solvent if the Present Discounted Value (PDV) of future trade surpluses is equal to the current external imbalances (Milesi-Ferretti and Razin, ibid).

2.9 Approaches to Current Account Sustainability

There are several approaches to determine whether a particular current account position is sustainable or not. The most notable approaches include the accounting approach, the elasticity approach, the absorption approach, structural approach, and the intertemporal solvency approach.

2.10 The Accounting Approach

The accounting approach defines a sustainable current account as one that does not generate increases in the debt-to-GDP ratio over an extended period of time (Opoku-Afari, 2007). The sustainability condition in this approach is specified as follows:

$$\Delta d_t = \left( \frac{1+i_t}{1+g_t} \right) d_{t-1} - (x-m)_t = 0$$

(2)

Where $d_t$ is the external debt-to-GDP ratio, $i_t$ is the interest rate, $g_t$ is the GDP growth rate and $(x-m)_t$ is the trade balance-to-GDP ratio. When a trade balance obtains, the change in the stock of external debt is determined by the difference between $i_t$ and $g_t$. With an unchanging stock of debt, the external debt-to-GDP ratio remains constant and the trade balance and current account are sustainable. In the real world, however, there is seldom an exact equality.
between \( i_t \) and \( g_t \). If the interest rate falls below GDP growth, the trade deficits can continue to exist forever without an increase in the ratio of debt to GDP. A deficit is not sustainable when the economy’s growth rate falls below the ruling interest rate. In such an instance, the trade surplus is required to offset an increase in the debt stock arising from this unfavourable discrepancy.

The major drawback of the accounting approach is that it makes assumptions about debt being able to grow at the rate of GDP in order to maintain a constant debt-to-GDP ratio. This does not explain the role that lenders play in deciding whether a country’s external position and associated policies is sustainable or not. For a country like Zimbabwe which is unable to borrow from the multilateral lending institutions such as the IMF, WB, and AfDB, focusing on the debt to GDP ratio would be quite misleading.

### 2.11 The Elasticity Approach

The elasticity approach to the balance of payments is a partial equilibrium model that looks at the effects of changes in the exchange rate on both the current and capital account. The model emphasizes the role of exchange rate and trade flows on current account adjustments and it is widely applied to evaluate the impact on currency.

The major weakness of the elasticity approach is that it disregards the feedback effects of macroeconomic factors such as domestic economic activity, wages and prices, and interest rates on the balance of payments. By limiting its focus on the direct linkages between exchange rates and the balance of payments, the elasticity approach disregards the analysis of the exchange rate adjustment process on the simultaneous pursuit of policy objectives for the balance of external payments and internal economic activity. In the case of Zimbabwe, the elasticity approach would be inapplicable given that there is no exchange rate under the current multiple currency system.

### 2.12 Absorption Approach

According to the absorption approach, a current account deficit is a condition where absorption exceeds income while a surplus exists when absorption is less than income or exports exceed imports. A current account is in surplus when production exceeds spending,
or exports exceed imports. It is in deficit when spending is larger than production or imports exceed exports.

The drawback of the absorption approach is that does it not sufficiently consider the monetary aspect, in particular the money markets and inflationary effect of devaluation. Moreover, a reduction in absorption or an increase in income does not always guarantee the elimination of deficits. The absence of an active money market and lack of monetary policy autonomy as a result of the multiple currency system make it difficult to apply this model to the Zimbabwean scenario.

2.13 The Structural Approach

The structural approach consists of mainly three steps. The first step involves estimation of an econometric model that relates current account to its medium term fundamentals. In other words, the significant coefficients will be interpreted as important values for the current account to be on a sustainable path. The second step involves calculation of the current account norm by multiplying the coefficients obtained from the current account model with the medium term fundamental values. In the last step, the actual current account is compared to the current account norm. When the actual current account deficit is greater than the norm, this implies that the current account deficit is unsustainable; whilst if the deficit is smaller than the norm, it means that the current account deficit is sustainable.

The theoretical basis for the structural approach is the savings-investment model. According to this approach, the current account balance is defined and derived from the national account identity. The current account deficits could arise from dissaving from both the private and public as well as from higher investments. The saving-investment model is specified in the following general function:

$$Y_t = \alpha_0 + \alpha_t Z_t + \mu_t$$

Where the dependent variable $Y_t$ denotes the current account deficit expressed as a ratio of GDP, $Z$ is the vector of the explanatory variables which include the fiscal balance, openness of trade, terms of trade, Real Effective Exchange Rate (REER), dependency ratio, and GDP growth.
This model is quite plausible in the assessment of current account sustainability in that it generally looks at all the factors that affect a country’s external imbalance. However, calculation of the norm is usually a challenge in developing countries because of lack of information on some of the key variables. Moreover, it is also a challenge to apply the same model in dollarized economies as calculation of variables such as the REER is not feasible.

2.14 The Intertemporal Approach

The intertemporal approach to current account sustainability analysis was motivated by the critique of econometric policy evaluation (Lucas, 1976). He argued that economic models based on decisions made by forward-looking economic agents were more reliable compared to models that are based on ad hoc econometric specifications. The intertemporal approach was popularized by papers written by Obstfeld, (1982) and Razin, (1983), among others.

Further impetus to develop the intertemporal model was due to the substantial current account deficits that were experienced as a result of sharp world oil price increases in 1973, 1974, 1979 and 1980. The divergent patterns of current account adjustment by industrialized and developing countries raised the inherently intertemporal problem of characterizing the optimal dynamic response to external shocks. Neither the classical monetary models nor the Keynesian models had offered reliable guidance on this question.

The intertemporal approach extends the absorption approach to balance of payments through its recognition that private saving and investment decisions, and even government decisions, result from forward-looking calculations based on expectations of future productivity growth, government spending demands, real interest rates, and so on. The model achieves a synthesis of the absorption and elasticity’s view by accounting for the macroeconomic determinants of relative prices and by analyzing the impact of current and future prices on saving and investment.

Liu and Tanner, (1996) conjectured that for a sustainable current account to be sustainable, the present value of the expected stock of debt should be zero. This is the transversality condition of the optimal control problem faced by an open economy in the long run. This
implies that the current account deficit is sustainable when the current account series is a stationary process.

2.15 Relationship between Capital Flows and Current Account Balances

Capital flows can affect the behaviour of the current account through their effect on savings and investment. Periods of large capital inflows are usually associated with increased rates of investment. If international capital inflows results in an increase in investment, assuming savings remain stable, this leads to an increase in the current account deficit. However, when these capital flows are reversed, this results in a sharp reduction (or reversal) in the current account, with potentially huge macroeconomic costs (Claessens et al. 1995).

Calvo et al. (1996) argued that the effect of capital inflows on the current account can be derived from standard open economy models, such as Irving Fisher’s model. In such a model, falling interest rates induces income and substitution effects, for debtor countries, culminating to an increase in consumption and consequently a widening of the current account deficit. For capital-importing countries, falling interest rates reduces the present value of debt and reduce the cost of borrowing. This implies that an increase in capital inflows is likely to be accompanied by a rise in consumption and investment, and a widening of the current account deficit (Calvo and Vegh, 1993). The effect of capital inflows is similar to the effect of a decrease in interest rates.

A study by Bosworth and Collins (1999) examined the relationship between capital flows and the current account using panel data that includes 58 developing countries over 17 years from 1979 to 1995 to analyse the effect of capital flows on investment and savings and the current account. They found that a large proportion of capital flows to the developing countries over the past two decades was used to finance current account deficits. These resource transfers were primarily used to finance investment as opposed to consumption. When they examined different types of capital flows, they found that FDI has highly beneficial effects on investment, whereas portfolio flows have no impact.
2.16 Impact of a Current Account Deficit on the Economy

A current account deficit is one of the important barometers for measuring the strength of an economy since it is closely related to the key variables such as national saving and investment, the fiscal balance, and private savings. A current account deficit has implications on the exchange rate and the country’s competitiveness. If the current account deficit is persistently large, this can lead to currency depreciation which can render monetary policy ineffective resulting in rising inflation. Currency depreciation has also been linked to currency crisis, (Sarno and Taylor, 1999). The link between the current account and the potential of a currency crisis stems from the fundamental insight that no country is able to accumulate foreign debt or run a current account deficit for an indefinite period of time. If the current account deficit becomes unsustainable, this can result in a currency crisis precipitated by the rapid depreciation of the domestic currency. Moreover, it is difficult to stabilise the economy in the presence of a persistently large current account deficit.

The impact of current account deficit also depends on how the deficit arises. A current account deficit associated with a huge trade deficit usually reflects the underlying challenges in the economy. However, if the current account deficit is associated with large foreign capital inflows such as FDI, it can stimulate growth, smooth consumption; provide portfolio diversification and productive efficiency. There are also some costs associated with large capital inflows. Capital inflows can increase the risk of contagion, monetary instability and weaken the effectiveness of monetary policy. Calvo et al (1996) argue that a widening current account deficit is one of the less desirable macroeconomic effects of large capital inflows to the debtor countries.

2.17 Empirical Studies on Current Account Sustainability

There are various studies on current account sustainability in different countries across the globe. Trehan and Walsh (1991) tested the sustainability of the current account deficit in the United States using annual data for the foreign debt for the period spanning from 1946 to 1987. They observed that the current account balance was sustainable. The solvency of Canada, Germany, France, Italy, Japan, the United Kingdom, and the United States of America (USA) was also tested using quarterly data spanning from 1970 to the early 1990s (Liu and Tanner, 1996). Their study found that the intertemporal solvency condition was
satisfied for the United States, Germany, and Japan and it was violated for the rest of the countries.

Aziz et al., (2000) studied the macroeconomic and financial conditions common to financial crises in the period from 1975 to 1997. Their study established that a large external deficit, which is also accompanied by a fiscal deficit, is closely linked not only to balance of payment crises, but to banking crises as well. Bruggermann and Linne (2002) estimated an early warning indicator for new European Union member countries as well as Russia and Turkey. The current account was not explicitly used as an explanatory variable, but they found that variables closely linked to it such as import and export growth and external debt, and fiscal deficit, have a strong predictive power. Edwards (2004) established that the probability of experiencing an abrupt current account reversal is linked to the size of the current accounts deficit and the level of external debt.

Husted (1992) and Taylor (2002) have shown that the long-run intertemporal budget constraint or typically the solvency constraint implies a stationary current account. The time series of current account imbalances as a ratio of GDP were mostly constructed and subjected to unit root testing by means of Augmented Dickey-Fuller (ADF) tests.

Lau, Baharumshah, and Haw, (2004) investigated the statistical properties of current account in Indonesia, Korea, Malaysia, the Philippines and Thailand utilizing data from 1976 to 2001. The sample period was split into the pre-crisis period between 1976 and 1996 and post-crisis period between 1997 and 2001. Univariate unit root tests indicated that current account deficit to GDP ratio followed a non-stationary process under both eras. However, after using more sophisticated panel techniques, it was shown that the current account displayed the mean-reversion properties in all the sampling periods, an indication that the empirical evidence supports the modern intertemporal approach to current account sustainability.

In South Africa, Searle and Mama (2010) analysed the sustainability of South Africa’s current account deficits by means of a test of the country’s intertemporal budget constraint (IBC) in the context of a co integration analysis. They found initially that the current account was unsustainable but the finding of an unsustainable current account position was reversed after controlling for structural breaks in 1994 and 2003. It was concluded, therefore, that South African’s current account deficit was sustainable.
Causal relationship between current account and capital flows were also analyzed by several studies. Fry, et al. (1995), used annual data from 1970 to 1992 for developing countries and found that 17 countries had capital accounts that granger caused current account, 12 countries with current account that granger caused capital account, and 21 countries that displayed no causal relationship between the two accounts. Faroque and Veloce (1990) analysed the causal relationship between current account and capital account balances of Canada the period for 1961 to 1984. They found a feedback relation between current account and long term capital account.

A study by Bosworth and Collins (1999) examined the relationship between capital flows and current account developments in developing countries. They used panel data for 58 countries over 17 years from 1979 to 1995 to analyse the effect of capital flows on investment and savings and the current account. They observed that a large proportion of capital flows to the developing countries was used to finance current account deficits. The capital flows were primarily used to finance investment as opposed to consumption. When they analyzed the different types of capital flows, they found that FDI had highly beneficial effects on investment, while portfolio investment flows had no impact.

The empirical studies clearly demonstrate the relevance of the IBC in the analysis of the sustainability of current account deficits. In addition, the studies amply show how the different forms of capital flows influenced the current account dynamics in different regions across the globe. Given Zimbabwe’s continued widening current account deficit and the recent surge in debt creating capital inflows, it would be interesting to also investigate the current account dynamics in Zimbabwe. In addition, it is also necessary to understand how the capital flows affect the behavior of the current account. This is important to determine whether the country is sustainable or not so that changes can be initiated timely without rendering costly adjustment on the economy.

### 2.18 Summary of the Chapter

The chapter reviewed the literature on current account dynamics and the various approaches to balance of payments and sustainability of current account deficits. The key issue addressed in the literature review is whether the current account deficit matters or not. Some writers
argue that in the presence of capital flows, the current account imbalance is not a problem. This is mainly because the there is an automatically adjustment mechanism in the system and the capital flows are a way of sharing the risks. Self interest is considered important as it results in socially optimum resource allocations. However, based on past experiences, there are problems associated with huge current account deficits. Unexpected capital outflows or sudden reversals can precipitate currency depreciation with a potential of stabilizing the economy, lead to currency crisis with negative implications on economic growth. Current account crisis can also have spill over effect on other economies. On the basis of the potential impact of a current account deficit, it becomes imperative for policy makers to take a keen interest on the external sector developments.

The literature also reviewed the various approaches to current account sustainability. Given the potential impact of persistent current account deficits on the economy, the issue of sustainability becomes a necessity. Although borrowers may be willing to lend, there is always a limit to which lenders can lend to a country and this creates huge financing changes for the economy.

The origin of current account deficits is also critical. According to the current account view, the trade account is the most important component of the current account balance. A negative current account deficit reflects the underlying structural challenges in the economy. On the other hand, however, the capital account view assumes that the capital flows are important to bridge the savings and investment gap in the economy. The type of capital that flows into the country to finance the capital account deficit is also important. For instance, foreign direct investment is more favourable than short term foreign debt as this may dry up whilst foreign direct investment is not only long term in nature but is a springboard for future economic growth. Thus, sustainability of current account is not a simple concept as there are many factors at play in the determination of sustainability.

The above literature review also highlighted the potential adverse negative impact of current account developments on an economy. Thus the current account deficit remains a key element in economic management. The next chapter looks at methodological issues.
CHAPTER THREE

3. METHODOLOGY

3.1 Introduction

This chapter discusses methodological issues used in the study. The chapter begins with derivation of the model used in the analysis. The study proceeds to look at the estimation procedure. The chapter also briefly describes the co-integration and the error correction model used in the analysis. The chapter also discusses the Granger causality tests applied in the study.

3.2 Model derivation

To assess sustainability of the current account deficit, a model derived from the intertemporal balance model developed by Liu and Tanner (1996) is adopted. The advantage of this approach is that it achieves a synthesis of the absorption and elasticity’s view by accounting for the macroeconomic determinants of relative prices and by analyzing the impact of current and future prices on saving and investment. Whilst the structural approach is equally plausible, the major drawback in the case of Zimbabwe is that lack of information on some of the variables makes it inapplicable to Zimbabwe. For instance, in the absence of domestic currency, it is not possible to calculate the Real Effective Exchange Rates (REER) for the country. As such, the intertemporal approach becomes the only feasible methodology for assessing sustainability of Zimbabwe’s current account deficit.

According to the intertemporal model, the country’s budget constraint for each period is expressed as follows:

\[ X_t - M_t + rB_{t-1} = B_t - B_{t-1} + v_t \]  \hspace{1cm} (3)

Where \( M_t \) and \( X_t \) denote imports and exports of goods services in each period, i.e. period \( t \), \( B_t \) represented the stock of foreign debt in period \( t \), and \( r_t \) is the world interest rate in period \( t \). The interest rate is assumed to be stationary with mean \( r_t \) (\( r_t = r + v_t \)), \( v_t \) being a random error with a zero mean). The forward iteration of equation 3 produces the following expression:
\[(1+r)B_{t-1} = \sum_{k=0}^{\infty} \frac{M_{t+k} - X_{t+k}}{(1+r)^k} + \lim_{k \to \infty} \frac{B_{t+k}}{(1+r)^k} + \sum_{k=0}^{\infty} \frac{V_{t+k}}{(1+r)^k} \quad (4)\]

Assuming that exports and imports are integrated of order one, i.e. I(1), and taking expected values, (4) may be written as:

\[CA_t = \theta + \lim_{t \to \infty} E_t \left[ \frac{rB_{t+k}}{(1+r)^k} \right] + \omega_t, \quad (5)\]

Where: \( \theta \) and \( \omega_t \) represents a constant and a stationary error term, respectively. A sufficient condition for equation 5 to hold, the second term (long run budget constraint) on the right-hand side is equal to zero. Hence, for a sustainable current account, the present value of the expected stock of debt should be zero. This is the transversality condition of the optimal control problem faced by an open economy in the long run. Hence sustainability implies that the current account deficit is sustainable when the current account series is a stationary process.

As Trehan and Walsh (1991) stated, current account stationarity is a sufficient condition to achieve the intertemporal budget constraint (IBC) condition. Therefore the model permits application of unit-root tests to check the intertemporal budget constraint (IBC) stationarity condition in current account.

Typically, the current account stationarity is critical in determining the validity of the intertemporal model of the current account. The intertemporal approach assumes perfect capital mobility which results in smooth consumption. This allows the model to predict whether the current account will be a stationary process, notwithstanding shocks in the economy. If the current account deficit follows a stationary process, it means that the country is solvent.

### 3.3 Estimation Procedures

Stationarity of the current account is tested using the Augmented Dick Fuller Test (ADF) unit root test procedure. Assuming that the data have an Auto Regressive Moving Average
(ARMA) structure, the model of univariate Dickey Fuller unit-root test in AR (p) can be written as:

$$\Delta CA_t = \alpha + \rho CA_{t-1} + \sum_{j=1}^{\infty} \beta \Delta CA_{t-j} + \epsilon$$  (6)

Where $\alpha$, $\rho$ and $\beta$ are constant and the white noise is indicated by $\epsilon$. $CA_t$ denotes the current account to GDP ratio ($CA_t/GDP_t$), and $\Delta$ is the first differenced operator.

If the current account deficit is stationary, it implies that the current account deficit does not violate the IBC, implying that the country is solvent. The requirement for solvency to be attained is that the current account deficit must be mean-reverting or follow a stationary process. The unit root tests are conducted first using the Augmented Dickey-Fuller (ADF) test based on the null hypothesis that a unit root exists in the time series.

However, since the ADF test is unable to discriminate clearly between non-stationary and stationary series with a higher degree of autocorrelation and is sensitive to breaks, other second generation stationarity tests are applied, notably the Dickey-Fuller Generalized Least Square (DF GLS), the semi-parametric Phillips-Perron test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test of Kwiatkowski et al., (1992).

### 3.4 Co integration Analysis

To ensure the robustness of our results, the co integration techniques of Johansen (1988) and Johansen-Juselius (1990, 1992) are used to determine whether there is a long run relationship between exports and imports of goods and services. This is important to investigate whether there is any theoretical reason to support the relationship between exports of goods and services and imports of goods and services. This is because, whilst one series may be non stationary, a combination of the two series might indicate a long run relationship, implying that they are a stationary process.
3.5 **Error Correction Model (ECM)**

When the exports and imports of goods and services are found to be co integrated, an Error Correction Model is estimated to determine the adjustment in the following period. The Error Correction Model (ECM) by Engel and Granger (1987) is a means of reconciling the short-run behaviour of an economic variable with its long-run behaviour. The error correction model is specified as:

\[ \Delta X_t = \beta_0 + \beta_1 \Delta M_t + \beta_2 \epsilon_{t-1} + \mu_t \]  

(7)

Where \( X_t \) and \( M_t \) are exports and imports of goods and services, \( \mu_t \) is the error term and \( \epsilon_{t-1} \) is the error correction component of the model and measure the speed at which prior deviations from equilibrium are corrected.

3.6 **Errors and Omissions**

To assess the implications of the huge net error and omissions, the errors and omissions will be added to the current account balance assuming that these are transactions which are also financing the current account deficit. The current account deficit will therefore reduce when the net errors and omissions are added. The sustainability of the current account deficit will also be assessed as above after adding the errors and omissions to the current account and the results are compared with the first scenario.

3.7 **Causality Test between Current and Capital Account Balance**

To test for causality between the capital and current account, the following model developed by Engle and Granger, (1987) is used.

\[ CA_t = \beta_0 + \sum_{i=1}^{L} \beta_{1i} CA_{t-i} + \sum_{i=1}^{L} \beta_{2i} KA_{t-i} + \epsilon_{1t} \]

\[ KA_t = \beta_3 + \sum_{i=1}^{L} \beta_{4i} KA_{t-i} + \sum_{i=1}^{L} \beta_{5i} CA_{t-i} + \epsilon_{2t} \]  

(8)

Where \( CA \) is the current account balance, \( KA \) is the capital account balance, \( \beta \) and \( \epsilon \) represents the coefficients and the error terms, respectively.
3.8 Causality Tests between Subaccounts of Capital Account and Current Account Balance

Capital flows are composed of three types of investments, which are foreign direct investments (FDI), portfolio investments (PI) and other investments (OI). Equations 9, 10, and (11) illustrate possible causal relationships between various types of capital flows and current account balances.

\[
CA_t = \beta_0 + \sum_{i=1}^{L} \beta_i t_i CA_{t-i} + \sum_{i=1}^{L} \beta_2 FDI_{t-i} + \varepsilon_{1t}
\]

\[
FDI_t = \beta_3 + \sum_{i=1}^{L} \beta_4 t_i FDI_{t-i} + \sum_{i=1}^{L} \beta_5 t_i CA_{t-i} + \varepsilon_{2t}
\] (9)

\[
CA_t = \beta_0 + \sum_{i=1}^{L} \beta_i t_i CA_{t-i} + \sum_{i=1}^{L} \beta_2 t_i PI_{t-i} + \varepsilon_{1t}
\]

\[
PI_t = \beta_3 + \sum_{i=1}^{L} \beta_4 t_i PI_{t-i} + \sum_{i=1}^{L} \beta_5 t_i CA_{t-i} + \varepsilon_{2t}
\] (10)

\[
CA_t = \beta_0 + \sum_{i=1}^{L} \beta_i t_i CA_{t-i} + \sum_{i=1}^{L} \beta_2 t_i OI_{t-i} + \varepsilon_{1t}
\]

\[
OI_t = \beta_3 + \sum_{i=1}^{L} \beta_4 t_i OI_{t-i} + \sum_{i=1}^{L} \beta_5 t_i CA_{t-i} + \varepsilon_{2t}
\] (11)

Where FDI is foreign direct investment, PI is portfolio investment and OI is other investments which are debt creating short and long term capital flows.

3.9 Causality Tests between Subaccounts of Current Account and Capital Balance

Causal relationship between subaccounts of current account balance and capital account is also quite important. As asserted previously current account balance is composed of three major accounts which are goods and services balance (GS), income balance (INC) and finally current transfers balance (CT).

\[
KA_t = \beta_3 + \sum_{i=1}^{L} \beta_4 t_i KA_{t-i} + \sum_{i=1}^{L} \beta_5 t_i GS_{t-i} + \varepsilon_{2t}
\]

\[
GS_t = \beta_3 + \sum_{i=1}^{L} \beta_4 t_i GS_{t-i} + \sum_{i=1}^{L} \beta_5 t_i KA_{t-i} + \varepsilon_{2t}
\] (12)
\[ KA_t = \beta_3 + \sum_{i=1}^{L} \beta_{4i} KA_{t-i} + \sum_{i=1}^{L} \beta_{5i} INC_{t-i} + \varepsilon_{2t} \]

\[ INC_t = \beta_3 + \sum_{i=1}^{L} \beta_{4i} INC_{t-i} + \sum_{i=1}^{L} \beta_{5i} KA_{t-i} + \varepsilon_{2t} \]  

(13)

\[ KA_t = \beta_3 + \sum_{i=1}^{L} \beta_{4i} KA_{t-i} + \sum_{i=1}^{L} \beta_{5i} CT_{t-i} + \varepsilon_{2t} \]

\[ CT_t = \beta_3 + \sum_{i=1}^{L} \beta_{4i} CT_{t-i} + \sum_{i=1}^{L} \beta_{5i} KA_{t-i} + \varepsilon_{2t} \]  

(14)

Where GS are goods and services, INC is the net income from abroad and CT is current transfers.

### 3.10 Stability Tests

A series of data can often contain a structural break, due to a change in policy or sudden shock to the economy. For instance, it is important to check for structural breaks in the economy particularly in 2009, following the official adoption of the multiple currencies in lieu of the local currency. In order to test for a structural break, the Chow test is used.

### 3.11 Justification of variables

To assess the sustainability of the current account deficit, the intertemporal approach looks at the current account to GDP ratio. The use of the current account to GDP ratio is mainly due to the fact that the sustainability of the current account also depends with the level of economic activity.

The direction of causality between current and capital account is also important for sustainability. As such the various components of the capital account, notably, foreign direct investment, portfolio investment, and other investments, notably, the short and long term debt are analyzed. As discussed in the literature review, if the current account deficit is financed from foreign direct investment, it becomes more sustainable that when it is financed from the volatile instruments such as portfolio investment as this can be withdrawn any time if the circumstances change. Long term debt is also more preferable to short term debt. This is largely because it enables companies to be able to invest in plant and machinery. As such,
these variables become critical in the assessment of the sustainability of Zimbabwe’s current account deficit.

The composition of the current account deficit is also critical. If the deficit is mainly driven by the trade account, it reflects the competitiveness challenges in the economy than when it is driven by net capital flows. Against this background, the components of the current account deficit are also important variables in the assessment of Zimbabwe’s current account deficit.

3.12 Data sources

For this study, annual data on balance of payment trends for Zimbabwe from 1990 to 2013, obtained from the Reserve bank of Zimbabwe data base is used. This period covers a relatively stable period from 1990 to 1999, the crisis era starting from 2000 to 2008 as well as the dollarization phase from 2009 to 2013.

3.13 Summary of the Chapter

In this chapter, intertemporal approach was applied to determine the sustainability of Zimbabwe’s current account deficit. To ensure robustness of the results, a co integration analysis was also applied to the total of exports of goods and services and imports of the same. Since it is possible that the two series can be co integrated, the study also looked at the error correction model. Because, the data shows that the net errors and omissions are very huge, the study proceeded to assume, that if the unaccounted transactions which are also financing the high import bill are known with certainty, the current account deficit would reduce in size. The net errors and omissions are then added to the current account deficit and the unit root tests are also conducted taking into account the effect of the net errors and omissions. In addition, the chapter discussed the Engel and Granger model for analyzing the causality between the current and capital accounts. The next chapter focuses on the analysis of the data.
CHAPTER FOUR

4. Results and Empirical Analysis

4.1 Introduction

This chapter provides an empirical analysis of capital flows and current account dynamics in Zimbabwe. The study begins by performing the unit root tests on the current account deficit to GDP ratio. The chapter proceeds with co integration analysis of the exports and imports of goods and services. In addition, the chapter develops an error correction model. The effect of errors and omissions on current account sustainability is also analysed. Finally some Granger Causality tests are performed on the key current and capital account components.

The stationarity of the current account deficit is important to the validity of the intertemporal model of the current account. Theoretically, the intertemporal approach combines the assumptions of perfect capital mobility and consumption smoothing behaviour to predict whether the current account can act as a buffer to smooth consumption in the face of shocks. The solvency constraint of the intertemporal model requires that the current account be a stationary variable. This means that the current account should be mean-reverting.

4.2 Empirical Results and Discussions

To assess the distributional properties of the current account deficit, descriptive statistics on exports and imports are reported in Table 1 below.
Table 1: Descriptive Statistics of the Variables

<table>
<thead>
<tr>
<th></th>
<th>CA_NET</th>
<th>CA_GDPR</th>
<th>EXPORTS</th>
<th>IMPORTS</th>
<th>KA</th>
<th>ERR_OMN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>-831.4792</td>
<td>-0.101667</td>
<td>2186.879</td>
<td>2765.838</td>
<td>315.1833</td>
<td>137.1118</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>-366.4500</td>
<td>-0.061000</td>
<td>1859.000</td>
<td>1977.550</td>
<td>174.3500</td>
<td>87.90000</td>
</tr>
<tr>
<td><strong>Maximum</strong></td>
<td>27.70000</td>
<td>0.005000</td>
<td>4416.300</td>
<td>7562.000</td>
<td>2208.200</td>
<td>930.50000</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>-3703.000</td>
<td>-0.299000</td>
<td>1530.000</td>
<td>1511.000</td>
<td>-403.4000</td>
<td>-1361.800</td>
</tr>
<tr>
<td><strong>Std. Dev.</strong></td>
<td>1040.791</td>
<td>0.089925</td>
<td>784.5720</td>
<td>1827.931</td>
<td>587.5841</td>
<td>447.86830</td>
</tr>
<tr>
<td><strong>Skewness</strong></td>
<td>-1.841407</td>
<td>-0.975480</td>
<td>1.609408</td>
<td>1.775954</td>
<td>1.610241</td>
<td>-1.132279</td>
</tr>
<tr>
<td><strong>Kurtosis</strong></td>
<td>5.035334</td>
<td>2.652192</td>
<td>4.488926</td>
<td>4.576397</td>
<td>5.836531</td>
<td>6.673764</td>
</tr>
<tr>
<td><strong>Jarque-Bera</strong></td>
<td>17.70570</td>
<td>3.927212</td>
<td>12.57768</td>
<td>15.10108</td>
<td>18.41741</td>
<td>18.62477</td>
</tr>
<tr>
<td><strong>Probability</strong></td>
<td>0.000143</td>
<td>0.140351</td>
<td>0.001857</td>
<td>0.000526</td>
<td>0.000100</td>
<td>0.000090</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td>-19955.50</td>
<td>-2.440000</td>
<td>52485.10</td>
<td>66380.10</td>
<td>7564.400</td>
<td>3290.683</td>
</tr>
<tr>
<td><strong>Sum Sq. Dev.</strong></td>
<td>24914645</td>
<td>0.185989</td>
<td>14157723</td>
<td>76850641</td>
<td>7940866</td>
<td>4613478.</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>

*Source: Researcher's own computations using e-views*

As shown in table 1 above, the average current account balance (CA) has mostly remained in the negative territory for almost the entire period under analysis. This indicates that the deficits have been a persistent feature in the Zimbabwean economy. The average current account deficit as a ratio to GDP is also above 10% of GDP. This is not only on the high side but it is also above the SADC maximum threshold of 9%. Looking at the average exports and imports, the results also indicate that imports have always exceeded exports.

The average capital account was in surplus for the period in question, although it was not sufficient to fully extinguish the trade deficit, hence the negative balance of payment position. The balance of payment deficit created the need for borrowing implying that the country was accumulating external debt. It is also worrisome that the country’s net errors and omissions have been very high implying that there could be some serious challenges in the compilation of balance of payments statistics, thus making the analysis of the current account sustainability a bit more complex. It is possible given the huge net errors and omissions that the current account deficit may appear to be unsustainable where as in reality the current account deficit is actually sustainable.
4.3 The Chow test

The study tested for structural breaks using the chow test. A series of data can often contain a structural break, due to a change in policy or sudden shock to the economy. This leads to some forecasting errors and hence unreliable model in general. The Chow test results are depicted in table 2 below.

Table 2: Chow Breakpoint Test

<table>
<thead>
<tr>
<th></th>
<th>F-statistic</th>
<th>Probability</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>1.976944</td>
<td></td>
<td>0.165968</td>
</tr>
<tr>
<td>Log likelihood ratio</td>
<td>4.348113</td>
<td></td>
<td>0.113715</td>
</tr>
</tbody>
</table>

Source: Researcher's own computations

According to the results of the Chow test, we fail to reject the null hypothesis that there is no structural break in the data since the p-value is above 5%.

4.4 Augmented Dickey-Fuller (ADF) Unit Root Tests

The unit root tests were conducted using the Augmented Dickey-Fuller (ADF) test based on the null hypothesis that a unit root exists in the time series. The unit-root tests were initially performed in levels and then after first differencing. The test results are presented in table 3 below.

Table 3: Unit Root Test Results

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Intercept</th>
<th>Level Intercept &amp; Trend</th>
<th>ADF TEST</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA_GDP Ratio</td>
<td>1.5297</td>
<td>-0.5615</td>
<td>-7.0932***</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>(0.9987)</td>
<td>(0.9708)</td>
<td>(0.0000)</td>
<td></td>
</tr>
<tr>
<td>Exports (G&amp;S)</td>
<td>-1.6250</td>
<td>-1.5548</td>
<td>-4.4239***</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>(0.4520)</td>
<td>(0.7743)</td>
<td>(0.0025)</td>
<td></td>
</tr>
<tr>
<td>Imports (G&amp;S)</td>
<td>0.5329</td>
<td>-0.5754</td>
<td>-3.3575**</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>(0.9841)</td>
<td>(0.9709)</td>
<td>(0.0243)</td>
<td></td>
</tr>
</tbody>
</table>

Source: Researcher's own computations

Figures in parenthesis are probabilities found from the critical values by MacKinnon (1996) Maximum lag length; *indicates stationarity at 10%, ** indicates stationarity at 5%, *** indicates stationarity at 1%.
From the above results, the critical value for the current account to GDP ratio is less than the t-statistic in levels. This means that the null hypothesis of a unit root is not rejected, implying that the current account deficit was non stationary. This also indicates that the current account deficit violated the intertemporal budget constraint suggesting that it is not sustainable. The solvency constraint of the intertemporal model requires that the current account should be a stationary variable or mean-reverting. However after first differencing, the variables became stationary implying that the variables are integrated of order one i.e. I(1).

The results above also indicated that exports and imports of goods and services were both non stationary in levels but stationary after first differencing, implying that they are integrated of order one, i.e. I(1).

However, the ADF test is unable to discriminate clearly between non-stationary and stationary series with a higher degree of autocorrelation and is sensitive to breaks. It has been proved, using Monte Carlo simulation that the power of the ADF test is very low (Destaings et al, 2013). Moreover, the test cannot distinguish between unit root and near unit root stationary processes. As such, the study also used other second generation stationarity tests, notably the Dickey-Fuller Generalized Least Square (DF GLS), the semi-parametric Phillips-Perron test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test of Kwiatkowski et al. (1992). The results of these tests are presented in table 4 below.

Table 4: Unit Root Test Results (Second Generation Stationarity Tests)

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>DF GLS</th>
<th>PP TEST</th>
<th>KPSS TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA_GDP Ratio</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level</td>
<td>0.1701</td>
<td>-6.6691***</td>
<td>-2.8876***</td>
</tr>
<tr>
<td>First Diff</td>
<td>(0.1840)</td>
<td>(0.0000)</td>
<td>(0.0000)</td>
</tr>
<tr>
<td>Level</td>
<td>0.5249</td>
<td>0.2531***</td>
<td></td>
</tr>
<tr>
<td>First Diff</td>
<td>(0.1840)</td>
<td>(0.0000)</td>
<td>(0.0000)</td>
</tr>
</tbody>
</table>

Source: Researcher’s own computations

Figures in parenthesis are probabilities found from the critical values by MacKinnon (1996) Maximum lag length; *indicates stationarity at 10%, ** indicates stationarity at 5%, *** indicates stationarity at 1%.

The results of the PP test also confirmed that the current account to GDP ratio is non stationary in levels implying that the current account deficit was not sustainable. In addition, the DF GLS and the KPSS overwhelmingly indicated that the current account deficit is non stationary in levels. However, all these methods indicated that the current account to GDP
ratio was stationary after first differencing. More explicitly, the above results suggest that the current account deficit in Zimbabwe was not sustainable.

4.5 Johansen Co integration Tests

Since the unit root tests results from the above analysis indicated that exports and imports of goods and services were integrated of order one, i.e. $I(1)$ for the period under analysis, the next stage of the analysis was to formulate sustainability tests, which rely on co integration analysis of imports and exports of goods and services. The exports and imports of goods and services series may individually follow a non stationary process, a combination of the two series may yield a stationary series implying that there is a long run relationship between the two variables.

The co integration techniques of Johansen (1988) and Johansen-Juselius (1990, 1992) are used to determine whether there is a long run relationship between exports and imports of goods and services. The advantage of this over other techniques is that it does not suffer from a normalization problem (Gonzalo, 1994). The superiority of the Johansen estimation has been shown by Phillips (1991) in terms of symmetry, unbiasedness and efficiency property. The determination of the number of co integrating vectors is based on the use of two test statistics, namely the trace test and the maximum eigen value test. This procedure begins with the determination of lag length of the vector autoregressive system using the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC). The results of the co integration tests are described in table 5 and 6 below.

<table>
<thead>
<tr>
<th>Hypothesized No. of CE(s)</th>
<th>Eigen Value</th>
<th>Trace Statistic</th>
<th>0.05 Critical Value</th>
<th>Prob,**</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td>0.505189</td>
<td>16.71557</td>
<td>15.49471</td>
<td>0.0326</td>
</tr>
<tr>
<td>At most 1</td>
<td>0.054668</td>
<td>1.236815</td>
<td>3.841466</td>
<td>0.2661</td>
</tr>
</tbody>
</table>

* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Table 6: Unrestricted Co integration Rank Test (Maximum Eigen Value)

<table>
<thead>
<tr>
<th>Hypothesized No. of CE(s)</th>
<th>Eigen value</th>
<th>Max-Eigen Statistic</th>
<th>0.05 Critical Value</th>
<th>Prob,**</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td>0.505189</td>
<td>15.47875</td>
<td>14.26460</td>
<td>0.0320</td>
</tr>
<tr>
<td>At most 1</td>
<td>0.054668</td>
<td>1.236815</td>
<td>3.841466</td>
<td>0.2661</td>
</tr>
</tbody>
</table>

Source: Researcher’s own computations

Max-eigen value test indicates 1 co integrating equation(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Co integration tests between exports and imports of goods and services were carried out using Johansen Techniques. According to the results from table 5 above, the trace statistic of 16.71557 considerably exceeded the critical value of 15.49475 and so the null hypothesis of no co integrating vectors is rejected. The trace statistic of 1.236815 is less than the critical value of 3.841466 and, therefore, we do not reject the null hypothesis of at most one co integrating vectors at the 5% level. From table 6 above, the maximum eigen value statistic of 15.47875 also exceeded the critical value of 14.26460 and the null hypothesis of no co integrating vectors is rejected. The maximum eigen value statistic of 1.236815 is less than the critical value of 3.841466 and the null hypothesis of at most one co integrating vectors at 5% level is not rejected.

These results amply reject the null hypothesis of no long-run equilibrium between exports and imports of goods and services. This implies that while in the short run the current account deficit was unsustainable, it would eventually become sustainable in the long run. This suggests that the intertemporal budget constraint exists. The challenge is how to obtain the amount of adjustments needed to correct or make the current account deficit sustainable in the long run in terms of the exchange rate adjustment or reduction of import absorption.

Given that the country is dollarized, it would not be feasible to effect the adjustment required through exchange rate devaluation. The adjustment will be a reduction in the absorption. At some point in time, the country will need to pay the debt arising from the current account deficit. High levels of current account deficits imply accumulation of external debt which needs to be repaid at some pint in time. The no ponzi condition implies that the country cannot live with indebtedness in perpetuity. The country will need to results the imports or increase competitiveness to make local products more attractive to the people.
The presence of a co integration relationship between imports and exports of goods and services is a necessary condition to sustain the foreign deficit, it is not a sufficient condition to be fully certain that the country is sustainable or not.

The study proceeds to check the slope coefficients of the co integration equation between export and import of goods and services. If both exports and imports series are integrated of order one, i.e. I(1), a regression test is also conducted to test the null hypothesis that $\beta = 1$ against the one-sided alternative that $\beta < 1$. If there is a long-run relationship, errors have tendency to disappear and return to zero i.e. they are I(0). Husted, (1992) derived a test model by formulating hypotheses from the equation 2 in chapter three. Since equation 2 in chapter 3 must hold in every time period, the period by period budget constraint can be combined to form the country’s IBC which states that the amount a country borrows (lends) in the international market should be equal to the present value of the future trade surpluses (deficits). This can be represented as follows:

\[ X_t = \alpha + \beta M_t + \mu_t \]  
\[ \Delta \log(X_t) = \alpha + \beta \Delta \log(M_t) + \mu_t \]  

Where $X_t$ represents exports of goods and services and $M_t$ represents imports of goods and services and $\mu_t$ is the error term.

If exports and imports of goods and services are co integrated, then $\beta = 1$ and the strong form of sustainability is satisfied. If $\beta = 1$ and exports and imports of goods and services are not co integrated, then the weak form sustainability is satisfied. If $0 < \beta < 1$, then the process has an explosive root and this signals an unsustainable current account position. If $\beta = 0$, then the process is non-stationary. The results of the co integration equation are indicated in table 7 below.
Table 7: Wald Coefficient Restriction Tests

<table>
<thead>
<tr>
<th>Restriction</th>
<th>F Statistic</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta = 1$</td>
<td>0.2181</td>
<td>0.6453</td>
</tr>
<tr>
<td>$\beta = 0$</td>
<td>3.7256</td>
<td>0.0672</td>
</tr>
</tbody>
</table>

Source: Researcher's own computations

Rejecting the null hypothesis that $\beta = 1$ for the alternate $\beta < 1$ would be evidence that the growth in international indebtedness may not be sustainable. The estimated value of the coefficient is $\beta = 0.690047$. The p values at $\beta = 1$ and $\beta = 0$ are all above 0.05 implying that the Wald Coefficient Restriction tests overwhelmingly rejects the null of $\beta = 1$ and $\beta = 0$ in both cases. Since $\beta$ lies between 0 and 1, it implies that the process follows an explosive path.

However, the residuals from the co integration regression are stationary at the 5% level using the ADF test. Despite the fact that the residuals from the regression are stationary, the coefficient is not unitary to conclude that the current account deficit was sustainable. More explicitly, the above results suggest that the current account deficits are not sustainable.

4.6 Error Correction Model

The Error Correction Model (ECM) by Engel and Granger (1987) is a means of reconciling the short-run behaviour of an economic variable with its long-run behaviour. If two variables are co integrated, then equation 15 in the previous section can be expressed as an ECM as follows:

$$\Delta X_t = \beta_0 + \beta_1 \Delta M_t + \beta_2 \epsilon_{t-1} + \mu_t$$  \hspace{1cm} (17)

Where $\Delta$ denotes the first difference operator, $\epsilon_t$ is a random error and 

$$\mu_{t-1} = X_{t-1} - \beta_1 M_{t-1} - \beta_2 M_{t-1}$$  \hspace{1cm} (18)
Table 8: Results of the ECM (DLOG (EXPORTS_GS))

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.010151</td>
</tr>
<tr>
<td></td>
<td>(0.7480)*</td>
</tr>
<tr>
<td>DLOG(IMPORTS_GS)</td>
<td>0.396759</td>
</tr>
<tr>
<td></td>
<td>(0.0704)*</td>
</tr>
<tr>
<td>RESID01(-1)</td>
<td>-0.030223</td>
</tr>
<tr>
<td></td>
<td>(0.0512)**</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.567062</td>
</tr>
<tr>
<td>Durbin-Watson Statistic</td>
<td>1.909348</td>
</tr>
</tbody>
</table>

Source: Researcher’s own computations

Figures in parenthesis are p values; *indicates significant at 10%, ** significant at 5%, *** significant at 1%.

The above results show that the coefficient of the residual has a negative sign as expected and is also significant at 5%. The DW statistic is close to 2, implying that the model does not suffer from serial correlation. The residual coefficient (RESID01) has a negative sign as expected and indicates that about 3% of the disequilibrium is corrected in the next period.

4.7 Errors and Omissions

One of the major challenges observed in the country’s balance of payments statistics was the escalation of the errors and omissions in the recent years. It is assumed that the errors and omission constitutes those transactions which are not covered in balance of payment statistics because the information is difficult to collect such as remittances which are coming into the country through informal channels, the smuggling of minerals and the under valuation of imports in order to avoid payment of import duties.

If these transactions are known, the current account deficit which appears to be unsustainable might end up becoming sustainable. As such, there is need to analysis the effect of errors and omissions on current account sustainability. To assess the implications of the huge net error and omissions, it is assumed that if these transactions are reflected on the balance of payments statistics, these would result in a lower current account deficit in the event of a positive net errors and omission and high current account deficit in the event of a negative net
errors and omissions. Since the average errors and omission for the period were positive, it means the current account deficit would reduce when the net errors and omissions are added.

**Table 9: Unit Root Test Results**

<table>
<thead>
<tr>
<th></th>
<th>Level</th>
<th>First Diff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>Intercept &amp; Trend</td>
</tr>
<tr>
<td>CA_GDP Ratio</td>
<td>-1.968733</td>
<td>-6.099721***</td>
</tr>
<tr>
<td></td>
<td>(0.2974)</td>
<td>(0.0001)</td>
</tr>
<tr>
<td></td>
<td>Intercept</td>
<td>Intercept &amp; Trend</td>
</tr>
<tr>
<td></td>
<td>-2.70207</td>
<td>-6.062348***</td>
</tr>
<tr>
<td></td>
<td>(0.2446)</td>
<td>(0.0003)</td>
</tr>
</tbody>
</table>

*Source: Researcher's own computations*

Figures in parenthesis are probabilities found from the critical values by MacKinnon (1996) Maximum lag length; *indicates stationarity at 10%, ** indicates stationarity at 5%, *** indicates stationarity at 1%.

The result of the unit root test after taking into account the errors and omission amply demonstrate the fact that the current account deficit remains non stationary thus confirming the results obtained in the earlier analysis. This implies that sustainability of the current account deficit is not affected by the presence of the huge errors and omissions in the data used in this study. This underscores the need to unpack whether the behavior of capital flows has an influence on the current account deficit.

### 4.8 Granger Causality Analysis

In this section causal relations between current account and capital account balances and between sub-accounts of those major accounts are explored by performing Granger Causality Tests at the optimal lag. According to Granger Causality Test, there are two hypotheses to be tested. The null hypothesis states that CA does not granger cause KA against the alternative that KA does not Granger Cause of CA.

According to granger causality test results in table 10 below, the p-value of 0.01785 is below 5% implying that we reject the null hypothesis that current account deficit does not granger cause capital account surplus. This means that a unidirectional relation is found between current account and capital account series at 5% significance level, implying that the current account deficit granger causes the capital account. As asserted in literature review, a current account deficit which granger causes a positive capital account balance as in the above case reflects underlying structural challenges in the economy.
This is particularly the case in this instance where the current account deficit induces capital inflows into the country. However, the results are not sufficient to determine whether the capital flows are good for the economy or not and whether the current account balances will be sustainable in future or not. There is, therefore, need for further analysis of the causal relations of the sub-accounts of both the current and the capital accounts. The results of the Granger Causality Tests are shown in table 10 below:

The causal relationship between subaccounts of both the current and capital account balances was also analysed using the same procedure as above. From the literature review, it was highlighted that the capital account consists of foreign direct investments (FDI), portfolio investments (PI) and other investments (OI), namely short term debt and long term debt. On the other hand, the subaccounts of the current account are mainly, the trade balance between exports and imports of goods and services (GS), current transfers (CT) and net factor income from abroad (INC).
The results from the table also indicated a unidirectional causality between imports and the capital account. The p-value is less than 5% implying that we reject the null hypothesis that imports do not granger cause capital account surplus. In other words, the direction of causality is from imports to capital inflows. This confirms the above results that the trade balance is the one that is inducing the capital inflows reflecting the underlying structural challenges in the economy.

However, the results indicate that there is no causality between FDI and the current account deficit. This presents some challenges to the economy in the sense that FDI is important for sustainable economic growth. A current account deficit may be unsustainable in the short run.
but if it is financed from inflows of FDI, it will make the current account deficit sustainable as the economy grows and builds capacity.

The results also indicate a unidirectional causality from portfolio investment to current account deficit. The challenge with this result is that portfolio investment is volatile and subject to sudden stops and reversals. This can potentially destabilise the country as the economy is exposed to external shocks.

A unidirectional causality is observed from current account deficit to both long term capital and short term capital at 5% and 10% level of significance, respectively. This implies that the current account deficits are mainly being financed from debt creating flows as opposed to the much preferred FDI. This implies that the country is accumulating foreign debt. The challenge with this kind of scenario is that the country cannot continuously borrow in the long run in the event that the current account deficit does not retreat. There is a limit to which the country can borrow. In other works, the country will need to make an adjustment such as devaluation of the exchange rate or reducing absorption in order to curtail the import demand to be come sustainable.

There is, however, bidirectional causality between short term capital flows and imports. Given that there is bidirectional causality between short term capital flows and imports and the fact that it is the capital account which granger causes the current account, it cannot be concluded, therefore, that the current account deficit is induced by speculative-led investment. As such, there is no basis for exchange controls and in particular capital controls in order to limit the speculative capital inflows. Given the liquidity challenges in the economy, any attempt to limit the capital inflows would further exacerbate these liquidity challenges.

4.9 Conclusion

From the above results, it can generally be concluded that the country’s current account balance has been following an unsustainable path. This is largely because, the current account deficits violets the country’s IBC. The other challenge that is clear from the obtained results is that the current account deficits are mainly driven by debt creating capital flows compared to non debt-creating foreign direct investment.
This implies that if the country continues to run current account deficits, it will be forced in future to make a painful adjustment such as reducing the absorption and this will be too costly for the economy as the economy will slow down. In addition, the persistent current account deficits will further strain the liquidity situation in the economy.
CHAPTER FIVE

5. Conclusion and Policy Recommendations

5.1 Introduction

The study sought to understand dynamics of Zimbabwe’s capital flows and current account deficits. In particular, the main objective of the study was to investigate whether the current account deficit in Zimbabwe is sustainable or not. In addition, the study explored the causality between the current account and the capital account balance. The study was mainly motivated by the concern that the country could be on an unsustainable path based on the persistent and ever rising current account deficits. Moreover, the country has been contracting debt in order to finance the balance of payment deficits, which debt may become unsustainable thus limiting the country’s ability to continue borrowing in future. The study also sought to understand how the behavior of capital flows affected the current account balance.

5.2 Summary of Findings

The study amply demonstrated that Zimbabwe violates its long run IBC implying that the country’s current account deficits are not sustainable. The results of the ADF test indicated that the current account deficit to GDP ratio is a non stationary series implying that the current account deficit follows an unsustainable path. These results were also confirmed by the DF GLS, PP test, and KPSS tests.

Although the co integration relationship indicated that there is a long run relationship between the exports and imports of goods and services, the Wald Coefficient Restriction test on the co integration equation produced contrary results to this. The results indicated that the current account deficit follows an explosive process implying that it is unsustainable. The error correction model indicated that an adjustment of 3% is required to make the current account sustainable.
The study also analyzed the effect of errors and omission on current account sustainability. The study ruled out the possibility of the current account becoming sustainable if the errors and omissions are reduced.

The grander causality tests also produced interesting results. The study established that the current account deficits granger causes the capital flows. The current account deficit reflects the underlying challenges in the economy typified by pronounced supply gaps as a result of widespread company closers due to viability challenges and lack of competitiveness. These adverse external sector developments also exacerbate the liquidity challenges in the economy weighing down the country’s growth prospects.

The study also established that the capital inflows are not due to speculative investment which can be detrimental to the economy in the event of reversal or sudden stops. This is quite plausible given the country risk and uncertainty in the economy at the moment. This implies that there is no basis at the moment to consider strengthening capital controls to prevent an upsurge in capital inflows driven by speculative motive. However, there is basis to encourage off shore loans which are on long term basis as these encourage investment in plant and machinery.

5.3 Policy Recommendations

Given the unsustainable current account deficit, and the attendant liquidity challenges obtaining in the economy, there is need for active policies aimed at easing pressure on the current account. One of the policy options would have been to devalue the currency in order to discourage the high import demand and to promote exports. However, this option is no longer feasible given that the country is now in a de facto dollarization. Moreover, the manufacturing sector has shrunk such that there is very limited scope for export growth.

Although the country is receiving a significant amount of capital flows, this is more of short term debt which is not conducive to sustainable economic growth. Besides, the country cannot continue to borrow indefinitely into the distant future as these is a limit to which the country can borrow. However, since the current account deficit reflects the structural challenges in the economy, there is need to address the structural bottlenecks in the economy.
One important area the government needs to focus on is to increase FDI which is more long term and conducive to sustainable economic growth. Thus the country needs to revisit its investment laws to make the country a better investment destination. Once the country is able to attract more FDI, this will be a springboard to sustainable economic growth. An increase in FDI will result in increased output and a reduction in supply gaps in the economy thereby lessening our import dependency. The country will also be able to honor the international obligation thus putting the country back on the investment map.

In addition, the country needs to ensure that the offshore loans are on a long term basis compared to the short term loans. This is largely because the long term loans encourage investment in plant and machinery. The increase in investment in plant and machinery not only helps build capacity in the economy, but is critical to help companies improve their competitiveness by using modern production techniques.

The other important area of focus will be the budget performance. The current account deficit was also attributed to the underlying challenges in the economy including the budget deficit experienced over the crisis period. As such, there is need to reduce the fiscal slippages in order to lessen the need for borrowing especially for recurrent expenditure. This is particularly important given that the country is already grappling with a huge debt overhang.

### 5.4 Areas for Further Study

The study analysed current account dynamics and the granger causality between the current and capital account in Zimbabwe. The primary objective of the study was to assess whether Zimbabwe’s current account deficit is sustainable or not. For a complete picture on sustainability of the country, there is need to also analyse the sustainability of the fiscal balance. In addition, in order to fully comprehend the current account dynamics, there is also need to look at the determinants of the current account imbalances in Zimbabwe which areas were not covered in this particular study.
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APPENDICES

UNIT ROOT TEST RESULTS

Null Hypothesis: CA_GDPR has a unit root  
Exogenous: Constant  
Lag Length: 2 (Automatic based on SIC, MAXLAG=5)

<table>
<thead>
<tr>
<th>Augmented Dickey-Fuller test statistic</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>1.529692</td>
<td>0.9987</td>
</tr>
</tbody>
</table>

Test critical values:  
1% level -3.788030  
5% level -3.012363  
10% level -2.646119


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CA_GDPR)
Method: Least Squares  
Date: 05/07/14   Time: 10:18
Sample (adjusted): 1993 2013  
Included observations: 21 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA_GDPR(-1)</td>
<td>0.321904</td>
<td>0.210437</td>
<td>1.529692</td>
<td>0.1445</td>
</tr>
<tr>
<td>D(CA_GDPR(-1))</td>
<td>-0.891264</td>
<td>0.251188</td>
<td>-3.548197</td>
<td>0.0025</td>
</tr>
<tr>
<td>D(CA_GDPR(-2))</td>
<td>-0.794623</td>
<td>0.226613</td>
<td>-3.506521</td>
<td>0.0027</td>
</tr>
<tr>
<td>C</td>
<td>0.006385</td>
<td>0.021508</td>
<td>0.296846</td>
<td>0.7702</td>
</tr>
</tbody>
</table>

R-squared 0.522804  
Mean dependent var -0.007429

Adjusted R-squared 0.438593  
S.D. dependent var 0.074081

S.E. of regression 0.055507  
Akaike info criterion -2.774969

Sum squared resid 0.052378  
Schwarz criterion -2.576012

Log likelihood 33.13717  
F-statistic 6.208249

Durbin-Watson stat 1.707076  
Prob(F-statistic) 0.004823

Null Hypothesis: CA_GDPR has a unit root  
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on SIC, MAXLAG=5)

<table>
<thead>
<tr>
<th></th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-0.561479</td>
<td>0.9708</td>
</tr>
<tr>
<td>Test critical values:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-4.467895</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-3.644963</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-3.261452</td>
<td></td>
</tr>
</tbody>
</table>


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CA_GDPR)
Method: Least Squares
Date: 05/07/14   Time: 10:19
Sample (adjusted): 1993 2013
Included observations: 21 after adjustments

<table>
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<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA_GDPR(-1)</td>
<td>-0.145593</td>
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<td>0.5823</td>
</tr>
<tr>
<td>D(CA_GDPR(-1))</td>
<td>-0.632139</td>
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<td>-2.622813</td>
<td>0.0185</td>
</tr>
<tr>
<td>D(CA_GDPR(-2))</td>
<td>-0.649963</td>
<td>0.205114</td>
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<tr>
<td>C</td>
<td>0.049685</td>
<td>0.025286</td>
<td>1.964927</td>
<td>0.0670</td>
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<tr>
<td>@TRENDS(1990)</td>
<td>-0.006555</td>
<td>0.002576</td>
<td>-2.544942</td>
<td>0.0216</td>
</tr>
</tbody>
</table>

R-squared 0.660309  Mean dependent var -0.007429
Adjusted R-squared 0.575386  S.D. dependent var 0.074081
S.E. of regression 0.048273  Akaike info criterion -3.019623
Sum squared resid 0.037285  Schwarz criterion -2.770927
Log likelihood 36.70604  F-statistic 7.775409
Durbin-Watson stat 1.955466  Prob(F-statistic) 0.001114
Null Hypothesis: $D(CA_{GDPR})$ has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=5)

<table>
<thead>
<tr>
<th></th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-7.093185</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -3.788030
- 5% level: -3.012363
- 10% level: -2.646119


Augmented Dickey-Fuller Test Equation
Dependent Variable: $D(CA_{GDPR},2)$
Method: Least Squares
Date: 05/07/14   Time: 10:20
Sample (adjusted): 1993 2013
Included observations: 21 after adjustments

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<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
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<td>$D(CA_{GDPR}(-1))$</td>
<td>-2.211882</td>
<td>0.311832</td>
<td>-7.093185</td>
<td>0.0000</td>
</tr>
<tr>
<td>$D(CA_{GDPR}(-1),2)$</td>
<td>0.589350</td>
<td>0.189283</td>
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<td>0.0060</td>
</tr>
<tr>
<td>C</td>
<td>-0.020342</td>
<td>0.013002</td>
<td>-1.564504</td>
<td>0.1351</td>
</tr>
</tbody>
</table>

R-squared: 0.808638  Mean dependent var: 0.001143
Adjusted R-squared: 0.787376  S.D. dependent var: 0.124777
S.E. of regression: 0.057536  Akaike info criterion: -2.741247
Sum squared resid: 0.059587  Schwarz criterion: -2.592030
Log likelihood: 31.78309  F-statistic: 38.03133
Durbin-Watson stat: 1.512556  Prob(F-statistic): 0.000000
Null Hypothesis: D(CA_GDPR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 5 (Automatic based on SIC, MAXLAG=5)

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<th>Augmented Dickey-Fuller test statistic</th>
<th>t-Statistic</th>
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<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-3.828672</td>
<td>0.0407</td>
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</tbody>
</table>

Test critical values:
- 1% level: -4.616209
- 5% level: -3.710482
- 10% level: -3.297799

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 17

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CA_GDPR,2)
Method: Least Squares
Date: 05/07/14   Time: 10:21
Sample (adjusted): 1997 2013
Included observations: 17 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CA_GDPR(-1))</td>
<td>-6.001368</td>
<td>1.567480</td>
<td>-3.828672</td>
<td>0.0040</td>
</tr>
<tr>
<td>D(CA_GDPR(-1),2)</td>
<td>4.351400</td>
<td>1.445392</td>
<td>3.010534</td>
<td>0.0147</td>
</tr>
<tr>
<td>D(CA_GDPR(-2),2)</td>
<td>2.925239</td>
<td>1.194123</td>
<td>2.449696</td>
<td>0.0368</td>
</tr>
<tr>
<td>D(CA_GDPR(-3),2)</td>
<td>2.418541</td>
<td>0.911719</td>
<td>2.652726</td>
<td>0.0264</td>
</tr>
<tr>
<td>D(CA_GDPR(-4),2)</td>
<td>1.178454</td>
<td>0.535696</td>
<td>2.199855</td>
<td>0.0554</td>
</tr>
<tr>
<td>D(CA_GDPR(-5),2)</td>
<td>0.824821</td>
<td>0.326350</td>
<td>2.527413</td>
<td>0.0324</td>
</tr>
<tr>
<td>C</td>
<td>0.133325</td>
<td>0.053120</td>
<td>2.509905</td>
<td>0.0333</td>
</tr>
<tr>
<td>@TREND(1990)</td>
<td>-0.012509</td>
<td>0.004131</td>
<td>-3.028199</td>
<td>0.0143</td>
</tr>
</tbody>
</table>

R-squared         0.943907  Mean dependent var -0.003882
Adjusted R-squared 0.900279  S.D. dependent var  0.133847
S.E. of regression 0.042267  Akaike info criterion -3.184421
Sum squared resid  0.016079  Schwarz criterion -2.792321
Log likelihood    35.06758   F-statistic          21.63529
Durbin-Watson stat 1.314626  Prob(F-statistic)  0.000060
Null Hypothesis: CA_GDPR has a unit root

Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=5)

<table>
<thead>
<tr>
<th>t-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elliott-Rothenberg-Stock DF-GLS test statistic</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test critical values:</th>
<th>1% level</th>
<th>5% level</th>
<th>10% level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-3.770000</td>
<td>-3.190000</td>
<td>-2.890000</td>
</tr>
</tbody>
</table>

*Elliott-Rothenberg-Stock (1996, Table 1)*

Warning: Test critical values calculated for 50 observations and may not be accurate for a sample size of 23

DF-GLS Test Equation on GLS Detrended Residuals
Dependent Variable: D(GLSRESID)
Method: Least Squares
Date: 04/03/14   Time: 09:56
Sample (adjusted): 1991 2013
Included observations: 23 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLSRESID(-1)</td>
<td>-0.617617</td>
<td>0.202171</td>
<td>-3.054922</td>
<td>0.0058</td>
</tr>
</tbody>
</table>

R-squared            0.297409   Mean dependent var -0.001767
Adjusted R-squared   0.297409   S.D. dependent var 0.071702
S.E. of regression   0.060101   Akaike info criterion -2.743080
Sum squared resid    0.079467   Schwarz criterion -2.693711
Log likelihood       32.54542   Durbin-Watson stat 2.042115
Null Hypothesis: D(CA_GDPR) has a unit root

Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=5)

<table>
<thead>
<tr>
<th>t-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elliott-Rothenberg-Stock DF-GLS test statistic</td>
</tr>
<tr>
<td>Test critical values:</td>
</tr>
<tr>
<td>1% level</td>
</tr>
<tr>
<td>5% level</td>
</tr>
<tr>
<td>10% level</td>
</tr>
</tbody>
</table>

*MacKinnon (1996)

DF-GLS Test Equation on GLS Detrended Residuals
Dependent Variable: D(GLSRESID)
Method: Least Squares
Date: 04/03/14   Time: 10:02
Sample (adjusted): 1993 2013
Included observations: 21 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLSRESID(-1)</td>
<td>-2.121772</td>
<td>0.318148</td>
<td>-6.669132</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(GLSRESID(-1))</td>
<td>0.549493</td>
<td>0.194696</td>
<td>2.822321</td>
<td>0.0109</td>
</tr>
</tbody>
</table>

R-squared 0.782383  Mean dependent var 0.001143
Adjusted R-squared 0.770930  S.D. dependent var 0.124777
S.E. of regression 0.059720  Akaike info criterion -2.707915
Sum squared resid 0.067763  Schwarz criterion -2.608437
Log likelihood 30.43311  Durbin-Watson stat 1.448558
Null Hypothesis: D(CA_GDPR) has a unit root

Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=5)

**Elliot-Rothenberg-Stock DF-GLS test statistic**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLSRESID(-1)</td>
<td>-2.363257</td>
<td>0.280057</td>
<td>-8.438478</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(GLSRESID(-1))</td>
<td>0.672424</td>
<td>0.168883</td>
<td>3.981604</td>
<td>0.0008</td>
</tr>
</tbody>
</table>

R-squared 0.846702
Adjusted R-squared 0.838633
S.E. of regression 0.050123
Sum squared resid 0.047735
Log likelihood 34.11179

Warning: Test critical values calculated for 50 observations and may not be accurate for a sample size of 21

*Elliott-Rothenberg-Stock (1996, Table 1)*

DF-GLS Test Equation on GLS Detrended Residuals
Dependent Variable: D(GLSRESID)
Method: Least Squares
Date: 04/03/14   Time: 10:04
Sample (adjusted): 1993 2013
Included observations: 21 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLSRESID(-1)</td>
<td>-2.363257</td>
<td>0.280057</td>
<td>-8.438478</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(GLSRESID(-1))</td>
<td>0.672424</td>
<td>0.168883</td>
<td>3.981604</td>
<td>0.0008</td>
</tr>
</tbody>
</table>

R-squared 0.846702
Adjusted R-squared 0.838633
S.E. of regression 0.050123
Sum squared resid 0.047735
Log likelihood 34.11179
Null Hypothesis: CA_GDPR has a unit root

Exogenous: None
Bandwidth: 19 (Newey-West using Bartlett kernel)

<table>
<thead>
<tr>
<th>Phillips-Perron test statistic</th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.253460</td>
<td>0.5838</td>
<td></td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -2.669359
- 5% level: -1.956406
- 10% level: -1.608495


Residual variance (no correction): 0.004994
HAC corrected variance (Bartlett kernel): 0.004245

Phillips-Perron Test Equation
Dependent Variable: D(CA_GDPR)
Method: Least Squares
Date: 04/03/14   Time: 09:57
Sample (adjusted): 1991 2013
Included observations: 23 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA_GDPR(-1)</td>
<td>-0.053149</td>
<td>0.121257</td>
<td>-0.438319</td>
<td>0.6654</td>
</tr>
</tbody>
</table>

R-squared: -0.015543
Adjusted R-squared: -0.015543
S.E. of regression: 0.072257
Sum squared resid: 0.114863
Log likelihood: 28.30878

Mean dependent var: -0.010957
S.D. dependent var: 0.071702
Akaike info criterion: -2.374677
Schwarz criterion: -2.325307
Durbin-Watson stat: 2.575521
Null Hypothesis: CA_GDPR has a unit root
Exogenous: Constant
Bandwidth: 5 (Newey-West using Bartlett kernel)

<table>
<thead>
<tr>
<th>Phillips-Perron test statistic</th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips-Perron test statistic</td>
<td>-1.535909</td>
<td>0.4980</td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -3.752946
- 5% level: -2.998064
- 10% level: -2.638752


Residual variance (no correction): 0.004402
HAC corrected variance (Bartlett kernel): 0.004279

Phillips-Perron Test Equation
Dependent Variable: D(CA_GDPR)
Method: Least Squares
Date: 04/03/14  Time: 09:59
Sample (adjusted): 1991 2013
Included observations: 23 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA_GDPR(-1)</td>
<td>-0.279000</td>
<td>0.177840</td>
<td>-1.568825</td>
<td>0.1316</td>
</tr>
<tr>
<td>C</td>
<td>-0.037146</td>
<td>0.022097</td>
<td>-1.681031</td>
<td>0.1076</td>
</tr>
</tbody>
</table>

R-squared: 0.104906  Mean dependent var: -0.010957
Adjusted R-squared: 0.062282  S.D. dependent var: 0.071702
S.E. of regression: 0.069433  Akaike info criterion: -2.413969
Sum squared resid: 0.101240  Schwarz criterion: -2.315231
Log likelihood: 29.76065  F-statistic: 2.461213
Durbin-Watson stat: 2.311034  Prob(F-statistic): 0.131635
Null Hypothesis: CA_GDPR has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West using Bartlett kernel)

<table>
<thead>
<tr>
<th>Phillips-Perron test statistic</th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips-Perron test statistic</td>
<td>-2.887578</td>
<td>0.1840</td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -4.416345
- 5% level: -3.622033
- 10% level: -3.248592


<table>
<thead>
<tr>
<th>Residual variance (no correction)</th>
<th>0.003433</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAC corrected variance (Bartlett kernel)</td>
<td>0.003499</td>
</tr>
</tbody>
</table>

Phillips-Perron Test Equation
Dependent Variable: D(CA_GDPR)
Method: Least Squares
Date: 04/03/14   Time: 10:00
Sample (adjusted): 1991 2013
Included observations: 23 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA_GDPR(-1)</td>
<td>-0.615068</td>
<td>0.214240</td>
<td>-2.870928</td>
<td>0.0094</td>
</tr>
<tr>
<td>C</td>
<td>0.006283</td>
<td>0.027090</td>
<td>0.231931</td>
<td>0.8189</td>
</tr>
<tr>
<td>@TREND(1990)</td>
<td>-0.006248</td>
<td>0.002629</td>
<td>-2.376249</td>
<td>0.0276</td>
</tr>
</tbody>
</table>

R-squared 0.301977   Mean dependent var -0.010957
Adjusted R-squared 0.232175   S.D. dependent var 0.071702
S.E. of regression 0.062829   Akaike info criterion -2.575690
Sum squared resid 0.078950   Schwarz criterion -2.427582
Log likelihood 32.62043   F-statistic 4.326177
Durbin-Watson stat 2.061027   Prob(F-statistic) 0.027460
Null Hypothesis: $D(\text{CA}_\text{GDPR})$ has a unit root
Exogenous: None
Bandwidth: 21 (Newey-West using Bartlett kernel)

<table>
<thead>
<tr>
<th>Phillips-Perron test statistic</th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-6.960951</td>
<td>0.0000</td>
<td></td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -2.674290
- 5% level: -1.957204
- 10% level: -1.608175


| Residual variance (no correction) | 0.004528 |
| HAC corrected variance (Bartlett kernel) | 0.003700 |

Phillips-Perron Test Equation
Dependent Variable: $D(\text{CA}_\text{GDPR},2)$
Method: Least Squares
Date: 04/03/14  Time: 10:07
Sample (adjusted): 1992 2013
Included observations: 22 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D(\text{CA}_\text{GDPR}(-1))$</td>
<td>-1.362237</td>
<td>0.203545</td>
<td>-6.692556</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared             0.680804  Mean dependent var -9.09E-05
Adjusted R-squared    0.680804  S.D. dependent var 0.121907
S.E. of regression    0.068874  Akaike info criterion -2.468676
Sum squared resid     0.099617  Schwarz criterion -2.419084
Log likelihood        28.15544  Durbin-Watson stat 2.357527
Null Hypothesis: D(CA_GDPR) has a unit root
Exogenous: Constant
Bandwidth: 15 (Newey-West using Bartlett kernel)

<table>
<thead>
<tr>
<th>Phillips-Perron test statistic</th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test critical values:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-3.769597</td>
<td>0.0000</td>
</tr>
<tr>
<td>5% level</td>
<td>-3.004861</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-2.642242</td>
<td></td>
</tr>
</tbody>
</table>


| Residual variance (no correction) | 0.004345 |
| HAC corrected variance (Bartlett kernel) | 0.001661 |

Phillips-Perron Test Equation
Dependent Variable: D(CA_GDPR,2)
Method: Least Squares
Date: 04/03/14   Time: 10:06
Sample (adjusted): 1992 2013
Included observations: 22 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CA_GDPR(-1))</td>
<td>-1.387876</td>
<td>0.206214</td>
<td>-6.730273</td>
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</tr>
<tr>
<td>C</td>
<td>-0.013654</td>
<td>0.014877</td>
<td>-0.917834</td>
<td>0.3696</td>
</tr>
</tbody>
</table>

R-squared 0.693705
Adjusted R-squared 0.678391
S.E. of regression 0.069134
Sum squared resid 0.095591
Log likelihood 28.60928
Durbin-Watson stat 2.431725

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Mean dependent var</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D. dependent var</td>
<td>0.013654</td>
<td>Mean dependent var</td>
<td>0.3696</td>
</tr>
<tr>
<td>Akaike info criterion</td>
<td>0.069134</td>
<td>Akaike info criterion</td>
<td>-2.419025</td>
</tr>
<tr>
<td>Schwarz criterion</td>
<td>0.095591</td>
<td>Schwarz criterion</td>
<td>-2.319840</td>
</tr>
<tr>
<td>F-statistic</td>
<td>28.60928</td>
<td>F-statistic</td>
<td>45.29658</td>
</tr>
<tr>
<td>Probi(F-statistic)</td>
<td>2.431725</td>
<td>Probi(F-statistic)</td>
<td>0.000002</td>
</tr>
</tbody>
</table>
Null Hypothesis: D(CA_GDPR) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 9 (Newey-West using Bartlett kernel)

<table>
<thead>
<tr>
<th>Phillips-Perron test statistic</th>
<th>Adj. t-Stat</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips-Perron test statistic</td>
<td>-13.36238</td>
<td>0.0000</td>
</tr>
<tr>
<td>Test critical values:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-4.440739</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-3.632896</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-3.254671</td>
<td></td>
</tr>
</tbody>
</table>


| Residual variance (no correction) | 0.004151 |
| HAC corrected variance (Bartlett kernel) | 0.000567 |

Phillips-Perron Test Equation
Dependent Variable: D(CA_GDPR,2)
Method: Least Squares
Date: 04/03/14   Time: 10:08
Sample (adjusted): 1992 2013
Included observations: 22 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CA_GDPR(-1))</td>
<td>-1.407143</td>
<td>0.207789</td>
<td>-6.771979</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>0.013765</td>
<td>0.032668</td>
<td>0.421354</td>
<td>0.6782</td>
</tr>
<tr>
<td>@TREND(1990)</td>
<td>-0.002209</td>
<td>0.002341</td>
<td>-0.943433</td>
<td>0.3573</td>
</tr>
</tbody>
</table>

R-squared                  | 0.707412     | Mean dependent var | -9.09E-05 |
Adjusted R-squared         | 0.676613     | S.D. dependent var  | 0.121907  |
S.E. of regression         | 0.069325     | Akaike info criterion | -2.373898 |
Sum squared resid          | 0.091313     | Schwarz criterion   | -2.225119 |
Log likelihood             | 29.11287     | F-statistic         | 22.96883  |
Durbin-Watson stat         | 2.532825     | Prob(F-statistic)   | 0.000009  |
Null Hypothesis: CA_GDPR is stationary  
Exogenous: Constant  
Bandwidth: 3 (Newey-West using Bartlett kernel)  

<table>
<thead>
<tr>
<th>LM-Stat.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kwiatkowski-Phillips-Schmidt-Shin test statistic</td>
</tr>
<tr>
<td>Asymptotic critical values*:</td>
</tr>
<tr>
<td>1% level</td>
</tr>
<tr>
<td>5% level</td>
</tr>
<tr>
<td>10% level</td>
</tr>
</tbody>
</table>

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction) | 0.007750 |
HAC corrected variance (Bartlett kernel) | 0.019879 |

KPSS Test Equation  
Dependent Variable: CA_GDPR  
Method: Least Squares  
Date: 04/03/14   Time: 10:09  
Sample: 1990 2013  
Included observations: 24

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-0.101667</td>
<td>0.018356</td>
<td>-5.538652</td>
<td>0.0000</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.000000</td>
<td>Mean dependent var</td>
<td>-0.101667</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.000000</td>
<td>S.D. dependent var</td>
<td>0.089925</td>
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</tr>
<tr>
<td>S.E. of regression</td>
<td>0.089925</td>
<td>Akaike info criterion</td>
<td>-1.938909</td>
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<tr>
<td>Sum squared resid</td>
<td>0.185989</td>
<td>Schwarz criterion</td>
<td>-1.889824</td>
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<tr>
<td>Log likelihood</td>
<td>24.26691</td>
<td>Durbin-Watson stat</td>
<td>0.622971</td>
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</tr>
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</table>

Null Hypothesis: CA_GDPR is stationary  
Exogenous: Constant, Linear Trend  
Bandwidth: 2 (Newey-West using Bartlett kernel)  

<table>
<thead>
<tr>
<th>LM-Stat.</th>
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<tr>
<td>Kwiatkowski-Phillips-Schmidt-Shin test statistic</td>
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<tr>
<td>Asymptotic critical values*:</td>
</tr>
<tr>
<td>1% level</td>
</tr>
<tr>
<td>5% level</td>
</tr>
<tr>
<td>10% level</td>
</tr>
</tbody>
</table>

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)
Residual variance (no correction) 0.003868
HAC corrected variance (Bartlett kernel) 0.006189

KPSS Test Equation
Dependent Variable: CA_GDPR
Method: Least Squares
Date: 04/03/14   Time: 10:10
Sample: 1990 2013
Included observations: 24

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.001843</td>
<td>0.025710</td>
<td>0.071697</td>
<td>0.9435</td>
</tr>
<tr>
<td>@TREND(1990)</td>
<td>-0.009001</td>
<td>0.001915</td>
<td>-4.699166</td>
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</table>

R-squared 0.500932  Mean dependent var -0.101667
Adjusted R-squared 0.478247  S.D. dependent var 0.089925
S.E. of regression 0.064955  Akaike info criterion -2.550589
Sum squared resid 0.092821  Schwarz criterion -2.452418
Log likelihood 32.60707  F-statistic 22.08217
Durbin-Watson stat 1.219471  Prob(F-statistic) 0.000109
CO INTEGRATION TEST RESULTS

Date: 03/24/14   Time: 15:01
Sample (adjusted): 1992 2013
Included observations: 22 after adjustments
Trend assumption: Linear deterministic trend
Series: EXPORTS_GS IMPORTS_GS
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

<table>
<thead>
<tr>
<th>Hypothesized No. of CE(s)</th>
<th>Eigenvalue</th>
<th>Trace Statistic</th>
<th>0.05 Critical Value</th>
<th>Prob.**</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.505189</td>
<td>16.71557</td>
<td>15.49471</td>
<td>0.0326</td>
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<tr>
<td>At most 1</td>
<td>0.054668</td>
<td>1.236815</td>
<td>3.841466</td>
<td>0.2661</td>
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</tbody>
</table>

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

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

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<th>Hypothesized No. of CE(s)</th>
<th>Eigenvalue</th>
<th>Max-Eigen Statistic</th>
<th>0.05 Critical Value</th>
<th>Prob.**</th>
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<tbody>
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<tr>
<td>At most 1</td>
<td>0.054668</td>
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<td>3.841466</td>
<td>0.2661</td>
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</table>

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

Unrestricted Cointegrating Coefficients (normalized by $b^*S11*b=I$):

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<thead>
<tr>
<th>EXPORTS_GS</th>
<th>IMPORTS_GS</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.003246</td>
<td>0.001202</td>
</tr>
<tr>
<td>-0.000538</td>
<td>0.000892</td>
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</tbody>
</table>

Unrestricted Adjustment Coefficients (alpha):

| D(EXPORTS_GS) | 336.3430 | -22.69791 |
| D(IMPORTS_GS) | 485.7821 | 66.84812 |

1 Cointegrating Equation(s):

| Log likelihood | -323.4075 |

Normalized cointegrating coefficients (standard error in parentheses)
**Adjusment coefficients (standard error in parentheses)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
<tr>
<td>C</td>
<td>-0.014133</td>
<td>0.030264</td>
<td>-0.466985</td>
<td>0.6453</td>
</tr>
<tr>
<td>DLOG(IMPORTS_GS)</td>
<td>0.690047</td>
<td>0.160581</td>
<td>4.297181</td>
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</tbody>
</table>

**REGRESSION TEST**

Dependent Variable: DLOG(EXPORTS_GS)

Method: Least Squares

Date: 04/15/14   Time: 17:42

Sample (adjusted): 1991 2013

Included observations: 23 after adjustments

R-squared 0.467893  Mean dependent var 0.028072

Adjusted R-squared 0.442555  S.D. dependent var 0.183878

S.E. of regression 0.137288  Akaike info criterion -1.050534

Sum squared resid 0.395806  Schwarz criterion -0.951795

Log likelihood 14.08114  F-statistic 18.46577

Durbin-Watson stat 2.003657  Prob(F-statistic) 0.000319
WALD COEFFICIENT RESTRICTION TEST

Wald Test:
Equation: Untitled

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<tr>
<th>Test Statistic</th>
<th>Value</th>
<th>df</th>
<th>Probability</th>
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<td>F-statistic</td>
<td>0.218075</td>
<td>(1, 21)</td>
<td>0.6453</td>
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<tr>
<td>Chi-square</td>
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Null Hypothesis Summary:

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<th>Value</th>
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</thead>
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<td>C(1)</td>
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<td>0.030264</td>
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Restrictions are linear in coefficients.

ERROR CORRECTION MODEL

Dependent Variable: DLOG(EXPORTS_GS)
Method: Least Squares
Date: 04/16/14   Time: 09:29
Sample (adjusted): 1992 2013
Included observations: 22 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
<tr>
<td>C</td>
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<td>0.325920</td>
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<td>0.206999</td>
<td>1.916716</td>
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<tr>
<td>RESID01(-1)</td>
<td>-0.030223</td>
<td>0.014525</td>
<td>-2.080780</td>
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</tbody>
</table>

R-squared 0.567062   Mean dependent var 0.030498
Adjusted R-squared 0.521489   S.D. dependent var 0.187829
S.E. of regression 0.129929   Akaike info criterion -1.117527
Sum squared resid   0.320751   Schwarz criterion -0.968748
Log likelihood 15.29280   F-statistic 12.44307
Durbin-Watson stat 1.909348   Prob(F-statistic) 0.000352
PAIRWISE GRANGER CAUSALITY TESTS RESULTS

Pairwise Granger Causality Tests
Date: 04/15/14   Time: 17:54
Sample: 1990 2013
Lags: 5

<table>
<thead>
<tr>
<th>Null Hypothesis:</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Probability</th>
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</thead>
<tbody>
<tr>
<td>CA_NET does not Granger Cause KA</td>
<td>19</td>
<td>5.43759</td>
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<td>PTFLIO_IN does not Granger Cause KA</td>
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<td>KA does not Granger Cause PTFLIO_IN</td>
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<td>LTC_IN does not Granger Cause KA</td>
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<td>KA does not Granger Cause LTC_IN</td>
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<tr>
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