# THE ANALYSIS OF MONETARY FRAMEWORK OF INFLATION TARGETING, EXCHANGE RATE REGIME SWITCHING AND VOLATILITY IN SELECTED SUB-SAHARAN AFRICAN COUNTRIES

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**DOCTOR OF PHILOSOPHY**
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# THE ANALYSIS OF MONETARY FRAMEWORK OF INFLATION TARGETING, EXCHANGE RATE REGIME SWITCHING AND VOLATILITY IN SELECTED SUB-SAHARAN AFRICAN COUNTRIES

**By**

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## ABSTRACT

Exchange rate volatility has affected not only sub-Saharan African economies but the volume of international transactions in general. It directly affects the nations' profitability of tradable commodities, balance of payment, terms of trade and investment decisions. Despite the measures taken by the monetary authorities to ensure macroeconomic stability, exchange rate remains volatile. This study, therefore pursues the following objectives. First, it investigates the effectiveness of the inflation targeting framework (ITF) as a hedging strategy for exchange rate volatility. Second, examines whether the monetary policy of ITF has performed the role of the nominal anchor in the economies. Third, examines the influence of exchange rate regime switching on exchange rate volatility and finally, determines causality among the variables of the monetary theory of exchange rate determination. In achieving the results of the objectives, the study employed a battery of econometric procedures namely, threshold generalised autoregressive conditional heteroscedasticity (TGARCH) model, generalised method of moments (GMM) estimators, time-varying Markov-switching transition probability ARCH model and asymmetric/Toda-Yamamoto dynamic causality with leverage bootstrapping. The results of the first objective indicate that the menace of exchange rate volatility reduces when the IT policy was adopted in Ghana and South Africa. However, the ITF policy transition increases the volatility of exchange rate. Secondly, the findings on the baseline and augmented Taylor rule models reveal that ITF become a nominal anchor in the economies immediately after the adoption of the policy, although the hypothetical response of interest rate to inflation deviation and output gap is greater in South Africa compared to Ghana. Thirdly, the results of the time-varying Markov-switching models indicate that the exchange rates of the countries are characterised by decline in the downward regime except for Nigeria which shows high decline in the upward regime. Finally, the estimates of the asymmetric/Toda-Yamamoto causality reveal the existence of size distortion when the asymptotic Granger causality is used. The main policy implication of the findings is that monetary authorities can ensure exchange rate stability through accountability and transparency in contractionary or expansionary policies in aggregate demand using monetary policy instrument.



**Key words**: asymmetric causality, exchange rate, volatility, inflation targeting, regime switching.

## ABSTRAK

Kesan daripada volatiliti kadar pertukaran bukan sahaja keatas ekonomi sub-Sahara Afrika malahan juga keatas jumlah urus niaga antarabangsanya. Ia secara langsung memberi kesan keatas perolehan keuntungan negara melalui perdagangan komoditi dipasaran antarabangsa, imbangan pembayaran, kadar syarat dagangan dan pemutusan pelaburan. Walaupun terdapat langkah-langkah yang diambil oleh pihak berkuasa kewangan bagi memastikan kestabilan makroekonomi, ianya masih tidak dapat mengurangkan volatiliti kadar pertukaran. Kajian ini bertujuan mencapai objektif yang berikut. Pertama, mengkaji keberkesanan rangkakerja mensasar inflasi (*inflation targeting framework*, ITF) sebagai strategi lindung nilai terhadap volatiliti kadar pertukaran. Kedua, mengkaji sama ada polisi kewangan ITF telah memainkan peranan sebagai tunjang nominal dalam ekonomi. Ketiga, mengkaji pengaruh kadar pertukaran sebagai pensuisan-rejim keatas volatiliti kadar pertukaran dan akhir sekali, menentukan kausalitas antara pembolehubah teori kewangan penentuan kadar pertukaran. Bagi mencapai objektif yang dinyatakan, kajian ini menggunakan model ambang autoregresif umum heteroskedastisiti bersyarat (TGARCH), kaedah penganggar umum momen (GMM), transisi kebarangkalian masa-berbeza pensuisan-Markov model ARCH dan kausalitas dinamik tidak-simetri/Toda-Yamamoto dengan *leverage bootstrapping*. Bagi capaian objektif pertama hasil empirikal menunjukkan bahawa ancaman volatiliti kadar pertukaran berkurangan apabila dasar mensasar inflasi dilaksanakan di Ghana dan Afrika Selatan. Walau bagaimanapun, peralihan kepada polisi ITF itu menambahingkatkan volatiliti kadar pertukaran. Kedua, penemuan pada model garis dasar dan model pengembangan peraturan Taylor menunjukkan bahawa ITF menjadi tunjang nominal dalam ekonomi sebaik sahaja pelaksanaan polisi tersebut, walaupun tindakbalas hipotetikal kadar faedah terhadap sisihan inflasi dan jurang keluaran adalah lebih besar di Afrika Selatan berbanding Ghana. Ketiga, keputusan empirikal bagi model masa-berbeza pensuisan-Markov bagi negara-negara dalam kajian menunjukkan kadar pertukaran dengan ciri-ciri penurunan dalam rejim ke bawah kecuali Nigeria yang menunjukkan penurunan tinggi dalam rejim ke atas. Akhir sekali, anggaran kausalitas tidak-simetri /Toda-Yamamoto memperlehatkan kewujudan saiz herotan apabila kausalitas asimptot Granger digunakan. Rumusan kajian keatas implikasi utama polisi ialah pihak berkuasa kewangan boleh memastikan kestabilan kadar pertukaran melalui kebertanggungjawaban dan ketelusan dalam perlaksanaan polisi penguncupan atau pengembangan permintaan agregat dengan menggunakan instrumen polisi monetari.



**Kata kunci**: kausalitas tidak-simetri, kadar tukaran, volatiliti, sasaran inflasi, pensuisan regim.

## DECLARATION

Some part of this thesis has been published and/or under publication process in the following referred journals and conference proceedings. Furthermore, few other articles are under review.

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Umar, M., Dahalan, J. & Aziz, M. I. A. (In press). Exchange rate stability and asymmetric causality in Nigeria: Does inflation differentials matter?. *Actual Problems of Economics* (Scopus indexed)

Umar, M., Dahalan, J. & Aziz, M. I. A. (In press). The South African monetary policy and inflation targeting as a nominal anchor: Does the monetary policy becomes more effective?. *International Journal of Monetary Economics and Finance* (Scopus indexed)

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Umar, M. & Dahalan, J. (2015). *Evidence on real exchange rate-inflation causality: An application of Toda-Yamamoto dynamic Granger causality test*. 2nd International Conference on Business Strategy and Social Sciences, 16th February, Movenpick Ibn Battuta Gate Hotel, Dubai, UAE.

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## LIST OF ABBREVIATIONS

| Abbreviation | Full Meaning |
|---|---|
| ADF | Augmented Dickey Fuller |
| AIC | Akaike Information Criterion |
| AR | Autogressive |
| ARCH | Autoregressive Conditional Heteroscedasticity |
| ARMA | Autoregressive Moving Average |
| ASSOC | Associate |
| CBN | Central Bank of Nigeria |
| EU | European Union |
| FAVAR | Factor Augmented Vector Autoregressive |
| FDI | Foreign Direct Investment |
| FER | Flexible Exchange Rate |
| FUK | Federal University Kashere |
| GARCH | Generalized Autoregressive Conditional Heteroscedasticity |
| GAUSS | Is a programming language designed to operate on matrices |
| GDP | Gross Domestic Product |
| GMM | Generalized Method of Moments |
| HP | Hodrick-Prescott |
| ICRG | International Country Risk Guide |
| IFS | International Financial Statistics |
| IMF | International Monetary Funds |
| IT | Inflation Targeting |
| ITF | Inflation Targeting Framework |
| LM | Lagrange Multiplier |
| LS | Lee and Strazicich |
| LP | Lumisdaine and Pappel Unit Root Test |
| MS | Markov-switching |
| MS-ARCH | Markov-switching ARCH |
| MWALD | Modified WALD Test |
| OECD | Organization of Economic Cooperation and Development |
| PPP | Purchasing Power Parity |
| SAP | Structural Adjustment Programme |
| SARB | South African Reserve Bank |
| SFEM | Second Tier Foreign Exchange Market |
| SIC | Schwarz Information Criterion |
| SSA | Sub-Saharan Africa |
| TETFund | Tertiary Education Trust Funds |
| TGARCH | Threshold GARCH |
| UUM | Universiti Utara Malaysia |
| USD | United States Dollars |
| VAR | Vector Autoregression |
| WDIs | World Development Indicators |

# CHAPTER ONE

# INTRODUCTION

## 1.1 Introduction

This chapter presents the general introduction of the thesis. The motivation and background of the study are highlighted in the following section. Section 1.3 discusses the statement of the problem. The research questions are presented in section 1.4. Sections 1.5 contains the objectives of the study. The significance of the study is given in section 1.6 while sections 1.7 and 1.8 respectively present the scope of the study and the organization of the thesis.

## 1.2 Background of the Study

Exchange rate volatility[1] has affected not only sub-Saharan African (SSA) economies but the volume of the world international transactions in general (Eun, Resnick & Sabherwal, 2012). It directly affects the nations' profitability of tradable commodities and services, balance of payment, terms of trade, efficient allocation of resources and investment decision (Kemme & Teng, 2000 and Taiwo & Adesola, 2013). The uncertainty stated as far back as 1914, during the World War I when the gold standard was discarded. The frequent uncertainties led to the Bretton Wood agreement of fixed exchange rate in 1944. The fixed exchange rate era overvalued the United States (US) dollar in the 1970s in relation to other countries' currencies. This paved way to Smithsonian agreement of flexible exchange rate in 1973. Despite the Smithsonian

[1] Exchange rate volatility is the degree of fluctuations or uncertainty pertaining the size of changes in the value of currencies. On the other hand, it is the degree of instability or unpredictability regarding the size of changes in the value of currencies. It is also seen as the liability of one country's currency relative to another to fluctuate over time (Nnamdi & Ifionu, 2013).

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