Investigating the Semi-strong Efficiency in Namibia's Foreign Exchange Market

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Investigating the Semi-strong Efficiency in Namibia's Foreign Exchange Market

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Abstract

This paper analyses the semi-strong form efficiency of the foreign exchange market in Namibia using three bilateral exchange rates. The semi-strong form efficiency was examined using the cointegration test and Granger causality test. The study applied these tests on the monthly nominal spot exchange rate data for the period between the years 1993 and 2011. The results from the study indicated that semi-strong form efficiency was evident within Namibia's foreign exchange market. This suggests that historical data cannot be used to predict current and future market prices. The semi-strong form efficiency on the Namibia stock market is attributable to its correlation with the Johannesburg Stock Exchange. Furthermore, the results should be interpreted with caution; in light of thin trading which has been identified as a problem for Namibia's financial markets attributable to dual-listing of stocks.

Keywords: Efficient market hypothesis, Namibia, foreign exchange market, cointegration, Granger causality test.

1. Introduction

The role of the exchange rate has been found to be crucial for small import-dependent (open) economies, such as Namibia's, which is characterized by highly concentrated export sectors. Proponents of efficient markets hypothesis argue that excess exchange rate volatility damages the real economy, by imposing large costs on producers and consumers, who then make less than efficient allocative decisions. Under these conditions policy concerns include the extent of allocation efficiency in thin markets with a volatile exchange rate, coupled with institutional imperfections such as interest rate regulation, credit rationing and exchange rate control. This characterizes thin markets with high transaction costs and which are subject to frequent policy adjustments (Aron, 1997). If indeed foreign exchange markets are inefficient, a model that best predicts the exchange rate movements can be developed. Effectively, this implies that there could be a case for intervention, for example, the smoothening of exchange rates through intervention mechanisms (Froot & Thaler, 1990). Elimination of exchange rate fluctuations can ensure economic stability in terms of prices and wages and enhance economic performance.

A foreign exchange market that is efficient needs minimal government intervention as its participants cannot make abnormal gains from foreign exchange transactions (Chiwira and Muyambiri, 2012). Nwosa and Oseni (2011) further argue that an efficient market is good for financial analysts for the following reasons:

(i) It enhances investment opportunities of potential investors by mitigating moral hazard and asymmetric information problems associated with the buying and selling of shares.

(ii) The informational efficiency of the market provides incentives for potential investors to enter new investment ventures and include in their portfolio of assets viable assets based on the prevailing market value of firms.

(iii) Market efficiency reduces the transaction cost of trading the ownership structure of a physical asset and opens ways for the emergence and attainment of optimal ownership structures.

The Namibian foreign exchange reserves are denominated in three (3) reserve currencies, the South African Rand (ZAR), European Currency Unit (EURO) and the United States Dollar (USD). In this regard, the role of the exchange rate is crucial in small import-dependent economies with highly concentrated export sectors such as Namibia. This is due to the fact that most of these economies are often associated with shallow and underdeveloped financial markets typified by the absence of forward markets, and low levels of foreign exchange reserves (Aron, 1997).

Aron (1997) stated that the controversy between proponents of the efficient market and their opponents centers on whether the small measured deviation from efficiency is due to the

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presence of a time-varying risk premium, or such factors as the "peso effect" which will not detract from the EMH; or whether investors, or a subset of investors, make systematic prediction errors.

Though many studies have been conducted on the efficiency of the foreign exchange markets in developed countries, little is known about these markets in the developing economies and much less so in Namibia. Therefore, the objective of this study is to investigate whether semi-strong efficiency exists in the Namibian foreign exchange market. The paper is organized as follows: the following section presents a literature review. Section 3 discusses the methodology employed. The empirical analysis and results are presented in section 4. Section 5 concludes the study.

2. Literature Review

2.1 Theoretical Literature

On the theoretical front, Hallwood and MacDonald (2000) assert that the EMH is one which emphasizes the fact that financial markets are informationally efficient. Informationally efficient market price changes must be unforecastable (Samuelson, 1965). Thus, one cannot consistently achieve returns in excess of average market returns on a risk-adjusted basis, given the information available at the time the investment is made, as in an efficient market prices always fully reflect available information (Fama, 1970). Furthermore, they agreed that there are three major versions of the hypothesis namely; the weak, semi-strong and strong forms of efficiency. The weak-form efficiency states that prices on traded assets such as stocks, bonds, or property already reflect all past publicly available information. The semi-strong form occurs when despite increasing the information set made publicly available, it is not possible for the market participant to earn abnormal profit on stock trades. Finally the strong-form efficiency holds when it is impossible for a trader to make abnormal profits using a trading rule based on either public or private information.

Over the years, classical and neoclassical economists consistently maintained that, an unregulated market price serves as the best yardstick to reflect the true level of scarcity or worth of a commodity. The EMH is based on the notion that stock prices are informationally efficient; that is reflecting all available information about the value of an asset in the financial market at any given time. This implies that asset prices are impossible to predict from available public information and that the only factor that can possibly move these asset prices is news that alters the market perception of the asset value. Thus when good news on the market's prospect becomes public, the value of the asset appreciates and when the prospect of the market deteriorates the value of the asset depreciates (Oseni & Nwosa, 2011). They further stressed that critics of the EMH emphasize that there is every reason to doubt that market players are always rational in their actions and that asset prices are informationally

efficient because asset prices are influenced by psychological perceptions of market player's economic outlook. Conversely, proponents of EMH argue that simply because asset prices rose or declined in the past is not an indication that they will follow a similar trend in the future.

2.2 Empirical Literature

There are numerous studies that have empirically investigated the efficiency market hypothesis in the foreign exchange market. Baillie and Bollerslev (1989) used daily data on seven spot exchange rates against the US dollar, the British pound, the German mark, the French franc, the Italian lira, the Swiss franc, the Japanese yen and the Canadian dollar, from March 1, 1980 to January 28, 1985 (totalling 1245 observations) with the Johansen (1988) test for cointegration. They found that spot exchange rate movements must be at least partly predictable; the deviations from this long run relationship can be used in the prediction of the future exchange rates, which is a violation of weak-form market efficiency.

Wickremasinghe (2004) examined the weak and semi-strong forms of the efficient market hypothesis (EMH), using the currency of Sri Lanka as a starting point for six international currencies. In order to examine the weak-form of EMH, he considered the traditional unit root test, while in order to contrast the semi-strong efficiency he utilized the methodology of Engle and Granger, in which the tests of Augmented Dickey Fuller (ADF) and of Phillips-Perron (PP) were applied over the residuals of the cointegration equation. The same methodology was applied in this study. In addition, Wickremasinghe carried out Johansen's tests, Granger causality and Variance Decomposition. In this work, monthly spot rates were used for the Japanese Yen, the Pound sterling, the US dollar, the French Franc, the Indian Rupee and the German Mark, relative to the Sri Lankan Rupee, for the period of January 1986 until November 2000. The principal results point to the fact that evidence exists for rejecting the semi-strong version of the EMH.

Cooray and Wickremasinghe (2007) examined the efficiency in the stock markets of India, Sri Lanka, Pakistan and Bangladesh using monthly for the period January 1996 to January 2005. The Augmented Dickey Fuller (ADF), the Phillips-Perron (PP), the Dickey-Fuller Generalized Least Square (DF-GLS) and Elliot-Rothenberg-Stock (ERS) tests were used to examine weak-form stock market efficiency and the results were confirmed by the classical unit root tests. However, it was not strongly supported for Bangladesh under the DF-GLS and ERS tests. Cointegration and Granger causality tests were used to examine semi-strong form efficiency. Semi-strong form efficiency was not supported as these tests indicated a high degree of interdependence among the South Asian stock markets. The above results have implications for domestic as well as foreign investors in South Asian stock markets.

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The Torun and Kurt (2007) study investigated whether or not there was weak and semi-strong form efficiency of stock exchanges in European Monetary Union Countries with panel data variables stock market price index, consumer price index, purchasing power of euro, unemployment rate using panel unit root, causality and co-integration tests for the period of 2000-2007. The study employed panel unit root tests in testing for the weak form efficiency while panel co-integration and causality analysis were used to test for the semi-strong form efficiency. The results from unit root analysis show that stock markets of European Monetary Union countries were weak-form efficient. According to results of co-integration and causality analysis, some countries weren't semi-strong form efficient.

In Pakistan, Aga and Kocaman (2008) examined the efficient market hypothesis in the Istanbul stock exchange market for the period spanning 1986 to 2005. The study used a computed index, called the return index-20, and also used a time series model to test the weak-form of the efficient market hypothesis. The results obtained from the time series analysis revealed that there was evidence of a weak-form of efficient market hypothesis in the Istanbul stock exchange market.

In Romania, Dima and Milos (2009) investigated market efficiency in the Bucharest Stock Exchange using daily observations for the period 10.04.2000 to 08.04.2009. The results for this study revealed that there was a limit to the informational efficiency of the market (in its weak form), given the prolonged financial instability experienced within the Romanian economy.

Çiçek (2014) examined the market efficiency in the Turkish foreign exchange markets on the basis of the forward rate unbiasedness hypothesis, in terms of the Turkish lira/US dollar and the Turkish lira/Euro for the period February 5 2005 through July 26 2013. The study employed the unit root test and Johansen cointegration method. Unit root tests on the spot and forward exchange rates confirmed that they were non-stationary but first differencing of these variables made them stationary. Hence, the unit root test results provided evidence for efficient market hypothesis in its weak form, indicating all exchange rates follow random walks. However, the Johansen cointegration test results indicated that the forward rates were cointegrated with their corresponding spot rate with a unitary cointegrating vector (1, -1). This implied that the forward rate unbiasedness hypothesis did not hold, suggesting the failure of market efficiency in its semi-strong form. The evidence presented for the forward rate unbiasedness hypothesis implies that the forward rates are an unbiased predictor of the corresponding future spot rates; market agents can use the forward rates as indicators of the future spot rates. This can be interpreted as market expectations regarding exchange rate movements are rational and/or time varying risk premiums are non-existent, i.e. no systematic forecast errors exist.

Based on the afore-mentioned literature, one can safely assert the following: there are mixed findings regarding the semi-strong efficiency hypothesis, ranging from those refuting or agreeing to its existence to those finding no relationship at all. There are also different methodological approaches evident in cross-country or individual country's studies and there is a debate on the use the Johansen cointegration technique to test for efficiency in the foreign exchange market. There is variation in terms of data frequency used. The authors could identify no study on Namibia that has specifically looked at semi-strong efficiency in the foreign exchange market. It is against this background that this study intends to fill the gap and add to empirical literature for Namibia.

3. Methodology

In order to establish the presence of the semi-strong efficiency, this paper adopts the Engle-Granger two-step procedure as used by Wickremasinghe (2004), Cooray and Wickramasinghe (2007) and Cicek (2014). In this regard the study will follow the sequence as outlined below.

3.1 Econometric or Analytical Framework

In following the Engle-Granger two-step procedure, the first step entails the analysis of the order of integration of the variables by examining whether the variables are stationary; does not contain unit root. When data contains a unit root it means any result derived from such data will be spurious or nonsensical. Spurious regression implies that the relationship between variables may appear statistically significant, though no meaningful relationship among the variables exists. Furthermore, being non-stationary implies that the mean, variance and covariance are not constant over time. There are various methods for testing for unit roots such as: Augmented-Dickey test (ADF), the extension to the Dickey Fuller test for example Pantula tests, Phillips Peron tests, Kwaitowski-Phillips-Schmidt-shin (KPS), Elliot-Rothenberg-stock point optimal (ERS), Ng-Perron tests and the graphical analysis and the correlogram test. However, this study will only use ADF, PP and KPSS tests for unit root. In the context of this study, the unit root test can actually be used to establish the weak form efficiency in the foreign exchange market.

The next step is to establish if cointegration exists among the variables of interest. Cointegration is generally defined as a concept which mimics the existence of the long run equilibrium relationship among variables. It gives an indication of convergence to some sort of equilibrium in the long run. This study employs the Johansen cointegration test for this purpose. Since this will be done in the vector autoregressive (VAR) framework, the first step uses first difference as shown below:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + ... + A_n Y_{t-n} + \varepsilon_t \qquad 1$$

whereas Y_t is lag length n $(p \times 1)$ vector endogenous variable, then first difference changes below:

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$$\Delta Y_t = \sum_{j=1}^{n=1} \pi_j \Delta Y_{t-j} + \pi Y_{t-n} + \varepsilon_t \qquad\qquad 2$$

whereas π_j is a short term adjusting coefficient to explain short-term relationship, π is long term shock vector that includes long term information that tips off on the existence long term equilibrium relationship. Moreover rank of π decides the number of cointegrated vector. π has three hybrids:

(a) $rank(\pi) = n$, then π is full rank, meaning all the variables are stationary series in the regression (Y_t)

(b) $rank(\pi) = 0$, then π is null rank, meaning variables do not exhibit cointegrated relationship.

(c) $0 < rank(\pi) = r < n$, then some of variables exist r cointegrated vector.

The Johansen cointegration approach uses the rank of π to distinguish the number of cointegrated vector and examine rank of vector in testing how many of non-zero of characteristic roots exist in the vector. There are two statistic processes for cointegration.

(i) Trace test:

$H_0 : rank(\pi) \le r$(at most r integrated vector)
$H_1 : rank(\pi) > r$(at least r+1 integrated vector)

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} \ln(1-\hat{\lambda}_i)$$

T is sample size, $\hat{\lambda}_i$ is estimated of characteristic root. If test statistic rejects H_0 that means variables exist at least r+1 long term cointegrated relationship.

(ii) Maximum eigenvalue test:
$H_0 : rank(\pi) \le r$(at most r integrated vector)
$H_1 : rank(\pi) > r$(at least r+1 integrated vector)

$$\lambda_{\max}(r, r+1) = -T \ln(1-\hat{\lambda}_{r+1})$$

If test statistics accepts H_0 that means variables have r cointegrated vector. This method starts testing from variables that do not have any cointegrative relationship which is r=0. Then the test has added the number of cointegrative item to a point of no rejecting H_0 that means variables have r cointegrated vector. The relevance of this technique in the context of this study is the fact that it reveals if there are co-movements among the currencies. If there are co-movements then it suggests the possibility of predictability and this violates the semi-strong form efficiency.

The final step in this study is to test for causal relationship between the variables of interests by means of Granger causality test. To cater for this, Granger (1969) developed a model based on lead and lag relations in forecasting. That is determining whether one time series is good for forecasting the other. There are different situations under which Granger causality test can be applied. However, in this study, Granger causality will be tested in a Vector Autoregressive (VAR) framework where a multivariate model is extended to test for simultaneity of all included variables. Granger used twin factors of VAR to find variables' causal relationship. The VAR can be considered as a means of conducting causality tests, or more specifically Granger causality tests. It assumes two series X_t and Y_t that define those messages set.

$$X_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} X_{t-1} + \sum_{i=1}^{k} \alpha_{2i} Y_{t-1} + \varepsilon_{1t} \qquad\qquad 3$$

$$Y_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} X_{t-1} + \sum_{i=1}^{k} \beta_{2i} Y_{t-1} + \varepsilon_{2t} \qquad\qquad 4$$

To determine the variables' relationship the following test are conducted on the coefficients.

(i) $\alpha_{2i} \neq 0 \; and \; \alpha_{1i} = 0$: meaning Y lead X or X lag Y.

(ii) $\beta_{1i} \neq 0 \; and \; \beta_{2i} = 0$: meaning X lead Y or Y lag X.

(iii) $\alpha_{2i} = 0 \; and \; \beta_{1i} = 0$: meaning both variables are independent.

(iv) $\alpha_{2i} \neq 0 \; and \; \beta_{1i} \neq 0$: meaning both variables are interactive each other and have feedback relationship.

The relevance of this test is to validate and confirm whether indeed there is no predictability among the variables. This is to compliment the cointegration test in establishing the existence of semi-strong form efficiency.

3.2 Data, Data Sources and Data Measurements

Owing to the fact that the market for forward contracts does not exist in Namibia as yet, and hence, the forward exchange rates are not published by the Bank of Namibia; the scope of this study is limited to the efficiency of the spot foreign exchange market. Therefore, the data used in this paper consists of monthly nominal spot exchange rates of the UK pound (GBP), the US dollar (USD), the European Currency Unit (EURO). The monthly bilateral spot exchange rates covering the period 1993:01 to 2011:12 were obtained from the Bank of Namibia Quarterly bulletin (2012).These spot exchange rates were then transformed into natural logarithms. Although the Namibian dollar is linked to the South African Rand, it is expected that the fluctuations of the rand in the international market are indirectly passed onto the Namibia dollar.

4. Empirical Analysis and Results

4.1 Unit Root Test

In testing for unit root the following tests were used: namely, the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests. The KPSS was added as confirmatory test due to the fact that the ADF and PP statistic has limitations of lower power and successive or persistent unit roots, respectively. They tend to under-reject the null hypothesis of unit roots. The results of the unit root test in levels are presented in Table 1 below.

Table 1 reports the results of the ADF unit test for the three nominal exchange rates for levels and the first differences of the natural log values. Interestingly, all exchange rates under consideration are non-stationary in levels, that is; their mean is not zero, the variance is not constant and the residuals appear to be correlated over time. When the variables were found to be non-stationary in levels, they were differenced once and became stationary, that is, with a zero mean, constant variance and the residuals uncorrelated over time. The level of significance of the ADF statistics for all currencies is 5%. Table 1 also shows the results of the PP unit root test for the three exchange rates. The PP test procedures are quite similar to those of the ADF test also at 5% level of significance. The results from the PP test also indicate that the series of the exchange rate are non-stationary in levels. Hence, concurring with those of the ADF.

Table 1: Unit root tests: ADF and PP in levels and first difference

Variable	Model Specification	ADF	PP	ADF	PP	Order of Integration
		Levels	**Levels**	**First Difference**	**First Difference**	
USD	Intercept and Trend	-1.940	-1.948	-11.386**	-11.425**	1
	Intercept	-1.915	-1.796	-11.416**	-11.416**	1
GBP	Intercept and Trend	-2.338	-2.107	-12.265**	-12.203**	1
	Intercept	-1.790	-1.506	-12.405**	-12.343**	1
EURO	Intercept and Trend	-1.743	-1.646	-11.736**	-11.736**	1
	Intercept	-2.605	-2.413	-11.752**	-11.752**	1

Source: author's compilation and values obtained from Eviews

Notes: (a) *, **, *** are levels of significance at 1, 5, and 10%, respectively. ** means the rejection of the null hypothesis at 5%. (b)USD, GBP and EURO denote the nominal exchange rate for US dollar, Pound sterling and the European currency unit (EURO), respectively.

Many economists have argued against using the standard unit root test and suggested using other powerful tests, such as tests that can be used to test the null of stationarity against the alternative of non-stationarity (Ibrahim et al, 2011). The most popular one is the KPSS.

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The KPSS test was also then conducted for confirmatory purposes so as to augment the ADF and PP tests conducted earlier. The results in Table 2 below still show that the series were found to be non-stationary in level form as in the case of ADF and PP. After differencing the data once, the unit root test shows that the series became stationary, implying that the series are integrated of order 1.

Table 2: Unit root tests: KPSS in levels and first difference

Variable	Model Specification	Levels	First Difference	Order of Integration
USD	Intercept	1.290	0.184**	1
	Intercept and Trend	1.345	0.060**	1
GBP	Intercept	1.487	0.296**	1
	Intercept and Trend	0.401	0.043**	1
EURO	Intercept	1.766	0.097**	1
	Intercept and Trend	0.201*	0.032**	1

Source: author's compilation and values obtained from Eviews

*Notes: (a) *, **, *** are levels of significance at 1, 5, and 10%, respectively. ** mean the rejection of the null hypothesis at 5%.*

4.2 Testing for Cointegration

After establishing the univariate characteristics of the series and having found the presence of the weak form of EMH, it was deemed necessary to proceed so as to establish whether there is a presence of the semi-strong EMH in Namibia's foreign exchange market. This process requires testing for cointegration which is the next step. This test was done by employing the Johansen cointegration test based on trace and Maximum Eigen values of the stochastic matrix. The results are presented in Table 4.3 below.

Table 3: The Johansen co-integration test based on trace and maximal
Eigen value of the stochastic matrix

Maximum Eigen Test				Trace Test			
H_0: rank = r	H_a: rank = r	Statistic	95% Critical Value	H_0: rank = r	H_a: rank = r	Statistic	95% Critical Value
r = 0	r = 1	9.05	29.80	r = 0	r >=1	18.51	21.13
r <=1	r = 2	6.28	15.49	r <= 1	r >= 2	9.46	14.26
r <=2	r = 3	3.18	3.84	r <= 2	r >= 3	3.18	3.84

Source: author's compilation and values obtained from Eviews

Note: Both Max-Eigen value and Trace tests indicates no cointegrating equations at the 0.05 level. Sample period 1993:01 to 2011:12.

Table 3 reports the results of the Johansen cointegration Test of the three exchange rates. It was necessary to test whether there are indeed co-integration relationships among these variables. The Johansen Maximum Likelihood (JML) approach to test for cointegration was

used on a VAR system of three variables based on Full Information Maximum Likelihood (FIML). The FIML procedure is essentially used to identify the rank of the matrix Π. The null hypothesis as stated above is that r=0 against the general alternative hypothesis r ≥ 1, or r ≥ 2, 3. In this regard a λ-trace statistic was employed, since the null hypothesis is r=0 and there are three variables (i.e. n=3). Table 3 shows that the null hypothesis that r=0 could not be rejected, since the calculated t-statistic (18.50) is smaller than the critical value (21.13) at 5 per cent significance level.

The trace-statistics have a very general alternative hypothesis. A more specific hypothesis is tested and in this regard a λ-maximal test is applied and the null hypothesis is that r=0 against the specific alternative hypotheses r=1. Table 3 shows that the null hypothesis of no co-integration could not be rejected, that r=0, meaning that no co-integrating vector exists among the variables in this model. This is again because the calculated t-statistics (9.049) are lower than the critical values (29.80) at 5 per cent significance level.

To sum up, it is evident that both the Maximum Eigen Values and Trace statistics strongly accepted the null hypothesis that there is no co-integration between all of these variables in the model (i.e. that r =0). This suggests that there are indeed no co-integrating vectors between these variables. The relevance of these results is their usefulness in determining whether there is a presence of semi-strong EMH. The fact that there is no cointegration among the variables implies that there are no co-movements between currencies. That is to say that, none of these currencies can predict the other. Hence one can safely conclude that there is no violation of the semi-strong form of the EMH. Therefore, this suggests that prices of financial assets instantly reflect publically available information, as the semi-strong EMH postulates.

These results should however be interpreted with caution especially as thin trading has been identified as a problem for Namibia's financial markets attributable to dual-listing of stocks (Mlambo & Biekpi, 1997).

4.3 Granger-causality test

To further analyze the semi-strong form of EMH, a Granger causality test was conducted. This is an additional test to verify the results of the cointegration test by confirming the presence of the semi-strong form of EMH. The Granger causality statistics are examined to determine whether lagged values of one variable do help to predict another variable. Table 4 summarizes the Granger-causality results for the three-variable VAR. It shows the p-values associated with the F-statistics for testing whether the relevant sets of coefficients are zero. The results show that none of the variables helps in predicting another. Notably, these results confirm the earlier results on the weak form of EMH and most importantly for this section; they are consistent with semi-strong form of EMH. Hence, one can confirm the presence of

semi-strong form of the EMH in Namibia. This implies that the coefficients on their lags will all be equal to zero in the reduced-form equation. This is consistent with the semi-strong form of EMH. Thus implying that the exchange rates instantly reflect all publicly available information.

Table 4: Granger causality tests

Regressor	Dependent Variable in Regression		
	USD	GBP	EURO
USD	0.00	0.84753	0.48689
GBP	0.17834	0.00	0.54619
EURO	0.95578	0.27847	0.00

Notes: (a) The entries in the table show the p-values for F-tests. (b)** mean the rejection of the null hypothesis at 5%. (b) USD, GBP and EURO denote the nominal exchange rate for US dollar, Pound sterling and the European currency unit (EURO), respectively.

5. Conclusion

This study examined the semi-strong form efficiency in Namibia's foreign exchange market. This was done with the purpose of establishing whether there are investment analysts who are reaping abnormal gains and as such to establish whether there is a need for government authorities to intervene. The study was based on monthly data covering the period 1993:01 to 2011:12, utilizing the technique of cointegration and Granger causality tests. The results reveal that there is evidence of semi-strong form market efficiency in Namibia's foreign exchange market. This suggests that the current market prices do not have memory and thus, past market prices cannot be used to predict current or future market prices. It also implies that the movement of one or more exchange rates can not be predicted from movements of the other exchange rates, thus, participants in the Namibia's foreign exchange market can not engage in abnormal profitable transactions in the short and long-run. This is to say, government cannot influence the movement of the exchange rates as the rates are not predictable. The semi-form efficiency on the Namibia stock market is attributable to its correlation with the Johannesburg Stock Exchange which was also found to be weak form efficient for the period investigated. The study recommends that Namibia would need to develop its own financial markets that would create investment opportunities, in order to retain funds in the country (reduce capital outflows) and address the issue of thin-trading, for it to optimally realize full benefits that come along with an efficient foreign exchange market. Furthermore, it would have been plausible to use simulative technical analysis methods, such as those used by this analysis, to see if one can actually beat the market by profitably trading the Namibian dollar vis-à-vis other currencies. Given that this was not the focus of this study, future studies should investigate this as comparison to current findings, taking into account other determinants of exchange rates such as interest rates, growth rate, and inflation figures.

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It is further suggested that future studies should use alternate methodologies such as the event study in testing the semi-strong form of efficiency and compare the findings thereof with those in the current study.

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