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Investigating an Effective De-Dollarisation Strategy for Zimbabwe

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DECLARATION

I, the undersigned, do hereby declare that this Dissertation is a result of my own original research and that no part of it has been presented for examination in any other University.

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ABSTRACT

The main aim of this study was to investigate an effective de-dollarisation strategy for Zimbabwe and establish the probability of successfully dollarisation. The study is motivated by a background of piecemeal interventions to establish an effective monetary regime to address competitiveness challenges related to currency overvaluation and the persistent liquidity crunch. In the absence of a conventional de-dollarisation strategy, the study sought to establish a probable framework of de-dollarising the Zimbabwean monetary regime. Ordinary Least Squares regression analysis was used to determine factors that induce de-dollarisation while Probit regression analysis was used to establish the probability of successfully de-dollarising, using time series data over the period 1980 to 2016. The study findings were consistent with the Institutional, Portfolio and Market Views showing that fiscal balance, current account balance, debt and institutions and gross domestic product are key in inducing successful de-dollarisation for Zimbabwe. De-dollarisation in itself is not a policy objective but rather a means to an end. As such a successful de-dollarisation strategy should comprise a comprehensive mix of structural reforms that address the macroeconomic environment to ensure a positive fiscal balance, positive current account balance and improvement on the global debt position. Complementary sound market based incentives and micro prudential measures, and an overhaul of the institutional make up also constitute this framework. Notwithstanding the fact that de-dollarisation requires time needing persistent and well coordinated efforts, making implementation dynamics such as policy sequencing a critical component of the successful de-dollarisation strategy. However the odds ratio in favour of a successful dedollarisation outcome for Zimbabwe is predicted at 42%, implying poor chances of success of this policy objective. Therefore considerations of addressing the internal and external balances of the economy; outside the currency mix with a view to improve productivity could bring long term solutions. The government of Zimbabwe is urged to pursue evidence based economic policies to guide the country's economic trajectory.

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LIST OF ACRONYMS

ADF	AUGUMENTED DICKEY FULLER TEST
AFREXIMBANK	AFRICAN –EXPORT-IMPORT-BANK
AFRODAD	AFRICAN FORUM ON DEBT AND DEVELOPMENT
BOP	BALANCE OF PAYMENTS
CCA	CAUCASUS CENTRAL ASIAN COUNTRIES
CDF	CUMULATIVE DISTRIBUTION FUNCTION
CLRM	CLASSICAL LINERA REGRESSION MODEL
CS	CURRENCY SUBSTITUTION
CSO	CENTRAL STATISTICAL OFFICE
ESAP	ECONOMIC STRUCTURAL ADJUSTMENT PROGRAMME
FE	FIXED EFFECTS
FOLIWARS	FOREIGN EXCHANGE LICENSED WAREHOUSES AND SHOPS
GDP	GROSS DOMESTIC PRODUCT
GLS	GENERALISED LEAST SQUARES METHOD (GLS)
GMM	GENERAL METHOD OF MOMENTS
GNU	GOVERNMENT OF NATIONAL UNITY
IMF	INTERNATIONAL MONETARY FUND
OLS	ORDINARY LEAST SQUARES
RBZ	RESERVE BANK OF ZIMBABWE
RE	RANDOM EFFECTS
RESET	RAMSEY REGRESSION EQUATION SPECIFICATION ERROR TEST
TBS	TREASURY BILLS
TFCB	TRADABLE FOREIGN CURRENCY BALANCES SYSTEM
RTGS	REAL TIME GROSS SETTLEMENT SYSTEM
USD	UNITED STATES OF AMERICAN DOLLAR

CHAPTER ONE

1.0 INTRODUCTION

In view of the evolution of the exchange rate system over the past three decades end of the, there arises a new dilemma facing many economies of finding a workable currency arrangement which has become more exigent, more so as world trade and capital markets have become more integrated. Evidently, in recent times several emerging economies experienced severe financial crises, leading to the acknowledgement of a need to revise exchange rate and monetary policy, taking into account more specifically the conditions under which these countries operate. As the global financial system has evolved a new phenomenon in the form of dollarisation which has been subsequently mirrored by reverse dollarisation or dedollarisation. Dollarization refers to a country abandoning its own currency in favour of a more stable as its legal tender (Balinho *et al.*, 1999)¹. Dollarization can be official, unofficial, partial or full. Unofficial (de facto) dollarization results from economic agents preferring to use foreign currency as for transactional convenience (currency substitution) or for portfolio balancing (asset substitution) (Feige and Dean, 2003). It is differentiated from official (or de jure) where foreign currency is given (typically exclusive) legal tender status. The opposite is true for dedollarisation.

However the key distinguishing feature of dollarisation is that it is permanent, or nearly so, rendering the phenomenon relatively difficult to reverse (de-dollarize). On one hand the largest motivation attributable to dollarisation is credibility which makes dedollarisation a challenging move. On the other hand dollarization can pose important challenges to policymakers as it constrains the capacity of monetary authorities to act as a lender of last resort; hampers banks' liquidity management; and weakens the stability of the financial sector, as it may amplify the impact of exchange rate movements on banks' balance sheets, thereby increasing the risk of contractionary effects and bank failure, thereby complicating the implementation of economic policies through various channels (Mecagni and Mauro, 2015). ²This has led to an emergence of a de-dollarization phenomenon which seeks to

¹ Dollarization is the use of foreign currencies as a medium of exchange, store of value, or unit of account is a notable feature of financial development under macro-economically fragile conditions (Mecagni, et al, 2015).

² Cases of failed de-dollarisation have been linked to countries that experienced severe hyperinflation prior to dollarization as shown by Reding and Morales (1999) Mueller (1994) for Bolivia; Lebanon Mongardin and Mueller (1999), Mexico, Uruguay and Peru (Kamin and Ericsson (1993) and Argentina (Clements and Schwarke, 1998) while those countries that were characterised by moderate rates of inflation, dollarisation has been considered easier to reverse such as Chile, Egypt and Yemen (Sahay and Végh, 1996).

reduce the use of foreign currency which usually sets in after relative periods of stability previously induced by initial dollarization phenomenon. Meanwhile there are two categories of de-dollarisation, namely, compulsory and market driven reduction in foreign currency holdings³.

Usually over time countries prematurely prioritize sovereignty over economic fundamentals opting to revert to their domestic currencies. Zimbabwe policy makers seem to be considering this route given the recent interventions by the Reserve Bank of Zimbabwe in currency management,⁴ with a view to influence money supply. The RBZ introduced a Foreign Exchange Stabilisation and Incentive Support Facility which ushered in a local currency Proxy called Bond notes to be granted to qualifying foreign exchange earners in bond coins and notes which will operate alongside the currencies within the multi-currency system and at par with the USD (RBZ, 2016).⁵ The bond notes and coins derive their name from the fact that they are guaranteed by the African Export-Import Bank (Afreximbank) bond facility and cannot be used beyond the Zimbabwean borders. This implies that the Bond notes are a proxy for the Zimbabwean local currency which cannot be traded outside Zimbabwe and is printed by the Reserve Bank of Zimbabwe⁶.

However, since the announcement of the issuance of the Bond Notes, the banking sector experienced huge panic withdrawals, which have resulted in perpetual long queues at most banks as the Bond Notes issuance is generally viewed to indicate desire by monetary authorities to introduce some form of domestic currency⁷. Compelling for this study is the fact that there seems to be no end to the liquidity crisis since the introduction of the Bond Notes, thereby threatening the multi-currency system. Therefore policy makers are grappled with decisions regarding potential de-dollarisation, the prospects of successfully de-dollarising and the applicable framework given that empirically there is no de-dollarisation strategy. This study seeks to fill this research gap with regards to Zimbabwe`s case and provide policy makers with an evidence based effective de-dollarization strategy.

³ The compulsory pesofication in Argentina in the wake of the 2001 crisis had costly consequences (Perry and Serven, 2004). In contrast to Israeli`s gradual market driven approach which has seen the dollarization ratio reduce from 50% in the 1980s to 15 % by 2004(Levy Yeyati, 2006).

⁴ The Reserve Bank has established a USD200 million foreign exchange and export incentive facility which is supported by the African Export-Import Bank () to provide cushion on the high demand for foreign exchange and to provide an incentive facility of up to 5% on all foreign exchange receipts, including tobacco and gold sale proceeds(RBZ).

⁵ The Reserve Bank of Zimbabwe will print \$20 million bond Afreximbank coins under the \$50 million guaranteed Afreximbank loan facility by first quarter of 2017(2017 Budget Statement), while \$70 million bond notes out of the \$200 million Afreximbank Loan facility have been printed since November 2016(RBZ).

⁶ The RBZ lastly printed money February 2009 when the Zimbabwean dollar was demonetised.

⁷Memories of the events of the hyperinflationary period experienced before dollarisation are still fresh where the Zimbabwean dollar lost 99.1% of its value between 1997 and 1998.

1.1 Background of the Study

The Zimbabwean monetary system has evolved with mixed economic fortunes. Like most developing countries, currency management has had a huge bearing on the overall economic trajectory. There are 4 distinct phases, the pre- independence era, the Zimbabwean dollar era between 1980-1990 (post independence era) and 1990-1998 (reform era), 1998- 2008 (lost decade) and the multiple currency era from 2009 to date.

1.1.1 Pre Independence Era (1960-1980)-The British Pound Era

Exchange controls in Zimbabwe date back to the pre-independence era. The country was using the British Pound whose exchange rate against the US dollar average USD1:0,4176GBP between 1960 and 1980 (World Bank). The economy was largely under sanctions against the Unilateral Declaration of Independence of 1965-1980. The country administered a tight and stringent Exchange Control system in terms of the 1977 Exchange Control Act [Chapter 170] and its Regulations to alleviate possible Balance of Payments problems due to economic sanctions. Consequently, economic policies pursued during this period were inward looking in nature and promoted self-sufficiency as it promoted large-scale investment in domestic manufacturing and agriculture⁸. As a result the economy had strong inter-sectoral backward and forward linkages ensuing modest real GDP growth rates averaging nearly 4.5 percent a year during 1960-80 (World Bank).

1.1.2 Post Independence era (1980 – 1990)- The Zimbabwe Dollar Era

The Zimbabwean state was established on 18 April 1980 and adopted its own currency, the Zimbabwean dollar, a move which was consistent with the newly acquired sovereign status. The Zimbabwe dollar was introduced in 1980 to directly replace the Rhodesian dollar at par (1:1) which effectively made the Zimbabwean dollar stronger than the US dollar. The foreign exchange shortages during this period were attributable to the stagnation and decline in the world commodity prices between 1985 and 1990 and the drought of the 1982/83 agricultural season. As a result rigid and extensive foreign exchange controls were administered through the Foreign Exchange Allocation and Import Licensing Systems though a significant amount of international capital came through the Zim-Cord arrangement⁹. Therefore failure by the

⁸ In appreciation of the privileges they got, the white settler population supported the Government in sanction busting and generally cooperated with the regime on whatever policies that were implemented during this Period (Mumvuma et al, 2003)

⁹ Substantial foreign aid pledges worth Z\$1.9 billion over the period 1981-1983 were made at ZIMCORD (Zimbabwe Conference on Reconstruction and Development) held in early 1981. Less than half of the pledged amount was disbursed. In 1976 for example, Kissinger had promised US\$1 billion on a resolution of Rhodesia's problems, but in 1980 the official US promise was only a paltry US\$25 million (Jenkins; 1997:11).

new government to fulfil political expectations broke the momentum of high growth that had been built over the previous two years¹⁰.

1.1.3 1990-1998 Reform Period

In 1990 following the Glasnost¹¹, i.e the fall of the USSR, the IMF/World Bank sponsored Economic Structural Adjustment Programme (ESAP) was introduced leading to the liberalization of the trade and exchange system. This led to the free floating of the exchange rate, the deregulation of the financial sector and the introduction of Foreign Exchange Bureaux de Change by mid 1994. The current account was fully liberalized in 1994.

Success of structural reforms was curtailed by a lack of social safety nets and the threat on vested political interests resulting in policy reversals.¹² Thereafter the ‘crush’ of the Zimbabwe dollar on 14 November 1997 after the disbursements of compensation for War Veterans resulted in hyperinflation and tumbling of the Zimbabwean dollar. As a result the Reserve Bank withdrew more of the Authorized Dealers’ delegated functions with all foreign exchange applications being centrally processed and approved by the Reserve Bank. The situation was exacerbated by the withdrawal of IMF’s funding in 1999 that culminated in further reviews of some of the Exchange Control policies.

1.1.4 1998-2008: The Lost Decade

The persistent shortages and externalization of foreign currency and a mushrooming parallel market for foreign currency, prompted the introduction of the batch system through Directive RD 346 of 15 November 2002(RBZ)¹³. This period also marked the beginning of the fast track land reform exercise which gave rise to a new economic order that drove mostly white farmers out of the most productive land, while replacing them with majority of indigenous Zimbabweans where over 276 000 families were resettled. This resulted in severe polarisation of Zimbabwe from the international monetary institutions, leading to further depreciation of the Zimbabwean dollar. Meanwhile the inflation rate hit a world record of 231.2 million percent as at July 2008 (CSO, 2008), or 489 billion percent as of September

¹⁰ The economy grew modestly and was characterized by policy lapses and adverse weather conditions in the following decade and recorded all time high growth rates of 10,6 % in 1980 and 12,5% in 1982 (Mumvuma et al, 2003), while averaging 5,5% during the period, on the back of a good agricultural season, and an international commodity boom

¹¹ The collapse of socialism, the influence of the World Bank, the drought, and world economy shocks

¹² This was a big diversion from earlier thinking during the height of the liberation struggle as reflected in the ZANU PF’s manifesto, written during the same period, which clearly stated that the land and all natural resources “belong to the people of Zimbabwe as a whole in perpetuity. No person has the right of private ownership of land and minerals. ZANU PF would dismantle the white farms and base its efforts for increased production on an entirely new socialist arrangement” (see Astrow; 1983).

¹³ During 1999-2008; a cumulative decline of at least 51%: (48% between 2000 and 2008) while Zimbabwe declined from the 2nd largest economy in SADC to 11th

2008 (IMF, 2009)¹⁴. According to Makochekanwa (2007), this was against a background characterised by an unchecked printing mill¹⁵, cost push and demand pull inflation as the country's productive capacity was eroded. This hyperinflation trend and other economic indicators during the period 1980-2012 are depicted in Table 1 below. With the local monetary authorities now printing the bond coins and notes, there is anxiety that the monetary authorities may resort back to this behaviour if the printing mills goes unchecked as before.

TABLE 1: ZIMBABWE ECONOMIC INDICATORS

Indicator	1986-90	1991-96	1997-08	2009-12
Real GDP Growth (percent)	4.6	2.8	-4.3	7.5
Real GDP Per Capita (percent)	1.4	-0.6	-3.6	15.7**
Manufacturing/GDP (percent)	20.6	21.1	13.5	15.7
Savings/GDP	16.5	17.8	6.3	-5.0
Investment/GDP (current prices)	16	21.7	10.6	15.8
Budget Deficit (percent of GDP)	-2.1	-5.8	-6.1	-3.9**
Inflation (percent)	11.8	26.6	19,255,755.00	0.8
BOP (US\$m)	-	73.5	-254.6	-1209.1
Trade balance (US\$m)	267.7	75.2	25.8	-3799.2
Export Growth (%)	0.1	0.1	-4.7	26.5
Import cover (Months) 100%	-	3.1	0.9	0.9
Real Wage Index –1990=100	93.5	73.5	59.7*	-
Formal Sector Employment	1,118,133	1,249,200	1,213,200*	1,192,900***
Employment Index – 1990=100	94.9	104.8	101.8*	100.1***

**Estimates

Sources: IMF online database

The Reserve Bank of Zimbabwe introduced a Managed Foreign Exchange Auction System on 12 January 2004 to deal with the persistent foreign currency shortages. Later, the Foreign Currency Auction system was replaced by the Tradable Foreign Currency Balances System (TFCBS) on 21 October 2005.¹⁶ However despite the various currency management strategies, liquidity remained elusive and fundamentals continued to deteriorate.

¹⁴ Independent analysts such as Steve Hanke (2008) put this inflation rate at 6.5 quindeillion novemdecillion percent (that is 65 followed by 107 zeros) as of December 2008

¹⁵ During, the hyperinflation period (2000 -January 2009, Zimbabweans felt the bitter brute as they had to cope with recurrent currency transitions from denomination notes of Z\$5, Z\$10 and Z\$20, the slashing of zeroes, to a currency whose denominations rapidly shifted from thousands, to millions, billions, trillions, quadrillion, sextillion, and ended at octillion by end of January 2009.

¹⁶ Under TFCBS, a dual exchange rate system prevailed with market transactions being conducted at the inter-bank market exchange rate and critical Government payments being conducted at the official exchange rate

Bowing to reality the RBZ, toward the end of September 2008, introduced foreign exchange licensed warehouses and shops (FOLIWARS), initially intended for a trial period of 18 months to March 31st, 2010 (RBZ, 2008)¹⁷. Shops not licensed under FOLIWARS, which included critical service providers such as commuter transporters, were excluded. In essence, the introduction of FOLIWARS defined the beginning of partial dollarization which had a contagion effect as many other unlicensed shops followed suit to also sell their products in foreign currency as the public had lost confidence in the domestic currency and its proxies forcing economic agents to devise their own survival methods¹⁸. Resultantly, The Government of Zimbabwe had no choice but to adopt the current multi-currency system as the practice was de facto (Ministry of Finance, 2009).

1.1.5 Multi –Currency Era (dollarization): 2009-2017

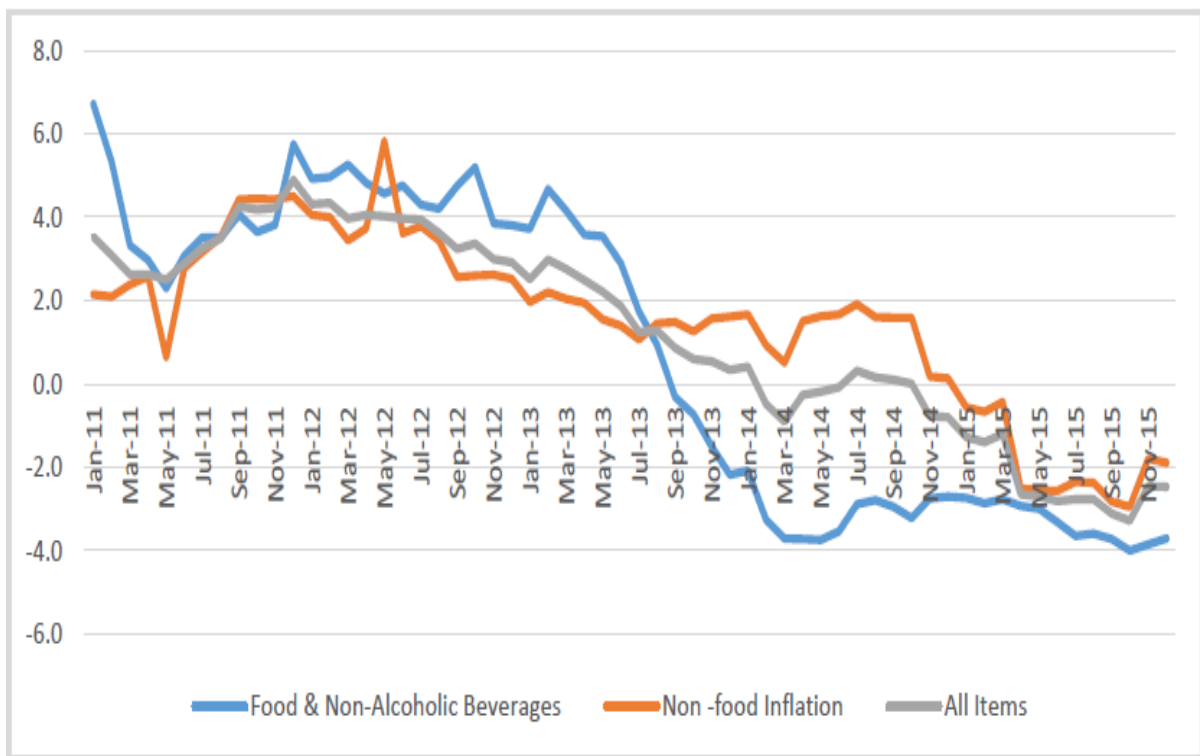
Dollarization restored stability and supported an emerging economic recovery under the dictates of the Short Term Economic Recovery Plan (STERP),¹⁹ where the inflation rate which reached a record high of 231 million percent in 2008 went down into a deflationary trend averaging -1% between 2013 and 2016(RBZ, 2016) as shown in Fig 1 below.

¹⁷1,000 retailers and 200 wholesalers were be allowed to sell goods in foreign currency. Under the scheme, fuel retailers and airlines were also be allowed to charge in foreign currency (RBZ).

¹⁸ Between 1997 and 1998 Zimbabwe lost 99% of its value(Hanke, 2010)

¹⁹ Economic growth improved immensely from -17.7% in 2008 to a peak of 11.7 % in 2011

FIGURE 1 : INFLATION TREND IN ZIMBABWE (2011-2015)



Source: RBZ, 2015

From a policy perspective, dollarisation of Zimbabwe exerted some costs and these are identified as (i) fiscal and quasi fiscal costs resulting from increased burden of public debt service from previous devaluations and high interest rates as well as the need to restructure financial institutions and some big corporations (ii) costs related to lost economic growth in some sectors due to transition (iii) social costs connected to unemployment, decline in real incomes, poor liquidity in the economy, worsened by health and education situation, leading to a rise in poverty and (iv) political costs associated with the loss of sovereignty over monetary policy(Kararach et al, 2010).

In essence, the absence of an effective monetary policy has inhibited the printing of money on one hand thereby imposing discipline. Meanwhile on the other hand the absence of the lender of last resort severely incapacitated monetary authorities from influencing money supply in the absence of any meaningful reserves. Foreign currency shortages are also blamed on inefficient distribution and utilization of scarce foreign exchange resource as the multiple currency system has been characterised by low levels of usage of plastic money and the real

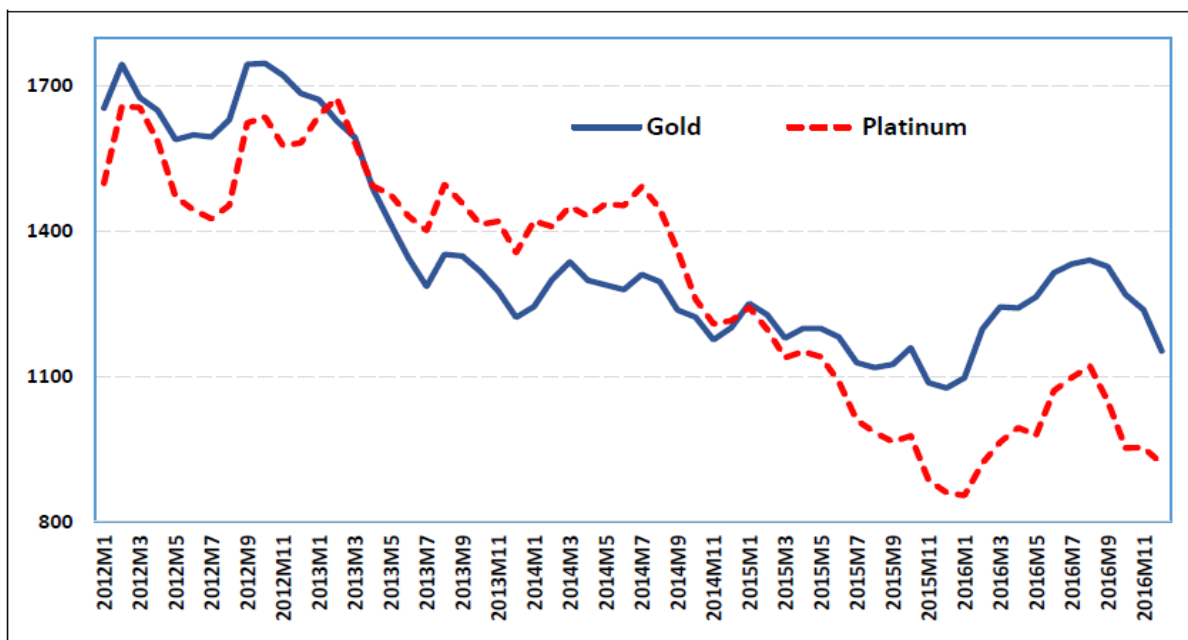
time gross settlement (RTGS) platforms.²⁰ Evidently the Multi- currency System is under threat as the liquidity crisis is symptomatic of this development. It is therefore pertinent to examine the underlying causes of this development in consideration for a plausible de-dollarisation strategy ought to be alive to the following:

1.1.5.1. Declining Exports

Under the multi currency regime, Zimbabwe`s major sources of money supply are exports of goods and services, diaspora remittances, offshore lines of credit and foreign direct investment(RBZ).

Of these, the major source is exports, of which around 80% of exports (USD2.6billion) is from five products, namely, tobacco, gold, platinum, diamonds and ferrochrome(RBZ,2016).²¹ The decline of foreign currency receipts between 2015 and 2016 is attributable to declining commodity prices as shown if figure 2. Henceforth policy formulation in favour de-dollarisation should provide strategies to stimulate exports and foreign investments to increase productive capacity thereby addressing supply side constraints that curtail competitiveness.

FIGURE 2: DECLINING INTERNATIONAL MINERAL PRICES



Source: RBZ, 2015

²⁰ According to the Central Bank of Zimbabwe, the “shortage of USD cash in the country as evidenced by queues at some banks and automated teller machines (ATMs) is attributable to a number of intertwined factors that include the dysfunctional multi-currency system as a result of the strong USD.

1.1.5.2 Reduced Global Competitiveness

Under the multi-currency system currency utilisation is skewed towards the USD as shown in Table 2 where the USD has been dominantly used, accounting for 95% of transactions.

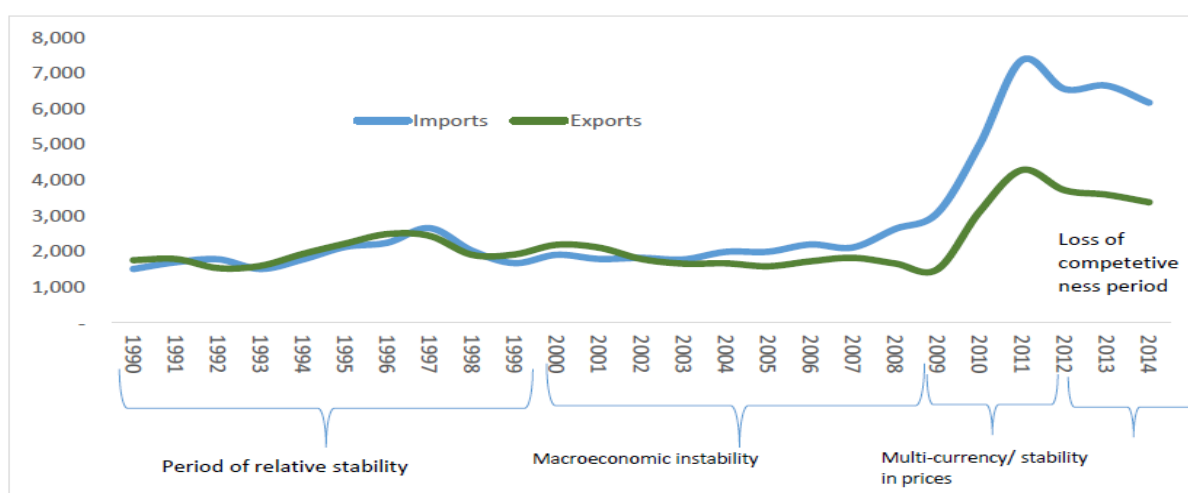
TABLE 2: FOREIGN CURRENCY UNDER MULTI-CURRENCY

Currency	2009	2013	2014	2015	2016
USD	49%	50%	60%	70%	95%
Rand	49%	50%	40%	30%	5%
Other	2%	-	-	-	-

Source: RBZ, 2015

The strengthening USD compromised global competitiveness of Zimbabwean products (fig 4). Since the advent of multi-currency system, the USD became more of a commodity, a safe haven currency or asset than a medium of exchange (RBZ, 2016).²² According to Brixiova and Ncube (2014), the stock-flow approach to the equilibrium exchange rate reveals that under the multi-currency regime, overvaluation (estimated at 45%) has significantly hampered GDP growth and employment in export sectors as shown by loss of competitiveness post 2013 as shown in Fig 3.

FIGURE 3: LOSS OF COMPETITIVENESS



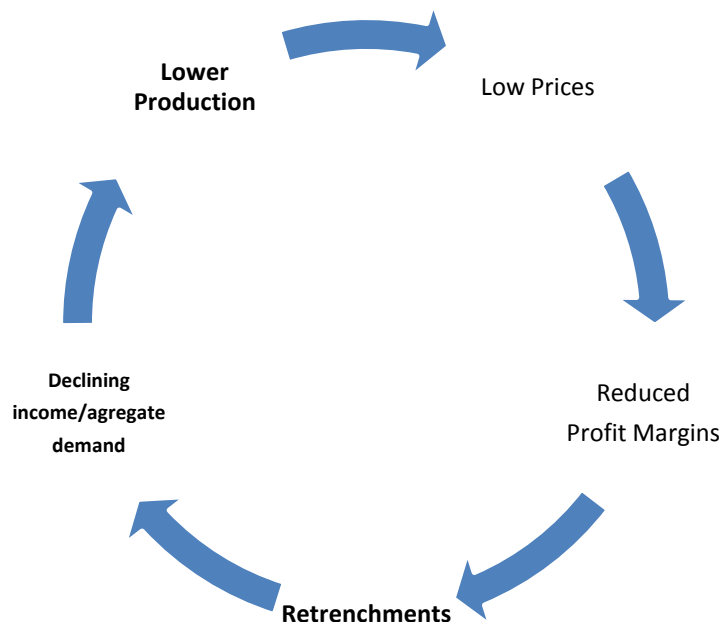
Source: Zimstat, 2016

²² According to the 2016 Monetary policy statement, money was diverted to unproductive uses, tax evasion, porous border posts, smuggling and non-repayment of loans IFFs (trade mispricing, externalising of export sales proceeds and remittance of unproductive and unsanctioned investments), as funds leave Zimbabwe without circulating in the economy making Zimbabwe a net exporter of liquidity.

Resultantly a deflationary trend set (Figure 1). Falling prices raised the real value of debt, which undermined borrowers' balance sheets. In addition, consumers would delay spending, in anticipation of further deceleration in prices, thereby negatively impacting on output. Empirical evidence, however, suggests that the effects of negative inflation on an economy depends on whether it is caused by decreases in aggregate demand or a rise in productivity (Elwell, 2010; Marcin, 2015).

As shown in Figure 4, decline in aggregate demand results in lower production costs, which translates to lower prices and reduced profit margins. The lower profit margins force companies to lay off workers, thus, creating a vicious cycle. A prominent example of such a deflationary spiral is the persistent post-1998 deflation in Japan

FIGURE 4: DEFLATIONARY SPIRAL



Source: Marcin, 2015

The negative inflation caused by falling aggregate demand is essentially detrimental to economic growth and may, in a worst case scenario, develop into a hard-to-break, self-reinforcing deflationary spiral (Marcin, 2015). It is highly anticipated that an effective de-dollarisation strategy should break this cycle.

Thus reduced competitiveness resulting from supply side bottlenecks are also evident of a deteriorating business environment²³. In the World Bank Competitiveness Report for 2014-15, Zimbabwe was at position 124 out of 144 countries and far below most of its regional comparators, with the exception of Malawi and Angola.

However it is generally agreed that undervaluation would stimulate competitiveness and growth in export sectors thereby impacting positively on GDP growth.²⁴ This is one of the immediate gains anticipated in a de-dollarisation framework which should be complemented by the use of market driven price incentives essential to promote the volume and efficiency of private sector investment to improve international competitiveness (Mumvuma *et al*, 2003).

1.1.5.3 Political expectations

Politically the transition to the GNU in 2009 is said to have reinforced optimism resulting in improved market confidence evidenced by the recovery of financial intermediation evidenced by the rapid growth in total bank deposits from US\$297.6 million in 2009 to US\$2.3 billion by September 2010 (RBZ, 2011)²⁵. However at the end of GNU, political expectations became pessimistic threatening the viability of the multi-currency system. This is reflected in the limited circulation of liquidity, low consumer and business confidence, and lack of competitiveness (RBZ, 2015).²⁶ This marked the reversal of the earlier gains as shown by the fall in the institutional ratings of Zimbabwe by the World Economic Forum's Competitive Report of 2015. It is therefore prudent to factor in the role of political institutions in crafting a plausible de-dollarisation strategy.

1.1.5.4 Current Account Deficit

Monetary policy statement of December 2015 attributes the deflationary trend to the severe shortage of money in the economy, citing the country's absorption capacity which remains much higher than export performance thereby derailing efforts to sustainably build a sufficient foreign exchange buffer so as to improve domestic money supply.²⁷ This high absorption capacity is responsible for draining the meager foreign exchange earned from

²³ High cost of utilities, obsolete machinery, rigidity in labour laws, poor infrastructure and cheaper imports are evident of deteriorating business environment.

²⁴ Such gains are however short-lived if complementary reforms in the second generation of policy reforms, such as civil service reform, fiscal rationalization are not successfully implemented

²⁵ Slowly however, the discipline brought about by dollarization caused a change in the practice of financial institutions, and confidence in them increased. Total bank deposits, which had fallen to US\$200 million in December 2007, rose from their December 2008 level of US\$290 million by 141 percent to US\$700 million as June 30, 2009.

²⁶ Heightened expectations over economic empowerment during the 2013 Harmonised elections were however dampened after 2014 as very little materialised in this regard, further exacerbating political pessimism.

²⁷ Zimbabwe's annual import bill is \$6 billion dollars compared to exports to the tune of \$2.9 billion dollars. This leaves a trade deficit of \$3 billion dollars. The trade deficit and budget deficit are like twin deficits. Twin relationships are always problematic.

exports, credit lines and remittances. Whilst the country experienced balanced trade prior to 2003, as exports were aligned to imports, the situation changed from 2004. Since then, the country has continuously experienced trade deficits as shown in Table 4 below which have increased from moderate levels of around USD400 million during 2004-2006 to the unsustainable levels of USD 2.5 billion between 2013 and 2014.

TABLE 3: SNAPSHOT OF BOP

	2013	2014	2015	2016	2017
	Actual	Actual	Actual	Est	Proj
Current Account Balance	-2,539.2	-2,247.5	-1,519.4	-1,283.9	-826.5
Trade Balance (Goods)	-2,947.1	-2,589.1	-2,448.1	-1,985.1	-1,537.3
Merchandise Exports F.O.B	3,861.8	3,717.2	3,614.2	3,365.8	3,669.5
<i>Of which, Agriculture</i>	<i>1,047.5</i>	<i>981.2</i>	<i>1,015.9</i>	<i>1,036.3</i>	<i>1,113.5</i>
<i> Mining</i>	<i>2,223.3</i>	<i>2,113.4</i>	<i>2,089.2</i>	<i>1,910.1</i>	<i>2,098.6</i>
<i> Manufacturing</i>	<i>487.0</i>	<i>532.8</i>	<i>417.1</i>	<i>325.1</i>	<i>360.7</i>
Merchandise Imports F.O.B	6,808.9	6,306.3	6,062.3	5,350.9	5,206.8
<i>Of which, Food</i>	<i>658.1</i>	<i>352.3</i>	<i>586.3</i>	<i>629.1</i>	<i>375.2</i>
<i> Fuel</i>	<i>1,364.7</i>	<i>1,393.6</i>	<i>1,460.9</i>	<i>1,455.9</i>	<i>1,539.5</i>
Capital & Financial Account	1,687.6	2,095.8	1,632.3	891.2	711.2
<i>Errors And Omissions</i>	<i>656.2</i>	<i>111.5</i>	<i>-138.6</i>	<i>206.3</i>	<i>0.0</i>
Overall Balance	-195.4	-40.3	-25.8	-186.4	-115.2

Source: RBZ, Ministry of Finance, Zimstat

1.1.4.5 Fiscal Balance (deficit)

According to the RBZ, cash shortages are a symptom of narrow fiscal space and a trade deficit” (RBZ, 2016). Revenue collections have been comparatively lower than expenditure on account of subdued economic activity leading to dwindling corporate tax and value added tax flows. Furthermore retrenchments which escalated following the Supreme Court Ruling of 17 July 2015 also adversely affected Pay As You Earn (PAYE) collections. Recurrent expenditure which was heavily subjected by employment costs, pensions and transfers accounted for 94% of government expenditure, leaving a measly 6% for capital expenditure and social spending. This fiscal deficit has been monetised through the issuance of treasury bills to the tune of US\$1,126 billion between 2012 and February of 2016 to finance some of its obligations (RBZ). There seemingly exists a strong co-relation between the time the government started injecting TBs in 2012 and the depletion of stock of hard cash in the market. The issuance of Treasury Bills is tantamount to printing money that can potentially fuel inflation and exacerbate the country’s liquidity crisis as recipients of settlements by way

of TBS have been discounted on the domestic market and exporting real money out of the system, thereby depleting nostro account balances and constraining the country's ability to import cash as nostro accounts run dry. The government has been riding on the issuance of debt to print money, which is then placed on the Real Time Gross Settlement System²⁸. The absolute fall in hard cash in Zimbabwe fell from USD582 million in 2009 to US\$269 million in April 2016, while the ratio of hard cash to deposits in Zimbabwe has fallen at an alarming rate from 49% in 2009 to 6% as at April 2016(ZIMSTAT). Can de-dollarisation arrest government financial indiscipline of this magnitude?

1.2 Problem Statement

The Acting Minister of Finance issued a statement on 29 January 2009 as he announced the country's adoption of the Multiple Currency System that "...given the hyperinflationary environment characterising our economy at present, our people are now using multiple currencies for day-to-day business transactions, alongside the Zimbabwe dollar" (GoZ, 2009), bringing hyperinflation and currency devaluation to a halt. Subsequent economic recovery saw industry capacity utilisation improving from an all time low of 10% in 2008 to a peak of 57.2% in 2012 while economic growth rose from -17.7% in 2008 to 11.7% in 2011(Ministry of Finance, 2013). However gains were however short-lived as capacity utilisation soon fell to 36% while economic growth fell to 2.8% in 2015 as a severe liquidity crisis unfolded under the Multi Currency System. The economy has also been operating below its potential output as reflected by a negative output gap.

The progressive appreciation of the US\$ against major trading partner currencies particularly the South African Rand, has prompted a review of the suitability of the continued use of the US\$ as the anchor currency in Zimbabwe's basket of multiple currencies.²⁹ Furthermore Zimbabwe has been exposed to the full impact of deteriorating international commodity prices in the absence of a direct mechanism to respond to such exogenous shocks. This prompted The Reserve Bank of Zimbabwe on 4 May 2016 to issue a statement to deal with the cash shortages, while stabilising and stimulating economic growth through a direct

²⁸ This money printed and placed on the RTGS has helped keep the RBZ liquid in local USD. The total value of bank balances with the RBZ increased from US\$97 million in 2009 to US\$778 million at April 2016(RBZ).

²⁹ These adverse exchange rate developments have occurred in a multiple currency environment that has largely been typified by lack of exchange rate and interest rate policy tools to correct both internal and external imbalances(RBZ, 2015))

injection of the local currency proxy, the Bond Note³⁰. A total of US \$70 million of bond notes has been disbursed since November 2016 to December 2016, while a total of US\$20 million bond coins have been issued since 2014(RBZ, 2017).

According to the RBZ (2016) the Bond Notes will be issued through a gradual and measured approach on a drip feed basis and are envisaged to fortuitously and subserviently go a long way to mitigate cash shortages within the economy. This goes to show some extent of transaction de-dollarisation in order to influence money supply. This divergence from the complete use of the multi-currency system is signalling a policy dilemma indicative of the desire to dedollarise somehow³¹. Furthermore, this facility was only introduced for an initial period of two years but less than a year down the line, the RBZ, in the 2017 Monetary Policy Statement announced that it will be extended for another two years. Clearly this reinforces an intention to move away in the least case from full dollarization and questions arise as to the efficacy of such a move as well as the appropriate framework necessary to induce a successful de-dollarisation outcome. The complexity of such a move is demonstrated by Mecagni and Mauro, 2015 who in their study examined evidence from 42 highly dollarized countries and found that only a fourth of these countries managed to de-dollarize successfully. Their success was attributable to macroeconomic stability, low inflation, high growth, and a prudent fiscal policy.

Overall there seems no precise blue-print to be followed by a prospective de-dollarizing country. The feasibility of such an agenda remains controversial and needs to be viewed within a broad macro-economic and institutional context. Therefore a research gap exists to establish the efficacy of de-dollarisation as a policy objective as well as investigate an evidence based de-dollarisation strategy for Zimbabwe.

³⁰ “The Reserve Bank established a USD200 million foreign exchange and export incentive facility which is supported by the African Export-Import Bank (Afreximbank) to provide a cushion on the high demand for foreign exchange and to provide an incentive facility of 5% on all foreign exchange receipts, including tobacco and gold sale proceeds..... the Zimbabwe Bond Notes of denominations of \$2, \$5, \$10 and \$20 shall, therefore be introduced in future as an extension of the current family of bond coins for ease of portability in view of the size of the USD200 million backed facility”.

³¹According to the Reserve Bank of Zimbabwe(the Bank) during the 2016 tobacco marketing season, 66 215 tobacco growers delivered and sold green leaf tobacco valued at US\$588 185 486. In order to incentivise tobacco growers to increase production, as well as promote financial inclusion, the Bank awarded a 5% export incentive to tobacco growers payable through normal banking channels which translated to a payment of US\$29 346 897 in Bond Notes

1.3 OBJECTIVE OF THE STUDY

The broad objective of this study is to investigate an effective de-dollarization strategy so as to edify the body of knowledge for the design and implementation of an optimal monetary regime choice for Zimbabwe. The specific objectives of the study are as follows:

- i) To measure the probability of successful de-dollarization.
- ii) To identify an effective de-dollarization strategy

1.4 RESEARCH QUESTIONS

Based on the research topic, the research questions are as follows:

- ii) What constitutes a successful dedollarization strategy for Zimbabwe
- i) What is the possibility of a successful dedollarization

1.5. HYPOTHESIS

It is important to also consider the following testable propositions in the study:

- i) Dedollarisation is not a policy objective for Zimbabwe
- ii) There is no effective de-dollarization strategy for Zimbabwe

1.6 JUSTIFICATION OF THE STUDY

Six years after the adoption of the Multi-Currency regime, whose main objective was to stabilize the economy and establish a credible nominal anchor, debate rages on, regarding the eventual choice of Zimbabwe's monetary regime. Adverse economic developments have occurred in a multiple currency environment that has largely been typified by lack of exchange rate and interest rate policy tools to correct both internal and external imbalance. This has prompted a rethink in terms of the need to establish a monetary regime threshold beyond which the continued appreciation of the US\$ will significantly dent economic growth prospects in Zimbabwe. Thus de-dollarisation, whether partly or otherwise may create room for policy makers to respond to emergencies. However empirics posit that successful de-dollarisation is usually the outcome of a sustained process of disinflation and stabilization, often supported by appropriate prudential efforts as was in the case of Poland whose successful de-dollarization process was against a significant strengthening of the macroeconomic environment, similar efforts could be fused in the de-dollarisation strategy

under study. Meanwhile the involuntary conversion of bank deposits in Argentina (1989), Mexico (1982), Bolivia (1982) and Peru (1985) had drastic macroeconomic consequences characterised by financial disintermediation, instability, and capital flight. Bonga and Dhoro (2015) in their study, emphasized that before dedollarisation occurs structural reforms must takes place in Zimbabwe, while Kramarenko *et al* (2010) concludes that reintroduction of an independent domestic currency would not be feasible for the foreseeable future, because of the need for a long history of policy credibility. Empirically there is no clear-cut blue-print to be followed by a prospective dedollarising country. The practicability of such an agenda remains contentious and needs to be viewed within a broad macro-economic and institutional context. Against this background, this timely research aims to establish the possibility of successful de-dollarizing and proffer an evidence based de- dollarization strategy that can lead Zimbabwe out of its current economic predicament.

1.7 Organisation of Study

The organisation of the rest of the study is such that Chapter Two presents theoretical and empirical literature review while Chapter Three gives an in depth outline of the methods and procedures applied to the study. Chapter Four proceeds with an estimation and interpretation of the results. Chapter Five presents the conclusion and summary of the study findings as well as giving study based policy recommendations and suggestions of areas for further study.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

In this chapter we review both theoretical and empirical literature. We start by reviewing theories of dollarization phenomenon in order to draw control variables. Thereafter theories of reverse in dollarization are also reviewed.

In addition we also review empirical literature to deepen our understanding of an effective reverse dollarization phenomenon on the Zimbabwean economy (monetary framework). Both empirical and theoretical literature will give us a framework for the study through identification of dollarization and de-dollarization issues that are relevant to this study that will enable us to identify an appropriate empirical model specification to carry out the study.

2.1 Theoretical Literature Review

De-dollarisation is the reverse process of dollarisation. As such understanding the phenomenon of dollarisation is critical in understanding the motivating factors behind the dollarisation process in Zimbabwe as well as in identification of variables that constitute a successful de-dollarisation strategy for Zimbabwe.

Bloch (2009) defines dollarization as the substitution of a domestic currency by a more stable foreign currency. More elaborate is the definition by Chitambara (2009) who pointed out “that dollarization is predominantly a response to a loss of confidence in the local currency owing to severe bouts of macro – economic instability, notably hyperinflation, currency crisis as well as high and volatile interest rates” Meanwhile Dean and Hira (2004) defined two types of dollarization, namely ³²de facto dollarization and de jure dollarization.³³ De facto dollarization is the spontaneous adoption of the dollar or any foreign currency by the general public without supporting government legislation while de jure dollarization is the adoption of the dollar or any foreign currency with supporting government legislation. On the extreme is full dollarization which is the most direct, irreversible, and credible way of bringing about

³² According to Baliño, Bennett, and Borensztein (1999), partial or unofficial dollarization occurs when residents hold a large share of their financial wealth in assets denominated in a foreign currency, even though that currency lacks the legal tender privileges of the domestic currency.

³³ The Joint Economic report of (2000) defined, De facto dollarization in detail and its characteristics, where they alluded that, “De facto dollarization occurs when people hold much of their financial wealth in foreign assets even though foreign currency is not legal tender.

tighter trade and financial integration (Bogetic, 2000). It lowers transaction costs by reducing the need to convert to local currencies. Three types of dollarization are commonly identified by Erasmus et al (2009):

- i) Financial dollarization (asset substitution) which is the substitution of local currency assets or liabilities for foreign currency assets or liabilities.
- ii) Real dollarization which is the use of foreign currency for denominating prices and wages
- iii) Currency Substitution which is transactions dollarization, involves the use of foreign currency for transactions. Meanwhile Cuddington (1983) describes currency substitution as a shift from domestic money balances to foreign money balances, regardless of the location but disagrees with Kamin and Ericsson (1993) who refer currency substitution as the shift towards foreign money balances held at home.

As noted by Calvo and Végh (1996), there is no consensus about the definitions of “currency substitution” and “dollarization.”³⁴ However early literature focused on currency substitution and was motivated by the history of soaring inflation in Latin America. The key message from this initial literature is that monetary policy will be futile in a country where foreign currencies are seen as substitutes for domestic currency. The inference is that the elasticity of substitution between domestic and foreign currency is likely to increase when the perceived risk of sharp changes in the value of domestic currency are greater, most likely in situations of floating or adjustable predetermined exchange rates. To the extent that inflation is ultimately reflected in the nominal exchange rate, expected inflation should underpin currency substitution. In such circumstances, the effectiveness of monetary policy is limited (Brillenbourg and Schadler 1980; Girton and Roper 1981; Ortiz 1983).

After the 1990s, the literature evolved into three categories inspired by macroeconomic developments in Latin America.

2.1.1 Portfolio View

This view explains dollarization as an optimal portfolio choice for a given distribution of real returns in each currency. Rennhack and Nozaki (2006) characterize financial dollarization as

³⁴ The Zimbabwe dollarisation experience is closely linked to all the three types of dollarisation mentioned above as it became official and fully dollarised in January 2009.

a rational response to inflation uncertainty. Similarly for this research de-dollarisation should be motivated by inflation certainty among other factors. Exchange rate regimes biased against depreciation are associated with high financial dollarization levels. In dollarized economies, residents hold foreign currency assets in order to protect local-currency purchasing power, while lenders limit their exposure to currency mismatches by lending in foreign currency.³⁵

2.1.2 Market Portfolio View

The second emphasizes a market portfolio view, which looks at dollarization as a response to market imperfections. Domestic borrowers contract debt in foreign currencies in response to the lack of domestic currency alternatives in incomplete financial markets, increasing the depth of financial markets. Many Latin American economies in the 1970s and 1980s as well as many SSA countries (for example, Democratic Republic of the Congo, Liberia, and Nigeria) have become dollarized following periods of financial repression and the imposition of capital controls (Mecagni and Mauro, 2015). Essential in modelling this study is the expectation that as markets become efficient and perfect when controls are relaxed, de-dollarisation should creep in.

2.1.3 Institutional View

This view is expressed by Weymouth (2007) who argues that dollarization represents the rational response of domestic investors to policy instability. As such individuals will store value in alternative currencies when they fear the expropriation of wealth through future volatility. The opposite is expected to encourage holding of assets in domestic currency to spur de-dollarization, thereby informing a plausible strategy.

2.1 Theories of Dollarisation

2.2.1 Cash in advance and transaction cost models

Giovanni and Turtelboom (1994) proposed a classification of dollarisation based on money demand in a multicurrency environment and distinguished the following;

- (i) cash-in-advance

This theory belongs to the portfolio view as it posits that demand for domestic and foreign currencies which can circulate in the absence of legal restrictions affecting their

³⁵According to Globalization and Monetary Policy Institute 2011 Annual Report, past chronic inflation episodes have been stabilized through the adoption of an independent central bank, an alteration in the fiscal regime and by instituting a credible exchange rate stabilization mechanism.

use is determined by real return differential between domestic and foreign currencies. Bogetic (2000) found that the higher the domestic inflation rate vis-à-vis foreign inflation, the higher the level of foreign currency holdings will be. This theory is consistent with the trend in most developing countries like Zimbabwe where hyper-inflation and depreciation resulted in loss of value of domestic currency leading to preference for foreign currencies. Thus a de-dollarization trend is similarly determined by this differential, whereby it is expected that the prevailing low inflation after dollarisation will motivate economic agents to move away from foreign currencies.

(ii) transactions cost models

Marshall (1987) and Poloz (1986), allude that currency substitution may emerge when transaction costs are high (that is, agents maintain foreign exchange as a medium of exchange and store of value) as with the market portfolio view. From this theory, a de-dollarisation strategy assumes that currency substitution will take place as economic agents are expected to substitute the foreign currencies held under the multi-currency system with the domestic currency or any of its proxies in a de-dollarization framework, motivated by prohibitively high costs of transacting in foreign currencies.

2.2.3 Liquidity Services Model

According to Miles (1978) and Thomas (1985), the Liquidity Services Model (LSM) motivates the use of money by its means of payment role. Thus the individual holdings of domestic and foreign money are optimally chosen, given their “moneyness” and interest foregone. The first order conditions of the individual optimisation problem lead to the equality between the marginal rate of substitution in the production of liquidity services and the ratio of user costs. When the production function of liquidity services is a constant elasticity substitution form the relative money demand takes the form:

$$\frac{eF}{M} = \left[\frac{\delta_2 \left(\frac{i}{i - \hat{e}_{+1}} \right)}{\delta_1} \right]^\delta \dots\dots\dots(1)$$

Where;

M and F are domestic and foreign nominal money holdings,

e is the nominal exchange rate,

i is the nominal interest rates on domestic bonds,

\hat{e}_{+E}^E is the expected exchange rate depreciation δ_1 and δ_2 are the weights in the Constant Elasticity of Substitution production function and δ is the elasticity of substitution between the two currencies.

This model postulates that the ratio of holdings of foreign to domestic money depends negatively on the expected exchange rate depreciation. Thus on one hand a consumer's choice of a particular currency holdings is based on costs of transacting. On the other hand the consumer's currency preference is motivated by the need to achieve a desired denomination structure for overall portfolio consideration that is independent of the currency holdings. This separation depends critically on the assumption of complete bond markets. In developing countries like Zimbabwe such where money markets are illiquid and incomplete this model may not be applicable. In developing an analysis of a possible de-dollarisation strategy expected appreciation of the local currency or its proxy is a key variable in inducing the decrease in the ratio of holdings of foreign to domestic currency.

Other models of currency substitution that in which currencies are viewed as providing liquidity services include Vegh (1989) and Agenor and Khan (1996). These models fail to describe the portfolio role that foreign banknotes may have in high inflation countries. Thus the liquidity services model is seen as the centre piece to test currency substitution hypothesis in countries with developed financial markets but less applicable to undeveloped financial markets.

2.2.4 Portfolio Balance Model

According to the Portfolio Balance Model by Cuddington (1983), Branson and Henderson (1985) the government provides all the three types of assets, namely cash, domestic and foreign bonds whereby households make a choice from these assets to form a portfolio. Postulating gross substitutability between all assets, builders of this approach have employed money demand functions that depend negatively on the yield of each alternative asset.

However bonds denominated in foreign currency are not easily available, as is likely to be the case in most developing countries, other variables apart from the relative user cost may be influencing the money demand. For this reason, Cuddington (1983) defended that in developing countries, where asset market are illiquid, one should follow instead the Portfolio Balance Model. However gross substitutability is not always consistent with personality optimisation. Furthermore the model falls short of explaining justification for

holding of money and may not appropriately explain the dedollarisation phenomenon in a developing country such as Zimbabwe. This model is pertinent in explaining the de-dollarisation framework as the expectation on depreciation/ appreciation whether or not economic agents will continue to hold on to foreign currency or be motivated to revert back to the domestic currency.

2.3 Motivation for de-dollarization

Ize and Yeyati (2005) and Leiderman *et al* (2005) argue that dollarization is associated with higher exchange rate pass-throughs, limiting the counter-cyclical capacity of domestic monetary policy and exacerbating the fear of floating in dollarized economies³⁶. Thus highly dollarized financial systems may be more vulnerable to crises. By hindsight de-dollarization is expected to arrest the high incidences of economic crisis.

As discussed by McKinnon (1982) and others, certain undesirable effects such as exchange rate volatility could be created by currency substitution. Feige *et al* (2003) alludes that dollarisation may also precipitate the escalation of an underground economies as economic activities go “unrecorded” as foreign currency, increasingly becomes the preferred medium of exchange for such transactions.³⁷

Mecgani and Mauro (2015) argue dedollarisation has been gaining momentum as dollarization can complicate the implementation of economic policies through various channels, by:

- i) Exposing the balance sheets of the public sector, private enterprises, and households to exchange rate risks, when assets and liabilities in foreign currency are mismatched. Accordingly, price elasticities to monetary shocks are prone to be higher in dollarized countries (Yeyati, 2006). By inference a successful de-dollarization strategy should result in an improvement in the interest rate’s channel effectiveness in monetary policy transmission.
- ii) Weakening the structural fiscal balance and fiscal flexibility by reducing the scope for seigniorage. Furthermore, de facto dollarization leads to a loss of seigniorage,

³⁶ Nicolo, Honohan, and Ize (2005) demonstrate that financial intermediaries in countries with extensive deposit dollarization are prone to higher risk, as measured by nonperforming loan ratios, deposit volatility, and “distance to default” metrics.

³⁷ By facilitating underground activities, de facto dollarization can also lead to a distortion in various measures of macroeconomic activity making the formulation of macroeconomic policy more difficult and It also lowers the costs of tax evasion and thereby reduces the ability of the fiscal authority to command real resources from the private sector.

thwarts the monetary authority from pursuing inflationary finance and inhibits its effectiveness in controlling exchange rate.

- iii) Reducing the abilities of governments to issue medium- and long-term debt in domestic currency known as the original sin further exacerbating vulnerabilities to shocks and thereby amplifying macroeconomic and output fluctuations.
- iv) Reduces effectiveness of monetary policy. Dollarization may affect the autonomy of monetary policy and weaken standard transmission mechanisms, potentially leading to aggregate demand effects in contrast to those in advanced economies (IMF, 2006). Reverse dollarisation therefore seeks to increase monetary policy autonomy. Ize and Yeyati (2005) argue that the interest rate channel becomes ineffective when most intermediation is in dollars.
- v) Exposes public and private sectors to foreign currency changes when asset and liabilities are mis-matched liquidity, including solvency risks³⁸. As a result, exchange rate changes become more important than interest rate changes in the conduct of monetary policy (Acosta-Ormaechea and Coble, 2011).
- vi) Reducing the authorities' capacity to use monetary policy and making it harder to use the central bank's lender-of-last resort function to stabilize the domestic banking system.

All in all, dollarization and subsequent de-dollarisation which is the subject of this study are complex phenomena to expect that simple rules are going to be the solution for every country. On the one hand, one could argue that macroeconomic solutions should be needed in as far as dollarization and de-dollarisation clearly have macroeconomic causes. On the other hand, the so-called "hysteresis" behind the dollarization process point to government intervention as an important tool in achieving de-dollarisation.

2.4 Empirical Literature Review

2.4.1 DeDollarization

Dedollarisation refers to the reduction in dollarisation levels (reverse dollarisation). According to Rogoff and Savastano (2003), among the countries that have managed to dedollarize, at least to some extent, literature shows cases of two distinctive categories, those which have done it unilaterally(forced) by legal means, and those which have only allowed

³⁸ Central banks exert less control over the domestic interest rate channel when residents hold substantial assets and liabilities in foreign currency (Fischer et al. 2013).

for market forces to reduce the share of dollar deposits.³⁹ Forced de-dollarisation involves measures to directly discourage dollarization. Such measures include limits on dollar deposits or loans, taxes on dollar intermediation and forced conversion⁴⁰. The intention is to speed things up (and hence reduce transition costs) by cutting through the policy coordination maze.

Meanwhile market based de-dollarisation combined macro-economic stability with other policies (such as capital market development) in local currency⁴¹. Understanding the categories is important in the consideration of the strategies that could be applied in the de-dollarisation framework for Zimbabwe. The strategies employed and their outcomes are reviewed.

There is a large literature that has documented that financial dollarization in some emerging economies displays “hysteresis”—that is, it rises in periods of economic disarray but does not fall proportionately when the economy is stabilized (Catao and Terrones, 2016).⁴²

A key observation from the most dollarisation experiences is that dollarisation still remains high, even after a decades of effects to de-dollarisation; hence de-dollarisation is not an overnight phenomenon⁴³. Should countries, instead, fight dollarization frontally and should de-dollarisation be a policy objective or not? There is no consensus on this question.

Vast evidence of de-dollarisation hysteresis is found in Guidotti and Rodriguez (1992), for Bolivia, Mexico, Peru and Uruguay, by Kamin and Ericsson (1993), for Argentina, by Clements and Schwartz (1993), for Bolivia, by Mueller (1994) and for the Kyrgyz Republic, by Reding and Morales (1999) for Bolivia. Recent trends show that since 1995, 64 countries have exhibited an increase in deposit dollarization (World Bank, 2014). This is quite at odds with the fact that inflation which has long represented one of the standard explanations for the phenomenon has declined at nearly a concomitant rate throughout the 1990s. Thus dollarization experiences also demonstrate the incidence of the dollarization hysteresis, which implies that dollarisation cannot be easily reversed as a consequence of

³⁹ Within the first group whose strategy was administrative in nature, the prominent one is Argentina, which obliged its residents –without previous notice – to transform foreign currency deposits into pesos, in the wake of the 2001 crisis.

⁴⁰ Bolivia and Peru tried to de-dollarize by introducing serious limitations on the availability of foreign currency deposits, but after some years had to allow for dollar deposits again due to increasing capital flight.

⁴¹ Reinhart, Rogoff and Savastano (2003) identify only four successful cases (Israel, Mexico, Palestine and Poland) out of a total of 86 countries of significant and persistent deposit de-dollarisation

⁴² The incidence of dollarization gives rise to an interesting fact when inflation has been tamed, dollarization continues to increase in many countries (Berg and Borensztein, 2000).

⁴³ The so-called hysteresis in the dollarization process is probably easier to explain for asset substitution than for currency substitution as foreign currency denominated assets would still provide insurance against the probability of a return to inflation and devaluation.

perceived lack of policy credibility and expected volatility of the local currency.⁴⁴ This implies that reversing dollarisation may be difficult because changes in practices regarding the settlement of transaction may be a slow process that depends on institutional changes and take place only when there are significant benefits to be gained by switching currencies.

2.7 Empirical Literature Review

2.7.1 De- Dollarisation

Empirical literature on the causes of de-dollarization is scant. Evidence of both forced/administrative de-dollarisation successes and market led de-dollarisation successes is mixed. To this effect, Ize and Yeyati (2005), in their paper discusses whether de-dollarization shall be a policy objective and if so how best to pursue this objective. They review existing theories of defacto dollarization and the extent to which they are supported by the available evidence conclude that countries where dollarization is substantial should consider a proactive dedollarization strategy as a policy option. However before embarking on an overly ambitious policy agenda, dollarized countries should make all the necessary research efforts to understand well the roots of their initial dollarization, its risks and costs (hence the benefits of de-dollarizing), and the implications of policy reforms (including in particular the calibration of prudential reforms). Understanding the complexity of the phenomenon and its important economic implications is a natural first step for any meaningful de-dollarisation attempt. This study is based on a qualitative survey that does not show the factors that induce de-dollarisation and only consider a few countries thereby leaving out other countries with peculiar circumstances with full dollarisation like Zimbabwe.

Another study by Fernandez-Arias (2005) also applies a similar methodology in Latin America over the last two decades. The paper analyzes the sources of liability dollarization in a portfolio framework and identifies the failures leading to excessive dollarization meriting policy intervention as well as the reasons why de-dollarization policy often goes awry. It then derives an analytically sound multipronged domestic de-dollarization program that takes into account the risks of misdiagnosis and the experience, both successful and failed. This program centers on the development of good local currency substitutes for dollar debt, such as CPI-indexed debt, rather than the repression of dollar debt. Relevant for investigating a probable de-dollarisation strategy for Zimbabwe are the experiences highlighted by

⁴⁴ According to Balino, Bennet and Barenzstein (1999) institutional changes that bolster the credibility of sustainable macro-economic policies are critical, such as an independent Central Bank with a clear mandate to stabilise prices.

Fernandez-Arias (2005) that depict that as much as de-dollarisation can be achieved it can just as easily be missed. On the extreme blunt de-dollarization measures repressing dollarization may easily fail to solve fragility and, instead, foster risky short-term debt or provoke massive financial disintermediation and crisis.

Naceur *et al* (2015) used dynamic panel data model in the Caucasus Central Asian Countries (CCA) which has some of the world`s highest dollarisation ratios with adverse consequences for macro-economic stability, monetary policy transmission and financial sector development. Their sample covered the period 2001Q1 to 2014Q1. Although the research methodology may not apply to this study given the multiplicity of countries under investigation and their consideration of only partially dollarized countries, it is worth noting their findings which border on volatile inflation, exchange rates, low financial depth, and asymmetric exchange rate policies biased toward depreciation is key in fostering de-dollarisation. In addition these researchers inferred from successful de-dollarisation country experiences that success could be achieved by pursuing a targeted menu of macroeconomic and financial stability measures de-dollarisation. Moreso, critical for this study is their assertion that there is no unique formula for success in de-dollarisation and emphasised that in implementation, policymakers need to consider proper sequencing of policies, effective communication as well as risks from potential financial disintermediation and instability, and/or capital flight.

Mecagni and Mauro, 2015 examined evidence from 42 highly dollarized countries, with a focus on Sub Saharan Africa. Their methodology takes the form of a two-pronged approach on the basis of country case studies and a pooled cross-sectional data regression analysis over the period 2001 to 2012. The variables used included real GDP growth, inflation, current account balance, fiscal balance, stock of public debt, stock of external debt and democracy(proxy used is the Polity IV). Their findings show that one-fourth of the countries significantly reduced dollarisation levels over the period of study. Their results highlight that macroeconomic stability, low inflation, high growth, and a prudent fiscal balance are key ingredients for success in de-dollarising. Results from this study further suggest thresholds for successful de-dollarization as inflation below 9% and fiscal deficit below 2%. Also insightful in the crafting of an effective de-dollarisation for Zimbabwe are their research findings that successful cases of de-dollarisation were witnessed from countries that had higher initial levels of dollarization and also started with more external debt but with a better current account balance and a higher Polity IV democracy index, compared with unsuccessful

countries. In addition, their conclusion that “successful de-dollarization requires an appropriate mix of sound macroeconomic policies, market-based incentives, and micro prudential measures, notwithstanding the fact that de-dollarization requires time and persistent, coordinated efforts” is informing for this study. A line of caution raised in their study that mandatory measures and direct controls have been useful only when they were used as a complement to a market-based strategy, and proved ineffective or worse, counterproductive, otherwise⁴⁵ is crucial for the implementation of an effective de-dollarisation strategy.

However, Mecagni and Mauro, 2015 took no consideration of a fully dollarized economy where variables such as the appreciation or depreciation of the domestic currency are irrelevant. Instead the de-dollarisation is induced to an extent by the over/under valuation of the US dollar relative to the Zimbabwean economic fundamentals. Also on the downside of their analysis is the exclusion of countries like Zimbabwe with peculiar economic conditions such as galloping inflation of 231 million percent (CSO) in 2008 and subsequent deflation after dollarisation in 2014. Such conditions would have a bearing on crafting an effective de-dollarisation strategy.

Using a different approach which segregated dollarisation into credit and deposit dollarisation García-Escribano and Sosa (2011) in their study, explored the short-term drivers of both credit and deposit in Bolivia, Paraguay, Peru and Uruguay. Their methodology was informed by a standard unrestricted vector auto regression analysis on macroeconomic variables, prudential regulations, and the development of the capital market in domestic currency. They found that the drivers of deposit de-dollarization are different from those of credit de-dollarization as exchange rate appreciation was significant in explaining deposit de-dollarization, while the introduction of prudential measures to create incentives to internalize the risks of dollarization fostered credit de-dollarization. For instance they show that the development of the capital market in local currency (for example, through the issuance of long-term treasuries in local currency) has been one of the drivers of credit de-dollarization as it has facilitated bank funding and pricing of long-term loans in domestic currency. Important for crafting an effective de-dollarisation strategy for Zimbabwe are their assertions that introducing prudential measures while maintaining macroeconomic stability and strong

⁴⁵ Of the countries that implemented measures to force rapid de-dollarization, only Mexico and Pakistan succeeded in keeping dollarization low (2.5 and 5.2 percent respectively at end-2007), although in both there were adverse macroeconomic consequences.

fundamentals would help deepening de-dollarization. However the study by García-Escribano and Sosa (2011) considered instances of partial dollarisation which are at variance with the Zimbabwean situation.

Another study which also was informing for the investigation of an effective de-dollarisation strategy is by Kokenyne *et al* (2010) who through an explanatory approach provide a summary of the key policies that encourage de-dollarization. Their focus is on instances where monetary authorities' intention is to gain greater control of monetary policy and draws from experiences of countries that have successfully de-dollarized. Similar to García-Escribano and Sosa (2011), their paper examines both macroeconomic stabilization policies and microeconomic measures, such as prudential regulation of the financial system. The main conclusion is that durable de-dollarization depends on a credible disinflation plan and specific microeconomic measures.

Empirical literature is also laden with mixed outcomes as Barajas and Morales (2003) who focussed on credit de-dollarisation provide evidence that greater exchange rate volatility reduces credit dollarization in a sample of Latin American countries. In contrast, Rennhack and Nozaki (2006), and Neanidis and Christos (2009) do not find evidence that a more flexible exchange rate regime, by itself, promotes de-dollarization.

Out of the view studies focusing on Zimbabwe, Bonga and Dhoro (2015) used an explanatory and empirical approach and found that adequate reforms have been emphasized before de-dollarisation occurs. Another descriptive study by Kramarenko *et al* (2010) considered the Zimbabwean currency issue in a paper that examined a wide range of issues relating to the post-hyperinflation Zimbabwe economy⁴⁶. The study similarly concludes that the reintroduction of an independent domestic currency would not be feasible for the foreseeable future, because of the need for a long history of policy credibility. However a quantitative analysis would be important to measure the significance of policy variables in informing an effective de-dollarisation strategy. Meanwhile Hawkins (2009) concludes that “there are compelling arguments against a return to the Zimbabwe dollar”; that “the multi-currency system can be made to work but is flawed and suboptimal”; and that “there is no overwhelming economic case for preferring the rand [but that] ... the rand is the pragmatic option”. Robertson (2009) also reviews various options and

⁴⁶ This paper goes into some detail in examining trade patterns, and the correlation of terms of trade movements and economic shocks between Zimbabwe and South Africa and Zimbabwe and the USA, in order to determine which might be the most appropriate foreign currency to use.

concludes that reintroducing an independent domestic currency is not feasible but focuses on the political, economic and institutional reform pre-requisites for currency stability. NECF (2009) posits that Zimbabwe “must have” its own currency for reasons of fiscal and monetary autonomy, and as a result does not consider that the use of foreign currencies for a prolonged period is feasible or desirable. However, it took the view that re-establishing the credibility needed for the reintroduction of a domestic currency could be achieved relatively quickly (within 3-4 years).

A study by Schuler (2005) showed that most countries that were dollarized and subsequently instituted their own currencies have performed worse in terms of monetary stability than they would have by remaining dollarized. For instance Cuba used the USD in the Century; introduced silver certificates issued by its treasury in 1934 and in 1950 established a central bank. Their study also concluded that the time frame for dollarization must be reasonable even a decade is probably not long.

It is evident from the empirical analysis above that consideration of countries that experienced de-dollarisation would be informing for an effective de-dollarisation strategy for Zimbabwe as shown below in Table 4.

TABLE 4: COUNTRY CASE STUDIES

Country and period	De-Dollarisation Strategy	Outcome
<p>Israel- Dollarisation was precipitated by a high and rising inflation throughout the 1970s, which further accelerated, reaching about 445 percent in 1984, in the context of a broad deterioration in macroeconomic conditions.</p>	<p>-Israel adopted a comprehensive strategy based on macroeconomic stabilization and prudential measures. -Fiscal consolidation which entailed cutting the fiscal deficit from 19 percent of GDP in 1985 to about 10 percent in the late 1990s.</p>	<p>- Resulted the share of deposits in dollars dropping significantly from over 50% in 1985 to 15% in 2004 - Restored confidence in the local currency by reducing inflation under an inflation targeting regime, while gradually increasing exchange rate flexibility</p>
<p>Bolivian - had a hyperinflation in the mid-eighties, with the inflation rate reaching 11,750% in yearly terms (Miguel Lebre de Freitas, 2003) -dollarization experience began in 1982</p>	<p>dedollarise through a mandatory conversion of foreign currency deposits into domestic currency. - Between November 1982 and August 1985, FCD were banished from the domestic banking system and converted into domestic currency at a below market exchange rate. -Early 2000, the government resumed the de-dollarisation attempt based on prudent macro economic policies accompanied by incentives to hold financial assets in domestic currency which included: -i) higher reserve requirements on foreign currency deposits, ii) higher requirements on foreign currency loans, iii)developed capital market for local currency bonds , beginning with government bonds and moving gradually to longer maturities (1 to 15 years)</p>	<p>- The consequences of these measures were fatal resulting in severe macro economic instability. - By 1985 the government had no choice but allow residents to hold deposits in foreign currency again. - By 2012 the share of deposits and loans dominated in foreign currency had declined to 25% and 21% respectively from the previous levels of 94% and 97% respectively in 2001.</p>
<p>Peru: Inflation reached a peak rate well in excess of 7600% a year in 1990.</p>	<p>In the mid 1980s Peru attempted to reduce dollarisation by forcibly converting foreign currency deposits to local currency. - Began de-dollarisation early 2000-by strengthening macro economic stability through fiscal surpluses , lower public debt ,inflation targeting ,boosting international reserves</p>	<p>-resulting in capital flight and a decline in financial intermediation - Again the government returned to dollarisation</p>
<p>Mexico- Mexico September 1982</p>	<p>- August 16 default on external debt September 1 , nationalization of banks in response to banking crisis. -Emerges from default in 1990 -Dollar deposits are allowed in December 1985</p>	<p>Successfully Dedollarised</p>
<p>Angola- Hyperinflation reached an all time high of 100% when the civil war ended in 2002 meanwhile the kwanza depreciated by 1600% against the dollar between 2001 - 2014</p>	<p>Used both market based and administrative measures as follows, i)improved macro economic stability and increased confidence in the kwanza. ii)reduced inflation to single digits (below 8% in 2013).</p>	<p>Successfully Dedollarised</p>

<ul style="list-style-type: none"> - the extensive rise of dollars by the oil sector to settle local suppliers as Angola continued to highly dependant on oil revenues - the higher reserve requirements on kwanza than on dollar deposits which encouraged banks to offer clients more attractive rates on dollar deposits on loans 	<ul style="list-style-type: none"> iii)stabilized the foreign exchange rate. iv)elaborated on a package of complementary -Limited the extension of foreign exchange dominated consumer credit to foreign exchange earners only -Phasing of the oil sector foreign exchange law which since mid 2013 required oil sector settle all domestic obligations including taxes and payments to local suppliers in local currency purchased in domestic banks 	

Source: Reinhart, Rogoff and Savastano (2003), Guidotti and Rodriguez (1992), Kamin and Ericsson (1993) Clements and Schwartz (1993), Mueller (1994) Mongardini and Mueller,(1999) Reding and Morales (1999)

2.8 Conclusion

The above theoretical and empirical literature shows that dollarization is a complex enough problem to think that simple rules will pose a solution for every country. It is generally agreed that dollarisation is a positive stance for stabilisation in the short run and several countries have adopted such regime to attain stability. However there is no precise blue-print to be followed by a prospective de-dollarising country. The feasibility of such an agenda remains controversial and needs to be viewed within a broad macro-economic and institutional context. There is general consensus that to ensure successful implementation, policymakers need to consider proper sequencing of policies, effective communication as well as risks from potential financial disintermediation and instability, and/or capital flight.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

Reviewing the relevant literature and outlining the proposed theoretical framework for the study assists in making the necessary methodological choices and constructing the appropriate model specification. Therefore, the outline of the research methodology of this study is presented in this chapter. Furthermore, this chapter presents the empirical model, definition and justification of variables as well as the data sources used in this study as well as diagnostic tests carried out.

3.2 Theoretical Model Specification

This study seeks to investigate an effective dedollarization strategy for Zimbabwe. The research procedure takes the form of an Ordinary Least Squares regression to determine the factors that induce dedollarisation while Probit regression analysis is used to determine the probability of successful de-dollarisation.

To investigate an effective de-dollarisation strategy for Zimbabwe, the study examines the factors that facilitate de-dollarisation by adopting the procedure by Mecagni and Mauro, 2015 and modified it to an OLS regression on time series data as follows:

$$Doll_t = \alpha_1 + \alpha_2 GDP + \alpha_3 INFL + \alpha_4 IDI + \alpha_5 CAB + \alpha_6 DBT + \alpha_7 FB + \varepsilon_i$$

Where: $Doll_t$ = Dollarisation Ratio at time t

GDP01= Real GDP Growth Rate

INFL=Inflation

CAB=Current Account Balance

FB=Fiscal Balance

DBT=External Debt

IDI= Institutions

ε_i = Error Term

Although there have been no specification tests, it is apparent that the linear functional form is extensively used in the empirical literature and yields worthy results, hence, the study will adopt the model followed by Mecgani and Mauro (2015), with some modification since the data in this study is only for a single country, Zimbabwe using annual time series data, while Mecgani and Mauro (2015) uses a pooled cross sectional analysis of quarterly data from 42 countries. Similar variables with the exception of exchange rate are used in this study to run an Ordinary Least Squares regression analysis to determine which factors are likely to induce dedollarisation and same variables also used to run the Probit Regression analysis. Exchange rate was left out due to huge outliers in data and also given the period of full dollarisation where the exchange rate seemed an irrelevant variable.

3.3 Definition and Justification of Variables:

3.3.1 Dollarisation Ratio (DR)

The dependant variable, is the dollarisation ratio which is an indicator of the level of dollarisation of a monetary regime. However, a major limitation in the empirical analysis of dollarisation/dedollarisation is that of measurability and quantification of when a previously dollarized country qualifies to be called dedollarised. Most estimates of the degree of dollarization do not include foreign currency in circulation, largely because it is difficult to measure⁴⁷. Therefore the most popular proxy is the ratio of foreign currency deposits (FCD) to domestic money (Dollarisation Ratio). This study looks at the ratio of foreign currency deposits to total deposits or to broad money, while others like Reinhart, Rogoff, and Savastano (2003), construct an index of economic and financial indicators to capture a broader concept of dollarization. The study is informed by Baliño, Bennett, and Borenstein (1999) who consider an economy to be highly dollarized if the ratio of foreign currency deposits to broad money exceeds 30 percent. Thus a country that was initially dollarized is said to have “de-dollarized” if:

- (1) its three-year average dollarization ratio has declined by at least 20% over the study period
- (2) the average proportion of foreign currency loans to total bank loans has not increased over a three-year period.

⁴⁷ Zimbabwe has a large informal economy that involves huge foreign currency transactions that are not banked (RBZ, 2016).

During the period 1980 to 2016 (period of study), dollarisation ratio had a wide range from very low levels of around 10% in the decade from 1980 to 1990 to high levels 94,5% by 2007 and 100% from 2016 (Mecagni and Mauro, 2015) when Zimbabwe was officially dollarized. Thus in the first decade DR was not prevalent as foreign currency holdings were mostly for international trade settlement and to a lesser extent for portfolio purposes (asset substitution), while the period post 2003 to 2008 has both transactions/currency dollarisation and asset substitution or portfolio dollarization increasing though unofficially before hitting the 100% mark at official dollarisation (2009-2016). However, the study considers the dollarisation ratio to begin to fall marginally since November 2016 with the introduction of the local currency proxy (Bond notes), which we view as not the same as the United States Dollar as the Bond Note is printed by the Zimbabwean monetary authority and cannot be traded beyond Zimbabwean borders. This marks the beginning of partial de-dollarisation to complement the multi-currency system mainly motivated to a greater extent by transactional convenience. The study posits that the dollarisation ratio is explained by the following factors that induce de-dollarisation⁴⁸, namely growth rate, fiscal balance, current account balance, external debt, inflation and institutions, which are explained below.

3.3.2 Real GDP Growth Rate (GDP01)

It measures economic growth, in relation to gross domestic product (GDP), from one period to another, adjusted for inflation - in other words, expressed in real as opposed to nominal terms. The real economic growth rate is expressed as a percentage that shows the rate of change for a country's GDP from one period to another, typically from one year to the next. The real economic growth rate, is a more useful measure than the nominal GDP growth rate due to the fact that it takes into account the effect that inflation has on economic data. The real economic growth rate is a "constant dollar" figure, and therefore provides a consistent measure, one that is not subject to being distorted by periods of extreme inflation or deflation which normal characterise dollarisation experiences as shown by Reding and Morales (1999) Mueller (1994) for Bolivia and in Lebanon (Mongardin and Mueller, 1999). From these studies as the economy grows, economic agents develop confidence in their own economy and consequently increase holdings of domestic assets, while reducing preference for foreign assets, therefore positing a negative relationship with dollarisation ratio for this study.

⁴⁸ By hindsight the same factors can explain dollarisation. Only the signs differ since the phenomena of dollarisation and dedollarisation are mirror images of each other.

3.3.3 Inflation (INFL)

This is a measure of the price level. Of critical importance are stability issues. As evidenced from empirics, most countries dollarized to tame instability, with inflation being the major culprit. The dynamic panel data model by Naceur *et al*(2015) used inflation as one of the key variables and their findings depicted that demand for foreign currency loans and deposits in the Asian countries was mainly driven by volatile inflation among other factors. Similarly, a study by Garcia- Escribano (2011) in their analysis of de-dollarization across categories of loans and deposits in Peru, used inflation as a proxy for stability. Their findings also reveal that macroeconomic stability is one major driver of de-dollarization. As inflation rate rises, economic agents move away from domestic holdings of own currency in favour of stable and stronger currencies thereby increasing the dollarisation ratio. From the above analysis, the study posits a positive relationship between dollarisation ratio and inflation. By inference de-dollarisation is synonymous with low values of the dollarisation ratio.

3.3.4 Current Account Balance (CAB)

It represents the difference between a nation's savings and its investment. The current account balance is a vital pointer of an economy's health which is derived from the sum of the exports (goods and services) less imports of the same, net of income from abroad and current transfers. The CAB is influenced by factors such as trade policies and currency valuation.

The study by Mecagni and Mauro (2015) depicts that a current account surplus or a deficit below 3 percent of GDP at initial period also increased the probability of success in de-dollarisation ratio by about 30 percent. A positive CAB shows an improvement in the health of the economy and builds confidence in economic agents to prefer domestic holdings of assets as well as transact in local currency thereby reducing the dollarisation ratio. Therefore the study considers a negative relationship between dollarisation ratio and CAB.

3.3.5 Fiscal Balance (FB)

This relates to money government receives from tax revenue and the proceeds of assets sold, minus any government spending. When the balance is negative, the government has a fiscal deficit. When the balance is positive, the government has a fiscal surplus. However a fiscal space narrows, there is an incentive for printing more money, which can only be possible in the presence of monetary policy and own currency (Feige and Dean, 2002). Therefore de-dollarisation increases when fiscal space is narrow. The study infers a positive relationship between dollarisation ratio and fiscal balance.

3.3.6 External Debt (DBT)

According to the International Monetary Fund, "Gross external debt is the amount, at any given time, of disbursed and outstanding contractual liabilities of residents of a country to non-residents to repay principal, with or without interest, or to pay interest, with or without principal". Debt liabilities include arrears of both principal and interest. A study by Mecagni and Mauro (2015) has shown that countries with a huge external debt burden overtime find it almost impossible to de-dollarise. In addition countries that de-dollarized implemented a significant reduction in external debt. Therefore the study projects a positive relationship between external debt and dollarisation ratio.

3.3.7 Institutions (DIDI)

Measured by Polity IV which is published by the Center for Strategic Peace as part of its INSCR (Integrated Network for Societal Conflict Research) database, measures institutional democracy on an 11-point scale (0–10) by combining indices that assign a quantitative(coding) to different features that qualify the competitiveness of political participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive (such as, the presence of contested elections). The index takes large negative values to describe particularly fluid or volatile situations, such as foreign interventions, anarchy/interregnum, or transition between regime conditions often leading to failed de-dollarisation experiences such as DRC. There is a negative relationship between dollarisation ratio and institutional development.

3.4 Data Sources

The econometric analysis uses annual time series data (1980 to 2016) extracted from the Reserve Bank of Zimbabwe, Zimbabwe National Statistical Agency(Zimstat), Ministry of Finance and World Bank Reports, World Economic Outlook Database, African Forum On Debt And Development (Afrodad) and International Monetary Fund (IMF).

3.5 Model Estimation Procedures

3.5.1 Ordinary Least Regression Analysis

A number of methods can be used to estimate regression functions including the General Method of Moments (GMM), the Generalised Least Square Method (GLS), Fixed Effects (FE) and Random Effects (FE). The study will adopt the Ordinary Least Squares (OLS) method after conducting a Ramsey Reset test for model adequacy. We will first run an OLS

regression which gives the minimum sum of squared deviations between the explained and the explanatory variables.

To ensure that the data does not violate the basic Classical Linear Regression Model (CLRM) assumptions, diagnostic tests will be conducted. Multicollinearity tests will be done to assess the randomness of regressors. It will be tested using the Correlation Matrix. We will consider pair wise correlation coefficient from the Correlation Matrix and Pair-wise correlation coefficient scores of 0.8 (absolute) or in excess between two explanatory variables show the existence of Multicollinearity in which case a solution to this may be to drop one of the correlated variables (Gujarati, 2004). Normality is one of the assumptions of the CLRM, to check for normality the Jacque-Bera (JB) may be employed or one may consider the Skewness and Kurtosis of the data. The study will consider the later, where Skewness measure closer to 0 and Kurtosis = 3 represent data that is normally distributed.

In the presence of heteroskedasticity the OLS estimates will no longer be BLUE hence to test for this we will make use of the Breusch-Pagan test for heteroskedasticity. The presence of auto-correlation has the same consequences and solution as those of Heteroskedasticity, tests for serial correlation include the Durbin-Watson (*d* test), the Breusch-Godfrey Serial Correlation LM Test for autocorrelation.

A general goodness of fit test for the model will be tested using the R-squared which is a coefficient of determination. It estimates the percentage of variations in the explained variable that can be accounted for by the explanatory variables in the model as R-squared ranges from 0 to 1, the higher its value towards one the better the model, because R-squared tends to increase with the addition of variables, we will be guided by the adjusted R-squared which adjusts for degrees of freedom. Adjusted R-squared is a statistical measure which indicates the suitability of the model and has no economic interpretation. We will apply the F test to test for the overall significance of the model. To examine the significance of individual explanatory variable we will make use of the P-values test which will be considered at the 10% level of significance. The Ramsey Regression Equation Specification Error test (RESET) for misspecification will be carried out. The test detects omitted variables and incorrect functional form of the model (Ramsey, 1969). The mechanics of the test is that, if non-linear combinations of the explanatory variables have any power in explaining the dependent variable, then the problem of misspecification exists.

3.5.2 Probit Estimation Procedure (Probability of De-dollarisation)

One of the research questions is to determine the possibility of successfully dedollarising for Zimbabwe. The researcher will present the probit model based on utility theory, or rational choice perspective on behaviour, as developed by McFadden in order to calculate the odds ratio in favour of successful de-dollarization as was applied by Mecagni and Mauro (2015) where the model is expected to predict “success” whenever it returns an estimated probability of dedollarization equal or higher than 50 percent.

The dummy variable for the Probit Estimation was 1= successful dedollarisation.

0= Unsuccessful dedollarisation

From the definition of the depended variable, the dollarisation ratio, the classification is such that successful dedollarisation, which is 1 represents the dollarisation ratios less than 30% and for Unsuccessful dedollarisation which is zero is represented by dollarisation ratios greater than 30% in accordance with assertions by Baliño, Bennett, and Borenstein (1999).

This odds ratio in favour of successfully de-dollarising is determined by an unobservable utility index (Ii) (also known as a latent variable), that is determined by one or more explanatory variables, say CAB (Xi) in such a way that the larger the value of the index (Ii) the greater the probability of a successfully de-dollarising.

The index I_t is expressed as:

$$I_t = \beta_1 + \beta_2 GDP + \beta_3 INFL + \beta_4 IDI + \varepsilon_t \dots\dots\dots (1)$$

where GDP01= Real GDP Growth Rate

INFL = Inflation

IDI=Institutional Variable (Democracy Index)

ε_t = Error term

Given the assumption of normality, the probability that I^* is less than or equal to I_i can be computed from the standardized normal CDF as

$$P_t = P(Y = 1 / X_t) = P(I_t \leq I_t) = F(\beta_1 + \beta_2 GDP01 + \beta_3 INFL + \beta_4 IDI + \beta FB + \varepsilon_t) \dots\dots\dots (2)$$

Where $P(Y=1|X)$ means the probability that de-dollarisation occurs given the value(s) of the explanatory variables and where Z_t is the standard normal variable, i.e., $Z \sim N(0,2)$. F is the standard normal CDF. Thus, in the probit models all the regressors are involved in computing the changes in probability.

The probit regression uses the Maximum Likelihood Method. Since we are using the method of maximum likelihood, which is generally a large-sample method, the estimated standard errors are asymptotic. As a result, instead of using the t statistic to evaluate the statistical significance of a coefficient, we use the (standard normal) Z statistic. So inferences are based on the normal table because when sample size is reasonably large, the t-distribution converges to the normal distribution. Hosmer- Lemeshow goodness of fit test was used to test for the overall goodness of fit and adequacy of the model.

3.5.3 Marginal Effects

Marginal effects are calculated to find out the effect of say a unit change in any one of the variables on the probability that $Y=1$, that is, de-dollarisation is successful. To do this, the derivative of equation (2) with respect to each variable is computed as follows:

$$\frac{dP}{dX_t} = f(\beta_1 + \beta_2 GDP + \beta_3 INFL + \beta_4 IDI) \beta$$

3.6 Conclusion

This chapter presented the methodology and procedures used to investigate the factors that induce dedollarisation and determine the probability of successful de- dollarisation in Zimbabwe. This includes a brief evaluation of the model specification, definition and justification of the variables, data sources and diagnostic tests carried out. The next chapter focuses on the estimation, presentation, economic interpretation and discussion of the results.

CHAPTER FOUR

ESTIMATION, PRESENTATION AND INTERPRETATION OF RESULTS

4.0 INTRODUCTION

The purpose of the study is to investigate an effective dedollarisation strategy as well as establish the probability of successfully de-dollarizing. This chapter's key focus is on the estimation, presentation and interpretation of the research findings. Therefore, this chapter will enable us to test the research hypotheses and answer the research questions posed in Chapter 1. Presented first is a summary of statistics followed by heteroscedasticity, correlation and multi-collinearity analysis. The Ramsey Reset specification for model specification test, Ordinary Least Squares and Probit regression results as well as interpretations of results are then presented. Eviews Version 9 was used for OLS regression while Stata Version 13 was used for the Probit estimation.

4.1 Descriptive Statistics

Below is a summary of descriptive statistics from 36 observations over the period 1980-2016.

TABLE 5: DESCRIPTIVE STATISTICS

	DR	CAB	DBT	FB	GDP01	IDI	INFL
Mean	44.99978	-139.8135	4.511257	1.075227	8.563108	51.78378	1.32E+10
Median	24.00000	-32.00000	4.444500	1.157000	8.290000	59.00000	18.00000
Maximum	100.0000	6.000000	10.57800	2.584000	14.20000	70.00000	4.89E+11
Minimum	9.200000	-674.0000	0.785000	-2.807000	4.420000	21.00000	-2.400000
Std. Dev.	36.68580	176.6290	2.085576	1.430147	2.473034	14.40705	8.04E+10
Skewness	0.672973	-1.183019	0.720430	-0.919956	0.943987	-0.902326	5.833333
Kurtosis	1.604203	3.647270	3.660535	2.982164	3.413833	2.560477	35.02778
Jarque-Bera	5.796392	9.276355	3.873263	5.219459	5.759205	5.318671	1791.247
Probability	0.055123	0.009675	0.144189	0.073554	0.056157	0.069995	0.000000
Sum	1664.992	-5173.100	166.9165	39.78339	316.8350	1916.000	4.89E+11
Sum Sq. Dev.	48450.53	1123121.	156.5866	73.63155	220.1724	7472.270	2.33E+23
Observations	37	37	37	37	37	37	37

As indicated by the standard deviations, the variations of external debt (DBT), fiscal balance (FB), growth rate (GDP01) and inflation (INFL) are quite small whereas larger for dollarisation ratio (DR), current account balance (CAB) and institutional variable (IDI). The minimum and maximum values were used to identify outliers in the data. Current account balance, fiscal balance, and institutional variable are negatively skewed while dollarisation ratio, external debt, growth rate and inflation are positively skewed. The variables, DR, DBT, FB, GDP01, and IDI are normally distributed and only two variables CAB and INF are not normally distributed as seen by the Jarque-Bera probability values.

4.2 Diagnostic Tests

4.2.1 Stationarity Tests

⁴⁹Augmented Dickey Fuller (ADF) test was used to test for stationary and the results are shown in Table 6.

TABLE 6: AUGUMENTED DICKEY FULLER STATIONARITY TEST

Variables	t-ADF	Critical -1%	Critical -5%	Critical -10%	Conclusion
D(DR)	-5.361629	-4.243644	-3.544284	-3.204699	I(1)
CAB	-6.405253	-4.234972	3.540328	-3.202445	I(0)
D(DBT)	-7.871171	-4.243644	-3.544284	-3.204699	I(1)
D(D(GDP01))	-4.6060084	-4.262735	-3.552973	-3.209642	I(2)
IDI	-5.430085	-4.234972	-3.540328	-3.202445	I(0)
INFL	-6.063090	-4.234972	-3.540328	-3.202445	I(0)

On the basis of the Null Hypothesis that there is no unit root against an alternative that there is unit root, it was found that Current Account Balance, Institutions and Inflation were stationary at level at 1% level of significance. Whereas, dollarisation ratio and debt, were not stationary at level but were found to be stationary at their first differences at 1% level of significance. Growth Rate (GDP01) was not stationary at level but was found to be stationary after second differencing at 1% level of significance.

⁴⁹ See appendix A

4.2.2 Heteroscedasticity

A heteroskedasticity test was performed to check if variances of error terms were homoskedastic. The Breusch –Pagan-Godfrey Test shown in Appendix B was used to test for heteroscedasticity and shows that the probability value 0.8414 which is greater than 0.8 so we may fail to reject the null hypothesis at 5% level of significance, no evidence of heteroskedasticity⁵⁰

4.2.3 Normality Test

The Jarque –Bera calculated statistic was found to be 1.181420 while the probability was found to be 0.553934. The probability value is greater than 0.05 thus we conclude that errors are normally distributed at 5% level of significance⁵¹.

4.2.4 Autocorrelation

The Breusch-Godfrey Serial Correlation LM Test was used to test for autocorrelation. The null Hypothesis being there is auto correlation against the alternative hypothesis is that there is no auto correlation. ⁵²The p-value is greater than α at 10 % level of significance. It shows there is no auto correlation.

4.2.5 Multicollinearity

A Pearson’s correlation test was carried out for all the variables. Variables are correlated if the correlation statistic is more than 0.8 or less than -0.8. The results of the test showed that there was low correlation among explanatory variables. The results show that all the absolute values of the partial correlation coefficient are less than 0.8 as shown in Table 7. This implies that there is no serial multi-collinearity among the variables. Therefore we can isolate individual effects of explanatory variables on the explained variable.

TABLE 7: CORRELATION MATRIX

	DR	CAB	IDI	DEBT	FB	GDP01	INFL
DR	1.000000						
CAB	-0.644051	1.000000					
IDI	-0.337200	0.021180	1.000000				
DEBT	0.727097	-0.497861	-0.270761	1.000000			
FB	0.791301	-0.395782	-0.280679	0.607297	1.000000		
GDP01	0.724248	-0.337098	-0.427523	0.792653	0.464200	1.000000	
INFL	0.239500	-0.153237	-0.186376	0.099110	0.209068	0.021670	1.000000

⁵⁰ See appendix B

⁵¹ See Appendix C

⁵² See appendix D

4.2.6 RESET Test

The Ramsey Regression Error Specification (RESET) shows no evidence of model misspecification. The Chi – squared statistic for the test is 0.14 with the p- value of 0.9216. The p- value was statistically significant at 5 % level and the null hypothesis that the model was correctly specified was accepted.⁵³

4.3 The Ordinary Least Squares Model Estimation (OLS) Results

TABLE 8:OLS REGRESSSION RESULTS

Dependent Variable: DDR
Method: Least Squares
Date: 05/03/17 Time: 09:32
Sample (adjusted): 1981 2016
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.750750	1.770498	2.683285	0.0119
CAB	-0.039755	0.006976	-5.698553	0.0000
DID11	-0.704566	0.159018	-4.430728	0.0001
DFB1	4.296861	2.247705	1.911666	0.0658
DGDP01	1.831808	0.603291	3.036358	0.0050
INFL	-1.18E-11	9.31E-12	-1.266846	0.2153
DEBT	-2.653837	0.728286	-3.643947	0.0010

R- squared 0.807028 *Durbin-Watson Stat* 1.748988

Adjsuted R-Squared 0.767103 *Prob(F-Statistic)* 0.00000

The whole model is significant at 1%. Since R-squared is 80.7%, it shows 80.7% of variation in dollarisation ratios is explained by variables included in the model and 19.53% is explained by other variables not included in the model. The adjusted R-squared is a quality measure of R-squared is about 76.7% which is closer to 80.7%.⁵⁴

4.3.1 Discussion of OLS Estimation Results

The current account balance is significant at 1% and shows that it has an influence on the dollarisation ratio. As expected, a unit increase in the current account balance will lead to a fall in the dollarisation ratio by 0.039755 which implies an increase in de-dollarisation. This is consistent with findings by Mecagni and Mauro (2015) who depicts that a current account surplus or a deficit below 3 percent of GDP at initial period also increased the probability of

⁵³ See Appendix E

⁵⁴ See Appendix F

success in de-dollarisation ratio by about 30 percent. Thus a positive current account balance shows an improvement in the health of the economy and builds confidence in economic agents to prefer domestic holdings of assets as well as transact in local currency thereby reducing the dollarisation ratio, positing a negative relationship with dollarisation ratio, thereby inducing dedollarisation.

In line with expectations the coefficient of debt is negative. A unit increase in debt will result in a decrease in the dollarisation ratio by 2.653837 and significant at 10%. This is consistent with dollarisation theory and country case studies with a similar unsustainable stock of debt which have tended to move towards de-dollarisation(decrease in dollarisation ratio) so as to create scope for expansionary monetary policies as was the case in Argentina in the early 80` when the government attempted for force de-dollarisation. The findings by Mecagni and Mauro (2015) show that an initial stock of public or external debt above 40 percent of GDP increased the probability of successful de-dollarisation by 25 percent.

Growth Rate is positively correlated to dollarisation ratio in line with the Portfolio Balance theory which posits positive returns on assets where the Growth Rate is increasing. The findings are also consistent with findings by Garcia- Escribano (2011) also reveal that macroeconomic stability is one major driver of de-dollarization. Growth Rate is significant at 10%. A unit increase of growth rate will lead to 1.831808 increases in dollarisation ratio.

As expected fiscal balance which is significant at 10% is also positively correlated to dollarisation ratio a unit increase of fiscal balance will result in an increase in dollarisation ratio by 4.296861. This is consistent assertions with the Liquidity Services Model by Staines (2014) who posits that a stronger fiscal balance encourages local investors to purchase long-term government bonds in local currency, facilitating the extension of the yield curve and the development of the local financial market.

As expected institutions are negatively correlated to dollarisation level, implying that as institutions improve, credibility improves as well thereby giving economic agents confidence in transacting (currency substitution) and holding their portfolio in domestic currency(asset substitution). This is consistent with assertion by Acemoglu et al., (2005) that a good institutional environment is a sufficient to induce economic growth.

Institutions are significant at 1%. A unit increase in DIDI will result in a 0.704566 increase in dollarisation ratio. This is consistent with assertions by Balino, Bennet and Barenzstein

(1999) who allude that institutional changes bolster the credibility of sustainable macro-economic policies such as an independent Central Bank with a clear mandate to stabilise prices as this presents a springboard for promoting confidence in the domestic thereby reducing currency dollarization (de-dollarisation).

However reversing dollarisation may be difficult because changes in practices regarding the settlement of transaction may be a slow process that depends on institutional changes and take place only when there are significant benefits to be gained by switching between currencies.

Inflation is shown to be insignificant. This tallies with the theory on dollarisation hysteresis where according to Uribe (1998) and Reding and Morales (1999) a temporary high level of inflation can start a dollarisation process that is not necessarily reversed when inflation comes down because dollarisation costs decline with the aggregate level of dollarisation, giving rise to multiple equilibria and history dependence in the demand for foreign currency.

4.4 Probit Estimation Model

In determining the probability of successfully de-dollarising we used the probit regression analysis. The Hosmer- Lemeshow goodness of fit test was used to test for the overall goodness of fit of the model. The overall goodness of fit of the model is reflected by non-significant p values. All the p values except one are non-significant.⁵⁵

4.4.1 Marginal Effects

The marginal effects were computed to give the magnitude of the effects of changes in the explanatory variables on the dependent variable. The results are summarised in the table below:

TABLE 9: MARGINAL EFFECTS

Variable	Dy/dx	Std Error	Z	P> z 	Mean
CAB	0.393693	0.11318	3.48***	0.001	0.522727
FB	-0.1360019	0.07727	1.76*	0.078	0.857955
IDI	-0.1429972	0.03854	-3.71***	0.0000	5.90341
DBT	0.1636114	0.06991	2.34**	0.019	1.71591
GDP	0.0031252	0.00153	2.05	0.441	54.2727
Cons	-0.0728806	0.03274	-2.23**	0.026	5.55682

(*), (**),(***) are the significant at 10%, 5% and 1% respectively

⁵⁵ See Appendix G

Current account balance has a p-value of 0.001 which means it is statistically significant at 1 % level of significance. The coefficient of the variable is positive to show that chances of de-dollarisation are high when there is a surplus current account balance. From marginal effects results, a positive current account balance increases the probability of de-dollarisation by 0.394.

Fiscal balance has a p-value of 0.078 showing that it is statistically significant at 10% level of significance. The positive coefficient of this variable shows that prospects of de-dollarisation are low when fiscal balance is in deficit. From marginal effects analysis, a deterioration in the fiscal balance will motivate monetary authorities to print money thereby setting fertile ground for de-dollarisation which reduces the dollarisation ratio. This increases the probability of de-dollarisation by 0.1360019 from a unit deterioration in the fiscal position. As fiscal space narrows, there is an incentive for printing more money, which can only be possible in the presence of monetary policy and own currency (Dean and Feige, 2003). Therefore a sustainable and credible fiscal policy reduces the Government's need to borrow in foreign currency and to resort to inflationary central bank financing.

Meanwhile Institutions are significant at 1 % level of significance and the negative coefficient is indicative a low chance of de-dollarisation when there are poor institutions. The marginal effects results estimate the probability of successful dollarisation at 0.14299 resulting from a unit improvement in institutions. This is consistent with findings by Mecagni and Mauro (2015).

Debt is significant at 1% level of significance and the positive coefficient depicts a positive correlation between the dollarisation ratio and debt. Thus chances of de-dollarisation are reduced by increased borrowings, showing persistence of loan or liability dollarisation. The marginal effects analysis shows that the probability of successfully de-dollarizing decreases by 0.1636 induced by a unit increase in debt levels. This is consistent with assertions by Mecagni and Mauro (2015) and Galindo and Leiderman (2005) who show a substantial increase in the dollarisation ratio in Latin American countries attributable to debt which remained high due to political uncertainty and an increase in international capital market risk perceptions.

Growth Rate is insignificant while inflation was omitted in the probit regression as it was insignificant in the OLS analysis above, showing evidence of dollarisation hysteresis. This is in line with findings by Guidotti and Rodriguez (1992), Dornbusch, Sturzenegger and Wolf

(1990) and Dornbusch and Reynoso (1989) who argued that there are switching costs associated to the use of foreign currency, such as learning costs, that, once incurred by economic agents, imply persistence. Since learning requires time, in light of these explanations short-lived inflation experiences should not have permanent effects on dollarisation. In the Zimbabwean context inflation and growth rate were favourable for only a few years (2009-2012), not sufficiently long enough to warrant a reversion in the monetary regime. Empirics require at least 10 years of dollarisation where a long history of credibility is established (Kramarenko, 2010) before attempting to dedollarise. Therefore the run on banks following the announcement to introduce Bond note on 4 May 2016 may be evident of the need to build credibility (RBZ, 2016)

4.4.2 Odds Ratio

Odds ratio in favour of successfully dollarisation is was calculated 0.42125 showing that there is a 42% chance of successful de-dollarisation given the mean variables of the probit significant variables, fiscal balance, current account balance and debt. Since the odds ratio in favour of successfully dedollarising is less than 50% it implies a poor chance of a successful dedollarisation for Zimbabwe. This is consistent with findings by Mecgani and Mauro(2015) whose predictions of success are evaluated at above 50%.

4.3 Conclusion

This chapter presented the estimation, presentation and analysis of results. Based on the study findings, it can be concluded that factors that induce de-dollarisation are fiscal balance, debt, current account balance, growth rate and institutions while the probability of successful de-dollarisation is currently measured at 42%. Thus, the probable de-dollarisation strategy befitting Zimbabwe is includes a comprehensive mix of both sound macro-economic policies that includes reforms to establish a positive fiscal balance, a favourable current account balance as well as an improvement in institutions. Consideration of country dedollarisation experiences from literature review resulted in the inclusion of a complementary regulatory framework, market based incentives that promote de-dollarisation being key components of the proposed dedollarisation strategy, notwithstanding the correct sequence of policies in the implementation matrix. This strategy will set the platform for currency and asset substitution in favour of domestic currency thereby making de-dollarisation a success. The next chapter presents a summary of the study and policy recommendations based entirely on the study findings and finally suggesting areas for advanced study.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

5.0 Introduction

This chapter presents the summary, conclusion and policy recommendations derived from the study findings before suggesting areas for further studies

5.1 Summary and Conclusions of the Study

This study was carried out to investigate an effective de-dollarisation strategy for Zimbabwe. The probability of success dollarising is also calculated. To this end, the study was centred on establishing the factors that induce de-dollarisation so as to craft a strategy befitting the successful execution of a de-dollarisation policy. Following the evolution and reform of the Zimbabwean monetary system from the Zimbabwean dollar to the multi-currency system in search of stability and subsequently the introduction of the bond coins and notes to deal with the liquidity crunch threatening to destabilise the economy, policy makers seem to be in search for an optimal monetary regime. The temporary and rather piecemeal nature of measures to establish an effective monetary regime creates fertile ground for research into the optimality of de-dollarisation as a possible monetary regime. Firstly the announcement to introduce dollarisation for an initial two years (GoZ, 2009) as well as the recent announcement to introduce Bond notes for an initial two years and now being extended for another two years given (RBZ, 2016).

The divergence from the complete use of the multi-currency system is signalling a policy dilemma indicative of the desire to dedollarise somehow,⁵⁶ thereby reinforcing an intention to move away in the least case from full dollarization. As such questions arise as to the efficacy of such a move as well as the appropriate framework necessary to induce a successful de-dollarisation outcome. The complexity of such a move is demonstrated by Mecagni and Mauro (2015) in their study which examined evidence from 42 highly dollarized countries and found that only a fourth of these countries managed to dedollarize successfully. Similar de-dollarisation experiences in other countries yielded mixed outcomes as dollarization has

⁵⁶According to the Reserve Bank of Zimbabwe during the 2016 tobacco marketing season, 66 215 tobacco growers delivered and sold green leaf tobacco valued at US\$588 185 486. In order to incentivise tobacco growers to increase production, as well as promote financial inclusion, the Bank awarded a 5% export incentive to tobacco growers payable through normal banking channels which translated to a payment of US\$29 346 897 in Bond Notes

been known to be difficult to reverse in some instances. More so the fact that there seems no precise blue-print to be followed by a prospective dedollarising country. The feasibility of such an agenda remains controversial and needs to be viewed within a broad macro-economic and institutional context, justifying the need for such a study on Zimbabwe.

The findings of the study show that fiscal balance, current account balance, external debt and institutions are significant enough to induce dedollarisation. The odds ratio in favour of successfully dedollarisation is however shown to be low at 42%. Given the persistence of dollarisation after prices have stabilised which is consistent with the study findings that inflation is insignificant in inducing dedollarisation(dollarisation hysteresis), brings a new dimension that the problem at hand could be beyond the currency sphere but rather address common forces that influence the significant variables of fiscal balance, current account balance and institutions.

5.2 Policy Implications and Recommendations

The study findings supported the assertions of the institutional view by Weymouth (2007) which points out that the choice of a currency is a rational response of domestic investors to policy instability. The findings are also consistent with currency and asset substitution theories of liquidity services and portfolio balance at a micro level, where motivation for substituting foreign currency holdings for domestic currency holding lies with the core functionalities of money for convenience in transacting (Liquidity Services Model and asset return considerations(Portfolio Balance Model). Thus the micro theories are dependant on macro drivers of currency choice which this study finds to be fiscal balance, debt, current account balance, gross domestic product and institution. The local currency proxy, the bond notes and coins are primarily transactional (currency substitution) in nature and once there is acceptable policy clarity from an institutional perspective asset substitution is expected to set in.

In light of these results, and building on successful dedollarization initiatives from Mexico Angola, Israel and Peru to mention a few from literature review, a menu of policies aimed at macroeconomic stabilization, complemented by prudential regulations is essential for Zimbabwe's effective de-dollarisation strategy. A combination of supportive and market-oriented policies is needed from the cross country evidence; the countries around the world that eventually managed to reduce significantly the use of foreign currencies generally implemented sound macroeconomic policies as well as microeconomic and prudential

measures aimed at strengthening the financial system and increasing the attractiveness of the local currency. Mandatory measures and direct controls have been useful only when they were used as a complement to a market-based strategy, and proved ineffective or worse, counterproductive, or otherwise.⁵⁷ Rapid and compulsory dedollarization is not ideal, given that it has disastrous consequence elsewhere.

5.3 Proposed de- dollarisation strategy for Zimbabwe is as follows:

5.3.1 Debt Management

External debt is found to be another significant variable to induce de-dollarisation in Zimbabwe. However debt at unsustainable levels is said to tax economic growth owing to opportunity costs imposed by way of interest payment and penalties⁵⁸. As such debt management with a view to restructure short term debt to long term debt is one stepping stone in creating necessary conditions that reduce the impact of debt on economic growth. Consistent with the notion by Mecagni and Mauro (2015) who found that countries with a huge external debt find it almost impossible to dedollarise. Therefore domestic resource mobilisation and improved accountability on borrowed funds as well as on the internal resources could be a long term solution to reducing debt to sustainable levels.

It is proposed that there is a deliberate shift of the local debt markets and the local household orientation from an FX-based orientation to a local currency orientation, even if the initial costs are higher. Structural changes in composition of the total public debt, the local corporate debt and the local household debt have to be facilitated. Local capital markets need to be reorganized, unified and readdressed and institutional investors have to be brought into the market “en masse.”

5.2.3 Current Account Balance and Fiscal Balance

Given the importance of Exports as a major source of money supply in a dollarized economy and the fact the this study depicts that CAB is a significant variable inducing de dollarisation, measures that boost exports should be accorded top priority. Thus productive capacity should be improved so as to reduce the import level, where 60% of Zimbabwean imports are food items(RBZ, 2015) while producing competitively in the global markets for the much needed foreign currency which impact on money supply dynamics in a multi currency monetary

⁵⁷ In an unstable macroeconomic environment, policy measures that force de-dollarization may lead to capital flight, financial disintermediation, and banking sector instability (Kokenyne *et al.*, 2010).

⁵⁸ IMF benchmark is that debt to GDP ratio should be less than 40% if it is sustainable.

regime. It could be argued that the problem at hand may not be a currency problem but rather productivity based one given a persistently unfavourable on average over the study period CAB. Thus regardless of the currency option, the fundamental basis for productivity ought to be right. Evidently productivity challenges have been faced over the years across different currency regimes.

By hindsight, Fiscal Balance has been largely an unfavourable forcing the public debt to grow as the government seeks to monetise the fiscal shortfall. It is important to point out that fiscal discipline is key in a cash budgeting framework that exists in a dollarized state. However a glance at the most significant sources of revenue for the Zimbabwean government is tax revenue which is negatively affected by a low and declining productive base where industry capacity utilisation has been hovering in the 36% to 40% range in the last three years (Goz, 2016). Therefore addressing productivity constraints could unlock a huge buffer in exports and subsequently create a sizeable buffer of foreign currency reserves sufficient to support any monetary regime.

Structural reform to address competitiveness is necessary to address the persistent unfavourable fiscal balance and current account balances whose weak dispositions have had a negative bearing on liquidity. Furthermore, the odds ratio in favour of successful dedollarisation is below 50%, which could be an indication of the need search for a solution out of the currency mix and look beyond de-dollarisation or dollarisation phenomenon.

5.2.4 Credibility/ Institutions

Credibility is a key ingredient in the dedollarisation maze. Given that attaining credibility is, not an overnight event, monetary policy authorities should constantly be seen as taking credible policy positions, be accountable, and act independently. Dollarization should eventually decline in response to confidence building and market-based policies that address the underlying problems that cause residents to seek out foreign-currency assets as a hedge against domestic macroeconomic instability or uncertainty. More transparent and effective communication by central bank officials is also important for building public trust in the credibility of monetary policymaking. Ize and Yeyati (2005) note that de-dollarization is very closely linked to improving monetary credibility, arguing that reforms should build the institutional capacity of the central bank to pursue independent monetary policy. Establishing credibility may entail switching monetary regimes and introducing an explicit price stability mandate (Acemoglu et., al, 2005). A monetary policy framework rooted in credible

communication of future actions can help enhance the attractiveness of the domestic currency through the expectations channel.

5.2.5 Financial Policy and Prudential Regulation

Kokenyne and others (2010) recommend that authorities actively manage public debt, create domestic bond markets, and promote alternatives to dollar-denominated assets, as well as hedging instruments for currency risk. Facing the original sin challenge: Developing a capital market with longer-term maturities in domestic currency can be challenging. Nonetheless, providing investment opportunities in domestic currency securities with medium- and long-term maturities and ensuring adequate rates of return can also increase incentives to move from dollar denominated financial instruments, thereby contributing to de-dollarization.

A cocktail of measures to raise financial intermediation in favour of domestic currency should be institute while building a liquidity buffer could be achieved through reserve requirement provisions in favour of the domestic currency and maintenance of a sufficient level of international reserves which would serve the purpose of liquidity support to the financial sector while high coverage of international reserves helps reduce the perception of a weak currency.

All in all a strategy to reduce dollarization will require making the dollar less attractive compared to the domestic currency. There is no silver bullet, but a comprehensive set of market-driven measures targeting the factors that have been shown to induce dedollarisation by the study complemented by the continuation of a stable macroeconomic environment are essential.

5.2.5.5 Policy Sequencing

Policymakers should be aware that successful de-dollarization takes time, and therefore proper sequencing of policies is important. A study by the IMF (2006) suggests that a credible and successful macroeconomic policy of disinflation is likely to reduce dollarization over time. In this context, proper sequencing of policies is essential. Generally, policies that target the de-dollarization of deposits contribute to de-dollarization of loans (Garcia-Escribano and Sosa, 2011).

Finally, implementation challenges exist. When implementing de-dollarization measures, policymakers need to account for risks from potential financial disintermediation and instability, and/or capital flight. De-dollarization policies also face the difficult task of changing ingrained behaviours where in dollarized economies; the public becomes used to

dealing in foreign currency and may resist the costs of switching to the domestic currency. Finally, because of the persistence of dollarization, de-dollarization may proceed very gradually, and policymakers may need to sustain reform momentum over many years.

Strategies from empirical literature review and country case study analysis by Ize and Yeyati(2005) also give insights on the probable de-dollarisation strategy. They allude that before embarking on an overly ambitious policy agenda, dollarized countries should make all the necessary research efforts to understand well the roots of their initial dollarisation, its risks and costs and the implications thereof, especially in light of the research findings that estimated the chances of a successful de-dollarisation outcome for Zimbabwe at less than 50%.

5.3 Limitations of the Study and Suggestions of Areas for Further Study

The study could have restricted to the period when official dollarisation began, but the period was rather short (January 2009 to December 2016). This then justified the widening period to between 1980 to 2016 which captures periods of very low usage of dollarisation and periods of complete usage of foreign currency, leading to huge variations in data given the instability of the decade leading up to 2008. In addition the large amounts of unbanked deposits circulating among economic agents could not be captured in the estimation of the foreign currency deposits relative to the total deposits in the economy, in the determination of the dollarisation ratio. Although several studies have been done on the optimal monetary regime in Zimbabwe there is need for more research to be done on the continuing debate in the country about the options for a **successor monetary regime**, should the country eventually decide to exit dollarization with special emphasis on de-dollarisation. Further research could be focussed on productivity being the issue at hand rather than currency being the issue as Zimbabwean policy makers grapple with a fragile economy, given the slim chance of successfully dedollarising shown in this study.

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APPENDICES

APPENDIX A: STATIONARITY TEST RESULTS

DDR

Null Hypothesis: D(DR) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.361629	0.0006
Test critical values:		
1% level	-4.243644	
5% level	-3.544284	
10% level	-3.204699	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(DR,2)
 Method: Least Squares
 Date: 05/02/17 Time: 13:01
 Sample (adjusted): 1982 2016
 Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DR(-1))	-0.946638	0.176558	-5.361629	0.0000
C	0.098997	3.211869	0.030822	0.9756
@TREND("1980")	0.109072	0.150626	0.724127	0.4742
R-squared	0.473226	Mean dependent var		-0.262640
Adjusted R-squared	0.440302	S.D. dependent var		11.91880
S.E. of regression	8.916804	Akaike info criterion		7.295569
Sum squared resid	2544.300	Schwarz criterion		7.428884
Log likelihood	-124.6725	Hannan-Quinn criter.		7.341589
F-statistic	14.37353	Durbin-Watson stat		2.005166
Prob(F-statistic)	0.000035			

CAB

Null Hypothesis: CAB has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.405253	0.0000
Test critical values:		
1% level	-4.234972	
5% level	-3.540328	
10% level	-3.202445	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(CAB)
 Method: Least Squares
 Date: 05/02/17 Time: 13:01
 Sample (adjusted): 1981 2016
 Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAB(-1)	-0.609939	0.095225	-6.405253	0.0000
C	69.90992	30.70851	2.276565	0.0294
@TREND("1980")	-7.686110	1.597476	-4.811408	0.0000
R-squared	0.584375	Mean dependent var		10.11111
Adjusted R-squared	0.559186	S.D. dependent var		135.8662
S.E. of regression	90.20675	Akaike info criterion		11.92174
Sum squared resid	268529.5	Schwarz criterion		12.05370
Log likelihood	-211.5913	Hannan-Quinn criter.		11.96780
F-statistic	23.19928	Durbin-Watson stat		1.148839
Prob(F-statistic)	0.000001			

DGDP01

Null Hypothesis: D(GDP01) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 2 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.606084	0.0043
Test critical values:		
1% level	-4.262735	
5% level	-3.552973	
10% level	-3.209642	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(GDP01,2)
 Method: Least Squares
 Date: 05/02/17 Time: 13:07
 Sample (adjusted): 1984 2016
 Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP01(-1))	-1.322369	0.287092	-4.606084	0.0001
D(GDP01(-1),2)	0.365994	0.235876	1.551634	0.1320
D(GDP01(-2),2)	0.396054	0.169867	2.331548	0.0271
C	-0.538226	0.572545	-0.940059	0.3552
@TREND("1980")	0.038433	0.026689	1.440019	0.1610
R-squared	0.565735	Mean dependent var		-0.009697
Adjusted R-squared	0.503697	S.D. dependent var		1.963133
S.E. of regression	1.383003	Akaike info criterion		3.625119
Sum squared resid	53.55553	Schwarz criterion		3.851862

Log likelihood	-54.81446	Hannan-Quinn criter.	3.701411
F-statistic	9.119192	Durbin-Watson stat	2.112823
Prob(F-statistic)	0.000076		

INFL

Null Hypothesis: INFL has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.999999	0.0000
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(INFL)
 Method: Least Squares
 Date: 05/03/17 Time: 11:01
 Sample (adjusted): 1981 2016
 Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFL(-1)	-1.028571	0.171429	-5.999999	0.0000
C	1.40E+10	1.40E+10	1.000000	0.3244

R-squared	0.514286	Mean dependent var	-0.238888
Adjusted R-squared	0.500000	S.D. dependent var	1.17E+11
S.E. of regression	8.27E+10	Akaike info criterion	53.16774
Sum squared resid	2.32E+23	Schwarz criterion	53.25571
Log likelihood	-955.0193	Hannan-Quinn criter.	53.19844
F-statistic	35.99998	Durbin-Watson stat	2.001681
Prob(F-statistic)	0.000001		

IDI

Null Hypothesis: IDI has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.024608	0.0420
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(IDI)
 Method: Least Squares
 Date: 05/03/17 Time: 11:02
 Sample (adjusted): 1981 2016
 Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IDI(-1)	-0.437055	0.144500	-3.024608	0.0047
C	20.81565	6.916889	3.009395	0.0049
R-squared	0.212019	Mean dependent var		0.055556
Adjusted R-squared	0.188843	S.D. dependent var		5.701852
S.E. of regression	5.135330	Akaike info criterion		6.164118
Sum squared resid	896.6347	Schwarz criterion		6.252091
Log likelihood	-108.9541	Hannan-Quinn criter.		6.194823
F-statistic	9.148253	Durbin-Watson stat		1.913442
Prob(F-statistic)	0.004715			

DIDI

Null Hypothesis: D(IDI) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.949658	0.0000
Test critical values:		
1% level	-3.632900	
5% level	-2.948404	
10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(IDI,2)
 Method: Least Squares
 Date: 05/03/17 Time: 11:03
 Sample (adjusted): 1982 2016
 Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IDI(-1))	-1.191855	0.171498	-6.949658	0.0000
C	0.154984	0.967105	0.160255	0.8737
R-squared	0.594085	Mean dependent var		0.257143
Adjusted R-squared	0.581784	S.D. dependent var		8.846212
S.E. of regression	5.720810	Akaike info criterion		6.381543
Sum squared resid	1080.013	Schwarz criterion		6.470420
Log likelihood	-109.6770	Hannan-Quinn criter.		6.412223
F-statistic	48.29775	Durbin-Watson stat		1.973809
Prob(F-statistic)	0.000000			

DFB

Null Hypothesis: D(FB) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.926938	0.0000
Test critical values:		
1% level	-3.632900	
5% level	-2.948404	
10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(FB,2)

Method: Least Squares

Date: 05/03/17 Time: 11:06

Sample (adjusted): 1982 2016

Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FB(-1))	-1.186803	0.171332	-6.926938	0.0000
C	0.104948	0.070478	1.489084	0.1460
R-squared	0.592504	Mean dependent var		-0.002543
Adjusted R-squared	0.580156	S.D. dependent var		0.627701
S.E. of regression	0.406721	Akaike info criterion		1.094067
Sum squared resid	5.458924	Schwarz criterion		1.182944
Log likelihood	-17.14616	Hannan-Quinn criter.		1.124747
F-statistic	47.98247	Durbin-Watson stat		1.988074
Prob(F-statistic)	0.000000			

APPENDIX B: HETEROSKEDASTICITY TEST RESULTS

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.446539	Prob. F(6,29)	0.8414
Obs*R-squared	3.044660	Prob. Chi-Square(6)	0.8032
Scaled explained SS	3.707902	Prob. Chi-Square(6)	0.7161

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 05/03/17 Time: 09:53

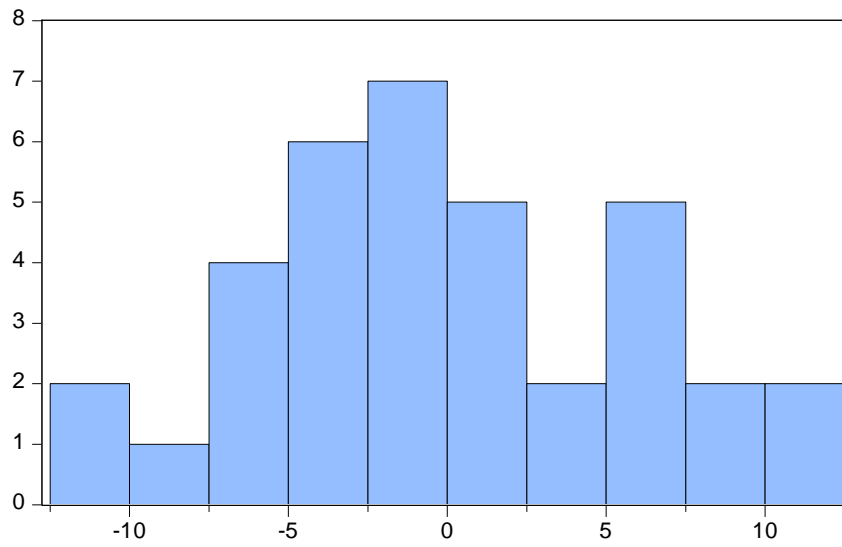
Sample: 1981 2016

Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.699226	12.29981	0.788567	0.4368
CAB	0.033975	0.048466	0.701017	0.4889
DIDI1	0.312879	1.104712	0.283222	0.7790
DFB1	1.663833	15.61501	0.106553	0.9159
DGDP01	4.316116	4.191117	1.029825	0.3116
INFL	-1.28E-11	6.47E-11	-0.197683	0.8447
DEBT	2.615759	5.059468	0.517003	0.6091

R-squared	0.084574	Mean dependent var	14.04604
Adjusted R-squared	-0.104825	S.D. dependent var	27.59849
S.E. of regression	29.00894	Akaike info criterion	9.745751
Sum squared resid	24404.05	Schwarz criterion	10.05366
Log likelihood	-168.4235	Hannan-Quinn criter.	9.853219
F-statistic	0.446539	Durbin-Watson stat	2.145709
Prob(F-statistic)	0.841388		

APPENDIX C: NORMALITY TESTS



Series: Residuals	
Sample 1981 2016	
Observations 36	
Mean	1.28e-15
Median	-1.250799
Maximum	12.40908
Minimum	-10.85226
Std. Dev.	6.028796
Skewness	0.257057
Kurtosis	2.276606
Jarque-Bera	1.181420
Probability	0.553934

APPENDIX D: AUTOCORRELATION TEST RESULTS

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.693498	Prob. F(2,27)	0.2028
Obs*R-squared	4.012633	Prob. Chi-Square(2)	0.1345

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 05/03/17 Time: 09:57

Sample: 1981 2016

Included observations: 36

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.625484	1.770008	-0.353379	0.7265
CAB	0.006880	0.007848	0.876689	0.3884
DID11	-0.046288	0.157926	-0.293097	0.7717
DFB1	-0.450085	2.212093	-0.203466	0.8403
DGDP01	-0.215054	0.601074	-0.357782	0.7233
INFL	2.12E-12	9.26E-12	0.228494	0.8210
DEBT	0.513865	0.771429	0.666121	0.5110
RESID(-1)	0.141764	0.195518	0.725070	0.4746
RESID(-2)	0.339456	0.201143	1.687636	0.1030

R-squared	0.111462	Mean dependent var	1.48E-15
Adjusted R-squared	-0.151808	S.D. dependent var	3.800967
S.E. of regression	4.079287	Akaike info criterion	5.862039
Sum squared resid	449.2957	Schwarz criterion	6.257919
Log likelihood	-96.51671	Hannan-Quinn criter.	6.000212
F-statistic	0.423375	Durbin-Watson stat	2.058205
Prob(F-statistic)	0.896695		

APPENDIX E: RAMSEY RESET TEST RESULTS

Ramsey RESET Test

Equation: UNTITLED

Specification: DDR C CAB DIDI1 DFB1 DGDP01 INFL DEBT

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	2.621950	28	0.0140
F-statistic	6.874620	(1, 28)	0.0140
Likelihood ratio	7.903974	1	0.0049

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	99.67713	1	99.67713
Restricted SSR	505.6573	29	17.43646
Unrestricted SSR	405.9802	28	14.49929

LR test summary:

	Value	df
Restricted LogL	-98.64391	29
Unrestricted LogL	-94.69192	28

Unrestricted Test Equation:

Dependent Variable: DDR

Method: Least Squares

Date: 05/03/17 Time: 10:18

Sample: 1981 2016

Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.234488	2.360842	0.099324	0.9216
CAB	-0.019006	0.010154	-1.871894	0.0717
DIDI1	-0.813506	0.150843	-5.393072	0.0000
DFB1	4.825931	2.059577	2.343166	0.0265
DGDP01	1.334627	0.581900	2.293566	0.0295
INFL	-5.82E-12	8.79E-12	-0.661674	0.5136
DEBT	-0.846507	0.957183	-0.884373	0.3840
FITTED^2	0.027201	0.010374	2.621950	0.0140
R-squared	0.845068	Mean dependent var		2.438889
Adjusted R-squared	0.806335	S.D. dependent var		8.652617
S.E. of regression	3.807794	Akaike info criterion		5.705107
Sum squared resid	405.9802	Schwarz criterion		6.057000
Log likelihood	-94.69192	Hannan-Quinn criter.		5.827927
F-statistic	21.81774	Durbin-Watson stat		2.095773
Prob(F-statistic)	0.000000			

APPENDIX F: ORDINARY LEAST SQUARES REGRESSION RESULTS

Dependent Variable: DDR
 Method: Least Squares
 Date: 05/03/17 Time: 09:32
 Sample (adjusted): 1981 2016
 Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.750750	1.770498	2.683285	0.0119
CAB	-0.039755	0.006976	-5.698553	0.0000
DIDI1	-0.704566	0.159018	-4.430728	0.0001
DFB1	4.296861	2.247705	1.911666	0.0658
DGDP01	1.831808	0.603291	3.036358	0.0050
INFL	-1.18E-11	9.31E-12	-1.266846	0.2153
DEBT	-2.653837	0.728286	-3.643947	0.0010

R-squared	0.807028	Mean dependent var	2.438889
Adjusted R-squared	0.767103	S.D. dependent var	8.652617
S.E. of regression	4.175699	Akaike info criterion	5.869106
Sum squared resid	505.6573	Schwarz criterion	6.177013
Log likelihood	-98.64391	Hannan-Quinn criter.	5.976574
F-statistic	20.21354	Durbin-Watson stat	1.748988
Prob(F-statistic)	0.000000		

APPENDIX G: PROBIT REGRESSION RESULTS

```
. estat gof, table group(10)
```

Probit model for dr, goodness-of-fit test

(Table collapsed on quantiles of estimated probabilities)

Group	Prob	Obs_1	Exp_1	Obs_0	Exp_0	Total
1	0.0001	0	0.0	4	4.0	4
2	0.0494	0	0.1	4	3.9	4
3	0.3370	1	0.9	3	3.1	4
4	0.6144	1	1.5	2	1.5	3
5	0.7589	4	2.9	0	1.1	4
6	0.8229	3	3.2	1	0.8	4
7	0.8972	3	2.6	0	0.4	3
8	0.9476	3	3.7	1	0.3	4
9	0.9943	4	4.0	0	0.0	4
10	0.9995	3	3.0	0	0.0	3

```
number of observations =      37  
number of groups =        10  
Hosmer-Lemeshow chi2(8) =      4.52  
Prob > chi2 =            0.8070
```