Central Bank Interventions in Controlling Exchange Rate: A Study of Da Afghanistan Bank Afghanistan

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Abstract

This study examines foreign currency exchange and capital notes intervention by Da Afghanistan Bank (DAB) and its effectiveness in controlling exchange that is Afghani to US$. In order to determine the role of central bank data was collected from January 2005 to December 2017on monthly basis. Augmented Dicky Fuller (ADF) and Phillips Perron (PP) test were used to determine the level of stationarity for dependent and independent variables. All variables were found to be stationary at level zero. Thus Ordinary Least Square Method was used to estimate the parameters. The results indicate that there is impact of intervention variable on exchange rate, but the relationship is very weak, which means as the amount for intervention variable increases, it helps reduce volatility though the affect is very minimum. The exchange rate determination theory is Monetary Channel for Afghani exchange rate and the interventions by DAB are unsterilized.

Key words: Da Afghanistan Bank, Augmented Dicky Fuller, Phillips Perron, Capital Notes

1. Introduction

Intervention in the foreign exchange market is a mechanism through which monetary authorities or central banks sell and purchase foreign currency in exchange for domestic currency to achieve the monetary policy objectives (Kiarie, 2012). According to Madura (2011) there are different ways to control exchange rate such as banning the use of foreign currency, banning locals from possessing foreign currency, restrictions on the amount of currency that can be taken out of brought in. Fixed exchange rate mechanism of controlling exchange rate have many advantages such as firms will always know the exchange rate and this makes trade and investment less

risky, absences of speculation, Encourages firms to invest, its keeps inflation low and avoid devaluation of currency.

Volatile exchange rate results in liquidity loss as it is the case with other financial assets as well (Madura 2011). Not only liquidity loss it may also negatively impact international trade and normal operations of the market. That is why central banks intervene to reduce such abnormality. Sometimes the exchange rates moves away from the fundamentals and equilibrium point, so the central banks make efforts to adjust the misalignment and brings it back to its normal pattern through intervention (Mwansa, 2009).

Monetary policy signals shape the market behaviors of the market participants, foreign exchange market intervention gives future signals and if there is unexpected changes in the monetary policy it will increase people mistrust. It will cause undesired movement in the exchange rate. (Mwansa 2009). At last, foreign reserves not only increases the credit worthiness of a country but it could also be used to support foreign investment attraction. The foreign exchange intervention actively started in the post Bretton Wood System era, prior to that it was allowed only to keep the exchange rate within the agreed range. After the fixed exchange rate regime ended, the decision to whether to use intervention or not was limited to individual central banks and states. At this stage the International Monetary Fund provided written guidance in regard to how to intervene in the markets (Osler, 2003).

The Plaza agreement in 1995 about intervention was first signed by the United States of America, France, Germany and Japan, but over the passage of time many other developed countries also started to intervene in the market, although, their intervention was very minimum. As developing countries also manage their exchange rates but with indirect intervention e.g. changing interest rates. Because of having policies mainly targeting exchange rate policies and interest rates limited major currencies issuers actively intervene in the market for smoothing abnormal markets.

However, developing countries and countries with transitional economies were more active regardless of which exchange rate regime they adopted (Dominguez, 1998).

In Afghanistan the biggest exchange market is informal market where most currencies exchanges take place and this market has physical existence in Kabul. The exchange rate for Afghani is determined based on demand and supply in this market and other markets in Afghanistan. As per the data provided by Market Operation Department of Da Afghanistan Bank the exchange rate for Afghani has followed an upward movement and has depreciated from 48.45 to 69.82 Afghani per unit of US Dollar during the period between 2005 till 2017.

1.1 Problem Statement

Although many studies have been conducted on the effectiveness of central bank's intervention operations, most of them focused on the developed economies in America, Asia and Europe. Such studies are much scant in Africa and Nigeria in particular. For instance, in Nigeria, only two studies Adebiyi (2007) and Omojolaibi & Gbadebo (2014) are known authors.

Foreign Exchange and Capital Notes Auction are two monetary policy tools that the Da Afghanistan uses to adjust misalignments, volatility of exchange rate and to manage Afghani liquidity in the market. These auctions should be well managed in terms of their frequency, amount of auction and when to conduct it. If care is not taken foreign exchange auctions can deplete the foreign reserves of the central bank and will incur more cost on capital notes without achieving the desired results. But decisions in regard to timing and how much to auction is not an easy job and heavily dependent on the current situation in the market, on the level of the foreign reserves available and the ability and willingness of the central bank to incur cost.

Although these auctions, especially, FX auctions are frequently conducted and they are given high importance in Afghanistan and other emerging economies that have adopted floating exchange rate regime and

have relatively volatile exchange rate (Adebiyi, 2007). But not much empirical work has been done to determine the effectiveness of these intervention in Afghanistan that creates a knowledge gap both for policy makers and academic students. Through this paper efforts is made to give rise to the debate that exists in international arena in respect to the effectiveness of the interventions.

1.2 Research Questions

To see is there any significant impact of Da Afghanistan Bank's Foreign Currency and Capital Notes Auctions on Exchange Rate. Is the intervention by the central bank is effective as they are perceived?

1.3 Objectives of this study

Following are the objectives of the study:

- To determine the effect of foreign currency and capital notes auctions on exchange rate volatility of Afghani to USD.

2. Literature Review

The discussions and debates in academia and among other stakeholders is whether the interventions by central banks are effective or not. This debate is not new it has been there ever since the floating exchange rate regime is introduced in 1970s and it has not ended here and will move on. However, there are mix views in this regard. One group is of views that intervention is not effective (Mehdi, 2011; Lahura and Marco 2013). Others are of the view that there is impact and that interventions are effective and the interventions help reduce volatility, but the others think and found that the interventions effectiveness is very weak (Jhingan, 2005; Omojolaibi and Gbadebi, 2014).

Exchange Rate is the value of domestic currency in respect to the value of foreign currency (Mussa, 1984; Ahmed, 2001). Another definition for exchange rate is that the price of an asset depends on supply of foreign and domestic financial asset and foreign income (Ardalan, 2004). Buying of one currency against another an

Dayyabu, Adnan & Sulong (2016) used Johansen cointegration and granger causality test to determine long term and short term effectiveness of Foreign Exchange Market Intervention in Nigeria. They found that there is long-run relationship between the exchange rate of Naira and interventions conducted by Central Bank Nigeria. Based on the Granger Causality test there is unidirectional or direction causality running from variables of intervention to the variable of money supply and it has severe effect on the stability of price. They concluded that intervention by central bank of Nigeria is non-sterilized.

Chipili (2014) conducted study on interventions by Bank of Zambia (Central Bank) by using GARCH (1,1) model. His work resulted in persistence volatility of exchange rate series. He found that BoZ's intervention reduces kwacha volatility, but its impact is weak. Ouma (2013) analyzed the intervention by Kenyan Central Bank by using ANOVA. The paper highlights that the Kenyan Central Bank intervenes in the foreign exchange market at time when there is misalignment in the market and this intervention results in the depreciation of the Kenyan currency shilling (KES). The paper further highlights that the intervention of the Kenyan Central Bank has played a very effective role in reducing exchange rate fluctuation.

Kiarie (2012) analyzed the intervention conducted by the Kenyan Central Bank by using ordinary least square (OLS) model of regression. His study found that the Foreign Exchange Market reacts both in positive and negative manner in response to the Central Bank intervention announcement. It was found that volumes traded in Foreign Exchange Market increases prior to Kenyan Central Bank intervention announcement and decreased after Central Bank intervention announcement. The study found that means returns were positive with regard to intervention announcement which is in line with signaling hypothesis. Based on the per mentioned points an inference can be made that market reaction to the intervention announcement is not fast that means there is efficiency, but not completely efficient.

In his study Berganza & Broto (2012) used daily exchange rate data of USD against four currencies of Latin American Countries such CLP, COP, MXN and PEN using base line model to analyze central banks interventions' effect on currency returns. The results of the paper shows that interventions by central banks of the selected countries had mixed results and it also depended on which type of intervention is used (sale or purchase of USD). In Peru, the dollar purchases had reasonable effect on the fluctuations, which is in line with findings of this study as well. While in Columbia it lead to higher volatility. The study found that large intervention did not have greater impact than small ones. Which is in contradiction to the case of Afghanistan.

Smwaka (2012) conducted study of Malawi Central Bank's intervention using GARCH model. He found that the kwacha which is the currency of Malawi depreciated against USD in response to the market intervention by Reserve Bank of Malawi. He further highlights that US dollar sales for the period before 2003 resulted in the appreciation of the Kwacha. However, in the same paper he confesses that the interpretation may be deceptive stating the reason that the coefficient of the empirical result is very small and insignificant. He added, criterion for equilibrium exchange rate result show that intervention by RBM during the period under review increased Kwacha/USD volatility.

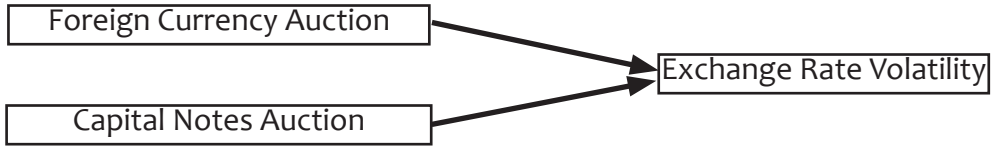
Using GARCH model Bhera and Co's (2011) research confirmed that intervention by Reserve Bank of India was effective in decreasing the fluctuation in the foreign exchange market of India. The intervention could not reverse the trend or movement of Indian Rupee against USD that support the finding of this research as well.

Mwansa (2009) research found that the objective of Bank of Zambia to reveres Kwacha depreciating is achieved through intervention. Using GARCH model Mwansa further adds that sales of USD increased the volatility of Kwacha and purchases of USD decreased the volatility. Hussain and Jalil (2006) also used GARCH model. They found out that the intervention

by State Bank of Pakistan has been effective and that they have successful in fixing the misalignment in the exchange rate of Pak rupees. They revealed in their paper that the interventions were effective not only in reducing the volatility of exchange rate, but also its direction. As it is the case with my research as well, the coefficient figure was very small.

Adebiyi (2007) used ARDL model to analyze the strength of intervention on monetary aggregates. He testified that intervention variables and exchange rate did not have strong relationship and said that Central Bank of Nigeria's intervention is sterilized. He came up with these reasons why it was not effective; not enough fund to support intervention because of decrease in reserve accumulation and secondly the intervention policy was not in line with macroeconomic policies and also the policy implementation process was interfered by politicians. Simwaka (2006) analyzed foreign exchange market intervention by Reserve Bank of Malawi (RBM) and found that the intervention by RBM had an impact Kwacha, but it was very weak and negligible. They further added that "But undesired volatility was still reduced significantly and that the sales of USD depreciated the value of Kwacha".

3. Theoretical Framework



Source: *Authors' Compilation*

3.1 Hypothesis

$H_{01:}$ Foreign Exchange Auctions do not have impact in reducing the exchange rate volatility

$H_{11:}$ Foreign Exchange Auctions have impact in reducing the exchange rate volatility

$H_{02:}$ Capital Note Auctions do not have impact in reducing the exchange rate volatility

$H_{12:}$ Capital Note Auctions have impact in reducing the exchange rate volatility

4.Research Methodology

4.1 Nature of Study

This study assesses the effectiveness of Da Afghanistan Bank (Central Bank of Afghanistan) intervention to control and adjust undesired exchange rate fluctuation. Hence, quantitative technique was followed to collect empirical data for testing the hypotheses. Nature of the study was explanatory where effect of intervention was determined.

4.2 Population

Da Afghanistan Bank has been intervening in the foreign market from 2002 on weekly basis till now.

4.3 Sample

In this research the time series data from January 2005 till December 2017 on monthly basis has been chosen as a sample to be studied.

4.4 Data Collection

The data for this study has been collected from Market Operation Department and Monetary Policy Departments of Da Afghanistan Bank.

4.5 Variables

Dependent variable

Exchange Rate: Exchange rate is the cost or price of buying a currency in exchange for another. The cost or price could be shown as the cost of one unit of foreign currency per local currency or vice versa (Pilbeam, 2006). The Dependent variable is exchange rate of Afghani, mainly, against US Dollar quoted as Afghani (Afs) per unit of US dollar ($).In this research the monthly changes for exchange rate has been considered (Mwansa,2009: Dayyabu and Sulong, 2016: Kiarie, 2012: Hussain and Jalil, 2007)

- Change in Exchange rate = $EX\text{-}RT_t / EX\text{-}RT_{t-1}$

Independent Variables

Foreign Exchange Auction: DAB conducts weekly auctions by selling US dollar and receives Afghanis against it. For analysis purposes month to month changes of data has been selected. (Mwansa, 2009: Dayyabu and Sulong, 2016: Kiarie, 2012: Hussain and Jalil, 2007)

- Change in Foreign Exchange Auction = $FX\text{-}A_t / FX\text{-}A_{t-1}$

Capital Notes Auction: These securities are sold to the market mainly they are bought by commercials banks to affect the Afghani liquidity in the banking sector. The data for Capital Notes Auction under study is month to month changes**.**

- Change in Capital Note Auction = $CN\text{-}A_t / CN\text{-}A_{t-1}$

4.6 Model Specification

The regression equation for the Ordinary Least Square model for the analysis of above data is:

$$EX\text{-}RT_t / EX\text{-}RT_{t-1} = \alpha + \beta_1 (FX\text{-}A/ FX\text{-}A_{t-1}) + \beta_2 (CN\text{-}A/ CN\text{-}A_{t-1}) + \mu$$

Where:

- $EX\text{-}RT_t / EX\text{-}RT_{t-1}$ = (dependent variable) Exchange Rate Volitity
- $FX\text{-}A/ FX\text{-}A_{t-1}$ = Foreign Currency Auction
- $CN\text{-}A/ CN\text{-}A_{t-1}$ = Capital Notes Auction

5. Data Analysis

5.1 Step One: Checking Stationarity

First it was checked whether data for Exchange Rate, Currency Auction and Capital Notes is stationary at level zero, one or two. So that we can investigate the relationship between exchange rate Afghani and the Central Bank intervention. To check whether the data is stationary at which level Augmented Dicky Fuller (ADF) and Phillips Perron (PP) tests were applied.

a. **Exchange Rate**

Table 1: Unit root

Variables	Augmented Dickey Fuller statistic: with trend and constant		Phillips – Perron statistic: with trend and constant.		Remark
	At first difference		At first difference		
	Critical Value at 5 %	Trace-Statistic Value	Critical Value at 5 %	Trace-Statistic Value	
Ex-Rate	-2.881	-9.221*	-2.880	-9.549*	I(0)
*MacKinnon (1996) one-sided p-values.					

Source: *Data output from GRETL*

Table 1: Show value of trace statistic and critical value at 5% by using two stationarity test Augmented Dickey Fuller and Phillips Perron test. The value of absolute trace statistic value should be greater than absolute value of critical value at 5% level, so in above table we can see results for change in exchange rate times series is stationary at I(0) as trace statistic is 9.22 and 9.549 which is greater than 2.881 and 2.880 respectively . So we can say that dependent variable change in exchange rate data is stationary at I(0).

b. **Foreign Currency Auctions**

Table 2: Unit root Testing

Variables	Augmented Dickey Fuller statistic: with trend and constant		Phillips – Perron statistic: with trend and constant.		Remark
	At first difference		At first difference		
	Critical Value at 5 %	Trace-Statistic Value	Critical Value at 5 %	Trace-Statistic Value	
FX-Auction	-2.881	-9.655*	-2.880	-4.175*	I(0)
*MacKinnon (1996) one-sided p-values.					

Source: *Data output from GRETL*

Table 2 show results for independent variable change in Foreign Currency Auction using Augmented Dickey Fuller and Phillips Perron statistic. In Table 2 we can see results for change in foreign currency auction times series is stationary at I(0) as trace statistic is 9.655 and 4.175 which is great-

er than 2.881 and 2.880 respectively . So we can say that independent variable change in foreign exchange auction data is stationary at I(0).

c. **Capital Notes Auction**

Table 3: Unit Root Testing

Variables	Augmented Dickey Fuller statistic: with trend and constant		Phillips – Perron statistic: with trend and constant.		Remark
	At first difference		At first difference		
	Critical Value at 5 %	Trace-Statistic Value	Critical Value at 5 %	Trace-Statistic Value	
Capital Note Auction	-2.881	-4.311*	-2.880	-6.385*	I(0)
*MacKinnon (1996) one-sided p-values.					

Source: *Data output from GRETL*

In Table 3 we can see results for change in capital note auction times series is stationary at I(0) as trace statistic is 4.311 and 6.385 which is greater than 2.881 and 2.880 respectively . So we can say that independent variable change in capital note auction data is stationary at I(0).

4.3. Step Two: OLS Method based on Stationairty Results

The results indicates that null hypothesis for all variables were rejected or they are non-stationary so we reject the null hypothesis and our data is stationary for all variable at I(0). Since data is stationary at I(0), Ordinary Least Square (OLS) model is used.

Table 3: OLS Output

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	1.436	.169		8.497	.000
	Ln_FX-A	-.132	.036	-.017	-3.661	.004
	Ln_CN-A	.013	.012	.011	1.083	.295
	Model Summary	R Square	Adj. R square	F-value	P-value	
		.192	.170	5.710	0.026	
a. Dependent Variable: ERT						

Source: *Data output from GRETL*

Using Ordinary Least Square Model (OLS) liner Regression:

The regression equation obtained after the analyses of the data is as follows:

$Y(ERT)= \alpha + \beta 1\ (FX\text{-}A) + \beta 2(CN\text{-}A) + \sigma$

$Y(ERT)= 1.436 - 0.132\ (FX\text{-}A) + 0.013\ (CN\text{-}A) + \sigma$

The coefficients indicates the direction and strength of relationship between independent variable and dependent variable. It shows if there is a unit change in independent variable and how much change is brought in dependent variable, while positive and negative sign shows positive and negative association.

In the above table we can see coefficient for foreign currency auction is -.132 which shows if there is increase in foreign currency auctions by central bank exchange rate will decline by -.132 thus this mechanism help central bank to control and stabilize exchange rate. While coefficient of capital notes only shows a change of only 0.013 in exchange rate if central bank increase capital note auction. Coefficient of constant value shows if effect of all independent variables is equal to zero still there will be change of 1.436 unit in exchange rate. This table highlights that there is a negative relation foreign currency auction and a positive relationship with capital notes, but effect is trivial. This its shows that capital notes have a weak relationship with exchange rate, while foreign currency auction helps in maintaining exchange rate stable.

i. **Significance of model**

The model is considered to be significant if the calculated value of F-test is greater than the tabulated value of F and the F tabulated value is 4 or we can say that Fcal>Ftab. The above table shows that the model is significant, since the calculated value of F test is 5.710 which is greater than 4 of tabulated value, therefore, it is concluded that the model is significant.

ii. **Individual significance**

P-value indicates that the individual significant or insignificant effect of in-

dependent variables with dependent variable. The general rule is that that Calculated P-Value greater or equal to that Tabulated P-Value or *Pcal≤ Ptab (0.05)*. P-values in table 3 indicates that foreign currency auction has significant effect on innerving exchange rate as its value is are 0.004, but Capital Notes do not have that much significant relationship with exchange rate as its value 0.295, which is much greater than the tabulated P-value 0.05.

iii. **Coefficient of determination**

R^2 which is also known as coefficient of determination. It shows how much the dependent variable is explained by independent variables. In other words, it indicates as a whole how much change in the dependent variable is due to independent variables. If value of R^2 closer to 1 is considered to be 100% or the value of dependent value is fully explained independent value. As we can see in the above table that our value of R^2 is 0.19 that it is not a good fit or the independent variables are not good predictors of exchange rate. The value R^2 in the above table tells us that 19% percent of changes in the exchange rate are due to foreign currency auction and capital notes auction.

6. Conclusion

The overall aim of this research was to find out the impact of foreign currency and capital note auction on Exchange Rate (Afghani/US$). For analysis purposes time series data from January 2005 till December 2017 on monthly was used. The research findings shows that interventions by DAB were un-sterilized and the effect of the intervention was not offset by purchasing securities.

The study found that the Monetary Channel is the perfect match for the intervention of DAB. Since it is the only channel that work under unsterilized intervention and it is based on demand and supply. The study further concludes that FX auctions have been effective in reducing the volatility, though the impact is very weak which is supported by the findings of Adebiyi (2007), Chipili (2014) and Carment Broto (2012) the case of Peru. While the

capital notes have not been effective way to control exchange rate by the Da Afghanistan bank.

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