Journal of Emerging Trends in Economics and Management Sciences (JETEMS) 3(6): 923-930

jetems.scholarlinkresearch.org

Real Exchange Rate Misalignment and Currency Crisis in Zimbabwe

Stein Masunda

Department of Agricultural Economics and Development,
Midlands State University.

Abstract
The sought to establish the role of the real exchange rate misalignment, particularly overvaluation in explaining currency crisis in Zimbabwe. Using annual data from 1980 – 2006 we established the determinants of real exchange rate misalignment and estimated the extent to which the exchange rate was misaligned. Using a dynamic ordinary least Squares (DOLS), the results of the empirical test supports the idea that re4al exchange rate misalignment in Zimbabwe was attributed to pressures exerted by government consumption, openness, excess credit , technical progress and capital flows. The calculated measure of real exchange rate misalignment was then used as a covariate in the currency crises model. Employing the logit and probit model, we estimated the extent to which real exchange rate misalignment (overvaluation), contributed in currency crisis. The results of the empirical test confirms too, that real exchange rate overvaluation, output growth, external debt, political instability and a slackening in the monetary policy are responsible for currency crises in Zimbabwe. This study contributes in identifying the factors responsible for currency crises in developing countries like Zimbabwe.

Keywords: words: real exchange rate, overvaluation, currency crises, misalignment, macroeconomic fundamentals

INTRODUCTION

The real exchange rate fundamentally influences the performance of economies, particularly in the context of globalization and the improper management of the real exchange rate can lead to exchange rate misalignment1. The effects of real exchange rate misalignment on growth, export performance have been widely researched depicting the importance of correct alignment as a precursor of any development strategy (Dollar, 1992, Edwards 1989, Cottani, 1990, Razin 1999, Dubas, 2012). The effects of real exchange rate misalignment have also been examined on currency crises models (Glicks and Hutchison, 2011 and Stein et al 2011).

Currency crises, defined as a speculative attack on the value of the currency leading to high magnitudes of depreciations (Glick and Hutchison, 2011), had been witnessed in a number of countries such as Mexico (1994-1995), Russia (1998), Brazil (1999), Turkey 2001 and Argentina 2002. Zimbabwe witnessed a currency crisis in November 1997 where the Zimbabwe dollar was overvalued by 13% (IMF, 2001). The study by the IMF (2001) also indicated that the long run real exchange rate was overvalued by about 45% at the end of 1999 and by 56% at the end of September 2001. Ndlela (2010) confirmed that the real exchange rate was also overvalued by up to 95% in 2003 – 2004. Ndlela et al. (2000) found that the real exchange rate was overvalued for more than half of the period 1990 – 2000. In 2009, Zimbabwe abandoned her currency in favour of a multiple currency system manifesting a strong sign of balance of payments crises. The study therefore seeks to empirically establish the role of real exchange rate misalignment in the currency crisis of 1997 and those experienced in the decade of 2000 - 2009 in Zimbabwe.

The economy of Zimbabwe witnessed serious macroeconomic instability that became worse in the last decade which saw the government abandoning its currency as it was deemed unsustainable in the background of hyperinflation and high rates of unemployment (Ndlela et. al 2010). The country witnessed episodes of devaluation and revaluation of the currency before it finally hit a snag when the currency became virtually useless in economic terms.

Currency crisis are usually a result of continuous maintenance of fixed exchange rate regimes (Glick and Hutchison, 2011). The exchange rate in Zimbabwe has gravitated around the two polar exchange rates regimes viz, fixed and floating. However, much of the time, the country favoured the *de facto* fixed exchange rate system and it is widely believed that the post 2000 economic crisis in Zimbabwe was triggered by the failure of the monetary authorities to maintain the appropriate level

[1] Real exchange rate is defined as the deviation of the actual exchange rate from the equilibrium exchange rate (Williamson, 1985) with the equilibrium exchange rate defined as the exchange rate the brings about a simultaneous equilibrium in the internal and external sectors (Montiel, 1999).

of RER. A number of variables have been used to explain currency crises and have been placed into different categories. Models that are used to explain currency crises are categorised into the generation models that ranges from the first to the third generations models. The first generations models were developed by Krugman (1979) where he asserts that a currency crisis will be a result of inconsistent government policies that will cause a depletion of resources leading to a speculative attack especially in the framework of fixed exchange rate regimes. This study therefore seeks to contribute to the existing debate on the fundamental determinants of currency crises in Zimbabwe as there is a dearth of such studies.

The entry point is to find a measure of real exchange rate misalignment which will be used as a covariate in the currency crisis model. In the first generations model, the government monetizes public expenditure and at the same time desires to keep the nominal exchange rate fixed. A speculative attack on the currency attack will be witnessed if the country only possesses a limited amount of foreign currency reserves. In this case the government will be forced to abandon the fixed exchange rate policy because the way it will be financing the deficit will be inconsistent with its intentions to keep the exchange rate fixed. The inconsistence will make all economic agents aware of the fact that the realization of a speculative attack is a probability of one event.

Equilibrium Real Exchange Rate and Measuring Misalignment

There is a vast literature on the determinants of the real exchange rates and currency crises and in terms of the methodological issues on the exchange rate, Clark and MacDonald (1998) discuss and compare methodological issues in two prominent approaches that include the fundamental equilibrium exchange rate (FEER) and the behavioural equilibrium exchange rate (BEER) to modelling equilibrium exchange rate. On the same frontier, Levich (1985) discuss from the early approaches of PPP to the portfolio balance models. FEER is that exchange rate which consists of medium term internal and external macroeconomic balance (Williamson, 1994) while the BEER explains the real exchange rate behaviour in terms of economic fundamentals using reduced form econometric equation (Clark and MacDonald; 1999, 2000).

On exchange rate misalignment, Edwards and Savastano (2000) conducted a survey and categorised most empirical efforts into two groups- single equation models and general equilibrium simulation models. In these models, the real exchange rate is defined as relative price of tradable and non tradable goods that achieves internal and external equilibrium simultaneously.

Generally, there are three approaches to the modelling of real exchange rate misalignment: PPP measure, model based measure and the Black market premium measure. The Purchasing Power Parity (PPP) methodology provides the simplest way to measure equilibrium real exchange rate. In this framework, the changes in the bilateral exchange rate between the two currencies over a passage of time are determined by changes in relative prices in the two countries. The deviations of the real exchange rate from the parity in a selected year are defined as misalignments. Regardless of its simplicity, the PPP methodology only accounts for monetary sources of exchange rates such as productivity shifts and terms of trade shocks neglecting contemporary exchange rate fluctuations attributed to real factors. In addition, the PPP chooses a single equilibrium exchange rate for all periods yet the equilibrium exchange rate is not an immutable number.

The second approach considers using the parallel market premium as a measure of the real exchange rate misalignment. Real exchange rate misalignment is measured as the deviation between parallel market and official exchange rates. A high-sustained premium is strongly argued to be a significant indicator of currency overvaluation, thus serving as a useful proxy. The black market premium has a strong advantage that it captures with an amount of precision the degree of foreign exchange controls and reflects the risks of transactions associated with the parallel market (Bouton et al 1994). However, it is argued to be an imprecise indicator since it is sensitive to temporary shocks that may have little or no effect on the underlying fundamental real equilibrium exchange rate. Ghura and Greenes (1993) found that the black market premium overstated the degree the degree of misalignment in sub Saharan African countries in the seventies and eighties. The third measure, the model based measure of RER misalignment is calculated as the deviation of the actual RER from some theoretically based equilibrium path of RER. Real exchange rate models are usually specified by positing a relationship between real exchange rate and its fundamental determinants (Edwards, 1989a, Frankel and Razin, 1996). In the model based measure it is necessary to define a sustainable or equilibrium exchange rate. The equilibrium exchange rate defines the real effective exchange rate (REER). This REER can be defined as the fundamental equilibrium exchange rate whose key exogenous inputs are medium term capital flows and the cyclical adjusted level of output or the behavioural equilibrium exchange rate (BEER) which explains the real exchange rate behaviour in terms of economic fundamentals using reduced form econometric equations (Clark and MacDonald; 1999, 2000). The BEER assumes that the unobservable expectation of the exchange rate is the long run equilibrium exchange rate. Current equilibrium will

therefore be a sum of two components: the systematic long run component and the real interest rate differential. Exchange rate misalignment which results from the BEER approach at any point in time can be decomposed into the effect of transitory factors, stochastic disturbances and the extent to which the economic fundamentals are away from the sustainable values.

This study uses , the single equation model utilized by Edwards (1989, 1994) Elbadawi (1994), Elbadawi and Soto (1994, 1995), Montiel 1997, Razin (1997) and Baffes et al (1999) by conducting cointegration approaches between actual exchange rate and a set of independent fundamental variables. This measure has theoretical foundation in the so called dependant model developed by Salter (1959), Swan (1963), Bruno (1976), Corden and Neary (1982), where real exchange rate is defined as the relative price of tradables to non-tradables. Exchange rate misalignment is calculated as the deviation of the actual real exchange rate from the equilibrium real exchange rate, determined from a theoretical perspective using real variables and neglecting monetary variables (Edwards 1987). This method involves the determination of fundamental factors e.g. productivity differential, terms of trade, government spending, trade policy among others that affects the equilibrium real exchange rate. The long run equilibrium exchange rate is then compared with the actual real exchange rate to come up with the extent and degree of misalignment. Historical data on the RER and its fundamental is used. A lot of empirical work has been conducted in determining the factors affecting real exchange rate misalignment and to some extent on the effects of the misalignment. Dollar (1992) concludes that real exchange rate overvaluation reduces exports volume.

Edwards (1989) established the link between real exchange rate misalignment and economic performance and concluded that those countries whose real exchange rate was close to the equilibrium exchange rate performed better in comparison to those whose actual exchange rate widely wondered away from the equilibrium rate. Cottani *et. al* (1990) argued that unstable exchange rates inhibited export growth in Latin America whilst stable real exchange rates promoted export growth in Asia. Dubas (2012) argues that real exchange rate overvaluation retards economic growth while undervaluation promotes economic growth. Glick and Hutchison (2011) conducted a study of the exchange rate regime, real exchange rate misalignment and currency and observe that real exchange rate crises act a precursor of currency crises. Kemme and Roy (2005) conducted a study on the effects of real exchange rate overvaluation on currency and crises. The study indicates that real exchange rate overvaluation acts as a prelude to currency crisis. Stein et. al (2011) establishes that real exchange rate overvaluation is strongly associated with currency crisis.

A number of studies have been conducted to establish the factors determining misalignment and the extent of misalignment in Zimbabwe. Ndlela's (2010) study indicates that the real exchange rate in Zimbabwe was overvalued. The study however used the bilateral real exchange rate between Zimbabwe and the United States of America for the period 1985-2004. Using the ordinary least squares approach, Masunda (2011) established that the real exchange rate was misaligned in most cases between 1980 and 2003.

However, the role of real exchange rate misalignment on currency crisis has not been explored in Zimbabwe. This study seeks to cover that gap by ascertaining whether real exchange rate misalignment was one of the principal factors promulgating currency crises experienced in Zimbabwe.

The Model

The theoretical model followed in this paper as in Masunda (2011) is adapted from Baffes et. al (1997). The model assumes a small open economy that produces and consumes two goods namely the tradables and the non tradables. In this framework, the real exchange rate is defined as ratio of tradable prices to non tradable prices and is given as follows:

$$e_1 = \frac{P_T}{P_{NT}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where e_1, is the real exchange is rate, P_T and P_{NT} are the prices of traded goods and non-traded goods respectively. P_T is assumed to be exogenous since we assume that Zimbabwe is too small an economy to influence world prices. This definition of the real exchange rate explains an internal exchange rate which is an important indicator of the incentive to reallocate domestic resources in a developing country like Zimbabwe where the growth of the traded goods sector relative to the non-traded goods sector is fundamental for development. Edwards (1987) argued that real exchange rate (RER) is a good proxy of international competitiveness with a decline in the real exchange rate denoting an increased domestic cost of producing goods while the converse holds for exchange rate depreciation. Edwards (1987) categorised these changes (appreciation and depreciations of the exchange rate) as either justified or unjustified. Justified changes are those that emanate from changes in real events such as technological progress, changes in external terms of trade, inter alia changes in taxation. These changes are an equilibrium phenomenon and do not result in misalignment. However, it is the unjustified change that brings about a misaligned exchange rate.

Since the objective is to derive the equilibrium real exchange that entails a simultaneous attainment of

both external and internal balance. The starting point is to make a distinction between internal and external balance. Internal balance implies a situation where the labour and non traded goods markets clears in the current period and is expected to be in equilibrium in the future (Edwards, 1989, Montiel, 1999). Internal balance is assumed to hold when

$$y_{NT}(e_1,\xi) = C_{NT} + G_{NT} = (1-\theta)e_1 C + G_{NT}, \ldots\ldots\ldots\ldots (2)$$

$$\partial y_{NT}/\partial e_1 < 0, \quad \partial y_{NT}/\partial \xi < 0$$

The above equation means that internal balance is achieved when the supply of non tradables under full employment conditions (y_{NT}) is fully absorbed by private (C_{NT}) and government (G_{NT}) spending on non traded goods. θ is defined as the share of total private spending that ids devoted to traded goods and ξ as a differential productivity shock that increases (decreases) output of traded (non traded) goods at given relative prices.

The external balance refers to a situation of sustainable current account position given a country's capital position as a net lender or borrower (Razin, 1997). Following Toulaboe (2006), Montiel (1999); the current account balance (Γ) is expressed as the sum of the trade balance (φ), net unilateral transfers (v) and net investment income (rf) i.e $\Gamma = \varphi + v + rf$ The trade balance is defined as the supply of tradable goods $(y_T(e_1))$ net of the sum of government (G_T) and private sector (ϕC) spending on tradable goods. $\emptyset$ measures transactions costs associated with private spending and Montiel (1999) assumes that these transactions cost are a decreasing function of the ratio of money holding to private spending. Net investment income (rf) is obtained by multiplying the real yield on foreign assets (r) by total net foreign assets (f). The external balance holds when;

$$y_T(e_1,\xi) - G_T - (\theta+\phi)C + v + rf \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

In the long run, the real exchange rate that ensures internal and external equilibrium simultaneously can therefore be expressed as follows:

$$e_1^* = f(G_{NT}, G_T, \emptyset^*, v + r^* f^*, \xi) \ldots\ldots\ldots\ldots (4)$$

Where asterisk superscripts denotes steady-state values of endogenous variables. Assuming that the country faces a serious binding credit constraint then the trade balance becomes exogenous and equation 4 will take the following form;

$$e_1^* = f(G_{NT}, G_T, \varphi, \xi) \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

The final form of the equilibrium real exchange rate is determined after taking into account the effects of the country's terms of trade and trade policies. Since Zimbabwe is too small a country to influence prices, the foreign prices of exportables and importables are assumed to be exogenously determined.

The corresponding domestic prices are;

$$P_x = E(1-t_x)P_x^* \ldots\ldots\ldots\ldots (6)$$

$$P_m = E(1+t_m)P_m^* \ldots\ldots\ldots\ldots (7)$$

Where t_x and t_m are export and imports rates respectively. E is the nominal exchange rate. The domestic price of the imports will be given by:

$$\frac{P_x}{P_m} = \frac{(1-t_x)}{(1+t_m)} * \frac{P_x^*}{P_m^*} = \frac{\delta}{\eta} \ldots\ldots\ldots\ldots (8)$$

Where

$$\eta = \frac{(1+t_m)}{(1-t_x)}, \delta = \frac{P_x^*}{P_m^*} \ldots\ldots\ldots\ldots (9)$$

Changes in the external TOT and trade policy variables will affect the RER for exports and imports. Effects on the terms of trade on real exchange rate are ambiguous (Elbadawi and Soto, 1994). An improvement in the terms of trade has both income and substitution effects in the sense that in one hand it leads to an increase in real wages, allowing an intersectoral shift in mobile factors of production to the tradable sectors. This, in the context of the Dutch disease theory will cause an appreciation in the real exchange rate. Substitution effect is explained as an improvement in terms of trade lowers the cost of imported inputs in the production of non- traded goods causing real exchange rate depreciation.

The equilibrium exchange rate can then be written incorporating the TOT and the trade policy variables. This can be presented as follows:

$$e_1^* = f(G_{NT}, G_T, \varphi, \delta, \eta, \xi) \ldots\ldots\ldots\ldots (10)$$

Given that the data on exports and imports taxes in Zimbabwe is scarce and unreliable, the trade policy variable is proxied by the ratio of the sum of the real values of imports and exports to value of the gross domestic product. Trade liberalization is assumed to lead to real exchange rate depreciation.

The trade balance is proxied by capital flows and capital inflows increase domestic spending which leads to a real appreciation of the domestic currency. Capital flow is defined as the ratio of net foreign assets to the GDP. Net foreign assets capture the effect of a net capital inflow. Montiel (1997) argues that when net capital inflows exceed debt services obligations, the real exchange rate may appreciate while Baffes et al (1999) justified the negative sign of the variable on its associated increases in domestic absorption particularly in the non tradable sector.

Government consumption of tradable and non tradable goods in Zimbabwe is hardly available and as such general government consumption is used as a proxy. A rise in government consumption will appreciate the real exchange rate. Technical progress

Proxies the Balassa-Samuelson effect caused by differential productivity growth in the traded good versus the non-traded good sector. Theory asserts that an increase in the productivity in the tradable sector relative to the non-tradable sector appreciates the exchange rate by creating excess demand in the non-tradable sector. The converse holds when productivity increases in the non-tradable sector relative to the tradable sector. The variable is captured by the growth rate of GDP.

The Baffes et al. (1999) model is here further modified by adding an extra component which is the excess credit. Excess credit exerts a demand effect on the price of non-tradables thus stimulating an appreciation in the exchange rate. The variable is measured as the ratio of money to GDP.
Given the sustainable values of the fundamental determinants of equilibrium real exchange rate, equation 10 will be expressed as follows:

$$\ln e^* = \beta X \dots\dots\dots\dots\dots\dots\dots\dots (11)$$

Where, e^* is the equilibrium exchange rate, β is a $1 \times K$ vector of coefficients and X is a $K \times 1$ vector of real exchange rate fundamentals.

Measurement of Real Exchange Rate Misalignment

The calculation of the variable follows a model-based measure developed by Edwards (1989) to measuring exchange rate misalignment. This study employs the Stock Watson Dynamic OLS single equation estimation procedure in determining the relationship between real exchange rate and its fundamental determinants. The dynamic ordinary least squares was chosen because of its advantages over both the ordinary least squares and the Johansen maximum likelihood procedures. The OLS *apriori* categorises variables as endogenous and exogenous with implication of endogeneity problem and also the error term is not normally distributed indicating the presence of autocorrelation. The Johansen maximum likelihood method is a full information technique which is exposed to the problem of model misspecification and small data observation.

The Stock Watson method is a robust single equation approach which corrects the problem of endogeneity by inclusion of leads and lags of the first difference of the regressors and for serially correlated errors by the generalized least squares procedure. In this case, the sample size is small justifying the use of the dynamic ordinary least squares technique as it has the same good property as the ordinary least squares for small sample size and also has the same asymptotic optimality property as the Johansen distribution uses a single equation empirical model similar to the one used by Baffes et al (1999), designed for a single country study like Zimbabwe. In this case the exchange rate is defined as the fundamental equilibrium exchange rate and specifically equation 11 will be specified as follows;

$$\ln REER_t^* = \delta + \beta_1 \ln Gcon_t + \beta_2 \ln Excred_t + \beta_3 \ln Open_t + \beta_4 \ln TOT_t + \beta_5 Tech + \beta_6 Kflow_t + v_t \dots\dots\dots\dots\dots\dots (12)$$

REER = Real effective exchange rate, TOT is terms of trade; Gcon is government consumption, Kflow is capital flow, Open is openness, Tech is technical progress, Excred is Excess credit, and v_t is the error term. The variable TOT (terms of trade) was dropped from the model because of lack of data.

The definition of misalignment followed as in Baffes (1999) is the one suggested by Edwards (1988) which is given as follows:

$(e_t - e_t^*)$ Where e_t = observed value of the exchange rate and e_t^* is the equilibrium exchange rate. If $(e_t - e_t^*) > 0$ then the currency is overvalued; conversely,
If $(e_t - e_t^*) < 0$ the currency is undervalued.
We calculate the long run equilibrium level of the RER by multiplying the estimated coefficients with the permanent values of the fundamentals. Finally, the RER misalignment is calculated by subtracting the equilibrium level from the actual RER.

The data that was used in the study was drawn from the World development indicators and the Reserve bank of Zimbabwe. In addition, the data is annual and in logarithms except for technical progress and capital flow.

Real Exchange Rate Misalignment Empirical Results

The estimates for the real equilibrium exchange rate in Zimbabwe are presented in Table 1.

The variables that significantly influence the long run real equilibrium exchange rate in the model are openness, excess credit, government consumption, technical progress and capital flow. These fundamental variables explain 98.5 percent of the variation in the real exchange rate which makes the adopted model capable of explaining the variation in the real exchange rate. In this analysis, the variable TOT was dropped due to lack of data. The variables have expected signs

The fundamental exchange rate model was estimated using leads and lags with insignificant leads and lags dropped. Since the short run model is the adjustment period where the leads and lags net out their effects, by rule of the DOLS its analysis and interpretation is not included.

Table 1: The Stock Watson (DOLS) Empirical Results

Dependent Variable: LNREER
Method: Least Squares
Date: 10/02/12 Time: 22:18
Sample (adjusted): 1980 2006
Included observations: 24 after adjustments
Newey-West HAC Standard Errors & Covariance (lag truncation=2)

	Coefficient	Std. Error	t-Statistic	Prob.
C	15.65420	2.042065	7.665870	0.0000
LNOPEN	-1.758819	0.324145	-5.426020	0.0003
LNEXCRED	1.729015	0.117281	14.74244	0.0000
LNGCON	-2.761334	0.354035	-7.799601	0.0000
TECH	0.032267	0.014669	2.199720	0.0525
KFLOW	-0.026849	0.013205	-2.033250	0.0694
DLNEXCRED(-1)	-0.578613	0.064397	-8.985037	0.0000
DLNEXCRED	-0.467831	0.109194	-4.284383	0.0016
DLNEXCRED(1)	0.429042	0.067387	6.366814	0.0001
DLNOPEN	1.978984	0.588911	3.360415	0.0072
DTECH(-1)	-0.030851	0.008312	-3.711482	0.0040
DTECH	-0.027012	0.008554	-3.158045	0.0102
DLNGCON	1.543099	0.245379	6.288627	0.0001
DLNGCON(1)	-0.308443	0.135698	-2.273014	0.0463

R-squared	0.985146	Mean dependent var	4.684091
Adjusted R-squared	0.965835	S.D. dependent var	0.721278
S.E. of regression	0.133319	Akaike info criterion	-0.900947
Sum squared resid	0.177739	Schwarz criterion	-0.213749
Log likelihood	24.81137	Hannan-Quinn criter.	-0.718634
F-statistic	51.01603	Durbin-Watson stat	2.145758
Prob(F-statistic)	0.000000		

The variables that significantly influence the long run real equilibrium exchange rate in the model are openness, excess credit, government consumption, technical progress and capital flow. These fundamental variables explain 98.5 percent of the variation in the real exchange rate which makes the adopted model capable of explaining the variation in the real exchange rate. In this analysis, the variable TOT was dropped due to lack of data. The variables have expected signs

The fundamental exchange rate model was estimated using leads and lags with insignificant leads and lags dropped. Since the short run model is the adjustment period where the leads and lags net out their effects, by rule of the DOLS its analysis and interpretation is not included.

The residuals of the model were subjected to a battery of test which includes the arch test, serial correlation, normality test, model specification and the results confirms that the DOLS single equation model of provided in table 1 passes these various tests.

Misalignment Effects on Currency Crisis

The generated/ calculated values of the variable misalignment were incorporated into the currency crisis model to ascertain whether a relationship exists between real exchange rate misalignments and currency crisis. In literature there are basically three approaches that are used to study currency crises and these include the descriptive approach, the logit/probit model and the signal approach. This study adopts the logit/probit model of currency crisis where currency crises is modelled on a set of explanatory variables that includes real exchange rate overvaluation, monetary growth, current account as a percentage of gross domestic product (GDP), the ration of money supply to international reserves. Following Glick and Hutchison (2011) we incorporate a misalignment indicator in a currency crises regression model. There are a number of currency crises definitions that have been given in literature and these include; a nominal depreciation of 25% or greater which is at least 10% greater than the depreciation in the preceding year (Frankel and Rose, 1996) and a 15% minimum rate of depreciation and a minimum of 10 percent in inflation (Milesi-Ferretti and Razin, 1998). This study adopts the Frankel and Rose definition. Using this definition, Zimbabwe experienced this phenomenon in 1997 where the Zimbabwe dollar depreciated by 31, 4%, 44.7% in 2000, 1398% in 2003 and 60% in 2006.

The independent variables which are trend deviations of the real equilibrium exchange rate, and other macroeconomic variables are entered as lagged variables in the currency crises model to establish whether they are leading indicators of the currency crises that have been witnessed in Zimbabwe.

More specifically we use a logit model of the nature;

$$CC = \delta_0 + \delta_1 \dot{Y}_{t-1} + \delta_2 MS_{t-1} + \delta_3 \dot{M}_{t-1} + \delta_4 ED_{t-1} + \delta_5 Polstab_{t-1} + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots (13)$$

In this model CC= currency crises with 1=currency crisis and 0 otherwise, $\dot{MS}$ is misalignment which also defined as 1=overvaluation and 0 otherwise. $\dot{M}$ is the growth rate in money supply and ED is the external debt as a percentage of GDP, $\dot{Y}$ is the growth rate of GDP and Polstab is defined as political stability which is measured as a dummy variable indicating a new minister of finance (Eichengreen, Rose and Wyplosz, 1995).

The results indicates that real exchange rate misalignment, real GDP growth, growth in external debt, money supply growth are leading indicators of the currency crises suffered in Zimbabwe. All these indicators increase the probability of a currency crisis. Results of the currency crises are given in Table 2 below:

The corresponding covariates, which can be categorised into the first, second and third generation model fundamentals entails that the crises that the economy faced was a hybrid of the three divergent approaches.

Table 2: Determinants of Currency Crises in Zimbabwe

	(1) Logit	(2) Probit
L.gdp growth	-0.192**	-0.120**
	(-2.06)	(-2.20)
L.misal	40.80***	24.65***
	(2.99)	(3.32)
L.externaldebt	0.218***	0.130***
	(2.64)	(2.88)
L.polstab	-3.458	-2.129*
	(-1.46)	(-1.65)
L.moneygrowth	0.0481***	0.0293***
	(3.59)	(3.90)
Constant	-15.69***	-9.321***
	(-3.07)	(-3.37)
Observations	23	23
Pseudo R^2	0.606	0.617

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

CONCLUSIONS

Real exchange rate misalignment has important consequences for currency crisis. The study identified critical macroeconomic fundamentals that exhibit a significant long run relationship to the real exchange rate. The study introduced both monetary and fiscal policy variable in explaining the real exchange rate misalignment. All the variables included were significant fundamental explaining the long run movement of the real exchange rate misalignment.

Deviations of the equilibrium real exchange rate from the actual exchange rate were interpreted as misalignment and observations of the misalignment indicated that real exchange rate overvaluation acted as prelude to the currency crises. Using a logit and probit model (for robustness checks) it was found that first, second and third generations models fundamental were responsible for the currency crises witnessed in Zimbabwe. In this case, it suggests that maintaining credibility in monetary policy, fiscal policy is vital in ensuring that a currency crisis is avoided. A slow in the growth rate of the economy saw many people going for foreign produced which led people to substitute domestic currency for foreign currency. This had a serious effect on the currency. At the same time a real exchange rate overvaluation led investors to shun the country as the cost of production was assumed to be high.

LIMITATION AND FURTHER STUDY

The study could be improved by using monthly data as this could provide a robust estimation of real exchange rate misalignment in Zimbabwe. Since this data is unavailable, future research can benefit by linear and geometrical interpolation to obtain the monthly data.

REFERENCES

Cerra V. and Saxena S.C. (2002) – What caused the 1991 currency crisis in India? IMF Staff Papers, Vol 49; No. 3

Cuaresma J.C. and Slacik T. (2008) – Determinants of Currency crises: A conflict of Generations, Focus on European Economic Integration

_____(2008) - On the determinants of currencycrises: The role of model uncertainty, Working papers in Eonomics and Statistics, University of Innsbruck

Glick R. And Hutchison M. (2011) – currency crises, Federal Reserve bank of San Francisco Working paper Series, Working paper 2011-22

IMF (2001) – Zimbabwe Recent Developments, Selected issues and Statistical Appendix. In IMF Country Report No. 01/13. Washington, D.C: International Monetary Fund

Jongwanich J. (2011) – Real exchange rate overvaluation and currency crisis: evidence from Thailand, Applied Economics, 40:3, 373 – 382

Kaminsky G.L. (2003) – Varieties of Currency crises, NBER Working paper No. 10193

Kaminsky G.L. et al (1998) – Leading indicators of Currency crises. IMF Staff papers Vol 45 No. 1

Kemme D. M. and Roy S. (2005) – Real Exchange rate Misalignment: Prelude to Crises, William Davidson Institute Working Paper Number 797

Ndlela T, Daniel B., Sikwila M.N. and Dhliwayo R. (2000) – Review of Exchange rate Management: The Zimbabwean case, 1990-2000: national Economic Cosultative Forum (NECF) in Collaboration with the World Bank – Zimbabwe Country Mission

Masunda S. (2011) – Real exchange rate misalignment and sectoral output in Zimbabwe, International Journal of Research and Economics, Volume 2 (4) pp 59-74

Rangvid J. (2001) – Second generation Models of Currency crises, Journal of Economic Surveys, Vol 15 (5), Blackwell Publishers

Stein J. L. And Paladino G. (1999) – Exchange rate Misalignment and Crises, CESifo Working Paper Series, Working Paper No. 205

Su et. al. (2010) – An evaluation of leading indicators of currency crises, African Journal of Business management Vol 4(15), pp 3321-3331

Tensay T. M. (2006) - measuring the real exchange rate misalignment of Ethiopia. A Dynamic OLS Approach, Ethiopian journal of Economics, Volume XV, October.

APPENDICES

APPENDIX 1

Table 1: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.494240	Prob. F(2,8)	0.1439
Obs*R-squared	9.217669	Prob. Chi-Square(2)	0.0100

Heteroskedasticity Test: ARCH

F-statistic	0.126889	Prob. F(1,21)	0.7252
Obs*R-squared	0.138139	Prob. Chi-Square(1)	0.7101

Ramsey RESET Test:

F-statistic	1.197619	Prob. F(1,9)	0.3022
Log likelihood ratio	2.998313	Prob. Chi-Square(1)	0.0834

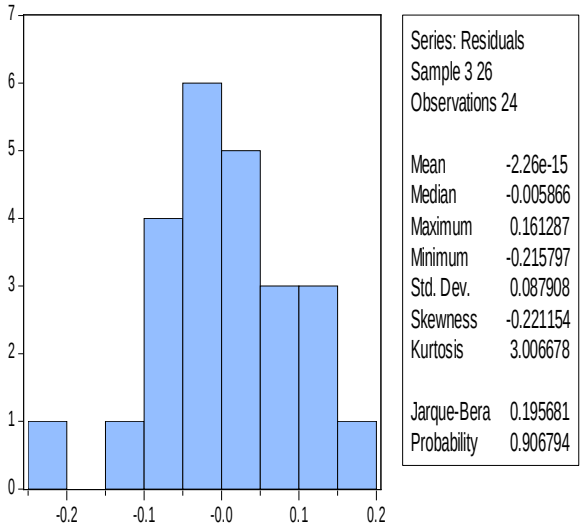

Figure 1: Normality Test