

**T.C.
SAKARYA UNIVERSITY
SOCIAL SCIENCES INSTITUTE**

**ANALYSIS OF THE DYNAMIC AND CAUSAL RELATIONSHIP
BETWEEN EXCHANGE RATE AND SELECTED
MACROECONOMIC VARIABLES IN SOMALIA: ARDL AND TODA-
YAMAMOTO METHODOLOGIES**

**MASTER'S THESIS
ABDIKANI ABDULLAHI SHEIKDON**

Department: Economics

Thesis Advisor: Prof. Dr. Ali Kabasakal

June 2021

**T.C.
SAKARYA UNIVERSITY
SOCIAL SCIENCES INSTITUTE**

**ANALYSIS OF THE DYNAMIC AND CAUSAL RELATIONSHIP
BETWEEN EXCHANGE RATE AND SELECTED
MACROECONOMIC VARIABLES IN SOMALIA: ARDL AND TODA-
YAMAMOTO METHODOLOGIES**

**MASTER’S THESIS
ABDIKANI ABDULLAHI SHEIKDON**

Department: Economics

**“The examination was held online on /29/06 /2021 and approved unanimously
By the following committee members.”**

COMMITTEE MEMBERS	ASSESSMENT
Prof.Dr. Ali KABASAKAL	SUCCESSFUL
Prof.Dr. Seyit KÖSE	SUCCESSFUL
Prof.Dr. Şakir GÖRMÜŞ	SUCCESSFUL

	T.C. SAKARYA ÜNİVERSİTESİ SOSYAL BİLİMLER ENSTİTÜSÜ TEZ SAVUNULABİLİRLİK VE ORJİNALLİK BEYAN FORMU	Sayfa : 1/1
Öğrencinin		
Adı Soyadı	:	ABDIKANI ABDULLAHI SHEIKDON
Öğrenci Numarası	:	Y186002024
Enstitü Anabilim Dalı	:	İktisat
Enstitü Bilim Dalı	:	İktisat
Programı	:	☒ YÜKSEK LİSANS ☐ DOKTORA
Tezin Başlığı	:	ANALYSIS OF THE DYNAMIC AND CAUSAL RELATIONSHIP BETWEEN EXCHANGE RATE AND SELECTED MACROECONOMIC VARIABLES IN SOMALIA:ARDL AND TODAYAMAMOTO METHODOLOGIES
Benzerlik Oranı	:	%19
SOSYAL BİLİMLER ENSTİTÜSÜ MÜDÜRLÜĞÜNE,		
☒ Sakarya Üniversitesi Sosyal Bilimler Enstitüsü Lisansüstü Tez Çalışması Benzerlik Raporu Uygulama Esaslarını inceledim. Enstitünüz tarafından Uygulama Esasları çerçevesinde alınan Benzerlik Raporuna göre yukarıda bilgileri verilen tez çalışmasının benzerlik oranının herhangi bir intihal içermediğini; aksinin tespit edileceği muhtemel durumda doğabilecek her türlü hukuki sorumluluğu kabul ettiğimi beyan ederim.		
17/06/2021 İmza		
☒ Sakarya Üniversitesi Sosyal Bilimler Enstitüsü Lisansüstü Tez Çalışması Benzerlik Raporu Uygulama Esaslarını inceledim. Enstitünüz tarafından Uygulama Esasları çerçevesinde alınan Benzerlik Raporuna göre yukarıda bilgileri verilen öğrenciye ait tez çalışması ile ilgili gerekli düzenleme tarafımda yapılmış olup, yeniden değerlendirilmek üzere@sakarya.edu.tr adresine yüklenmiştir.		
Bilgilerinize arz ederim.		
17/06/2021 İmza		
Uygun dur		
Danışman Unvanı / Adı-Soyadı: Prof.Dr. Ali KABASAKAL Tarih: 17/06/2021 İmza:		
☐ KABUL EDİLMİŞTİR ☐ REDDEDİLMİŞTİR EYK Tarih ve No:	Enstitü Birim Sorumlusu Onayı	

ACKNOWLEDGMENTS

To begin with, thanks be to almighty Allah who made it possible for me to witness such achievement. Secondly, I feel it necessary to use this opportunity to pay my earnest gratitude to my supervisor Dr. Ali Kabasakal, who gave me unwavering support throughout the preparation of my thesis as his insightful comments and guidance has greatly enhanced the value of my thesis and surely this great work would not have been possible without his support. In addition, I would like to offer my sincere gratitude to my family, who have always stood by me to give moral support and encouraged me to achieve many memorable milestones. Finally, special thanks are due to my treasured sister Hibo who has always been my side and supported me unconditionally throughout my student life.

Abdikani Abdullahi Sheikdon

29.06.2021

İÇİNDEKİLER

LIST OF ABBREVIATIONS.....	iii
LIST OF TABLES.....	iv
LIST OF FIGURES.....	v
ABSTRACT	vi
ÖZET	vii
INTRODUCTION	1
CHAPTER ONE: DEFINITIONS, THEORETICAL AND CONCEPTUAL FRAMEWORK	4
1.1. Exchange Rate Definition.....	4
1.1.1. Direct Quoting of the Exchange Rate.....	4
1.1.2. Indirect Quoting of the Exchange Rate	5
1.2. Conceptual Frame Work.....	5
1.2.1. Spot Exchange Rates	6
1.2.2. Forward Exchange Rates.....	6
1.2.3. Types of the Exchange Rates	6
1.2.4. Nominal Exchange Rate	7
1.2.5. Real Exchange Rate.....	7
1.2.6. Purchasing Power Parity (PPP)	7
1.2.7. Absolute Purchasing Power Parity (APPP).....	8
1.2.8. Relative Purchasing Power Parity (RPPP)	8
1.3. Exchange Rate Regimes	9
1.3.1. Pegged Exchange Rate Regime.....	9
1.3.2. Floating Exchange Rate Regime	10
1.3.3. Mixed Exchange Rate Regime	11
1.3.4. The Impossible Trinity	12
1.4. Dollarization in Somalia.....	13
1.5. Exchange Rate Regime in Somalia	14
CHAPTER TW0: RELATED LITERATURE REVIEW	16

2.1. Exchange Rate and Inflation	16
2.2. Exchange Rate and Trade Openness	19
2.3. Exchange Rate and Investment	23
2.4. Exchange Rate and Government Spending	26
2.5. Exchange Rate and Economic Growth.....	30
 CHAPTER THREE: ANALYSIS AND RESULTS SECTION	35
3.1. Dataset and Variables	35
3.2. Unit Root Tests.....	35
3.2.1. Augmented Dickey-Fuller (ADF) Unit Root Test.....	36
3.2.2. Philips-Peron (PP) Unit Root Test	37
3.3. ARDL Model.....	37
3.4. Bounds Test.....	38
3.5. Toda-Yamamoto Causality Test.....	39
3.6. Findings	40
3.7. Unit Root Tests.....	40
3.8. Diagnostics Tests.....	44
3.8.1. Serial Correlation.....	45
3.8.2. Heteroskedasticity Test	45
3.8.3. Normality check	46
3.8.4. Model Stability.....	46
3.9. Toda-Yamamoto Causality Test Findings.....	47
 DISCUSSIONS AND RECOMMENDATIONS	50
REFERENCES	54
APPENDIX	62
CURRICULUM VITAE	63

LIST OF ABBREVIATIONS

ADF	: Augmented Dickey-Fuller
ARCH	: Autoregressive Conditional Heteroskedasticity
ARDL	: Autoregressive Distributed Lag
APPP	: Absolute Purchasing Power Parity
CBS	: Central Bank of Somalia
CPI	: Consumer Price Index
ECT	: Error Correction Term
GARCH	: Generalized Autoregressive Conditional Heteroskedasticity
GBP	: Great Britain Pound
IMF	: International Monetary Fund
PP	: Philips-Perron
PPP	: Purchasing Power Parity
RPPP	: Relative Purchasing Power Parity
SHSO	: Shilling Somali
UNSD	: United Nations Division of Statistics
USD	: United States Dollar
VAR	: Vector Auto Regression
VEC	: Vector Error Correction

LIST OF TABLES

Table 1: Advantages and the Disadvantages of the Pegged Exchange Rate Regime...	10
Table 2: Benefits and the Drawbacks of the Floating Exchange Rate Regimes	11
Table 3: Results of the ADF and PP unit root tests	40
Table 4: Bounds test results.....	41
Table 5: Short-run results	43
Table 6: Serial Correlation Test Results.....	45
Table 7: Breusch-Pagan-Godfrey Heteroskedasticity Results.....	45
Table 8: Lag length determination according to the lag selection criteria	48
Table 9: Toda-Yamamoto Causality Test Findings.....	48

LIST OF FIGURES

Figure 1: A Comprehensive Framework of the exchange rates	6
Figure 2: The Impossible Trinity. N. Gregory Mankiw, Macroeconomics textbook....	12
Figure 3: The 20 best models according to the Akaike information criterion.....	44
Figure 4: Normality check histogram.....	46
Figure 5: CUSUM Test	46
Figure 6: CUSUM Square Test	47
Figure 7: Examining the Graph of Residuals	47



Sakarya University
Institute of Social Sciences Abstract of Thesis

Master Degree	X	Ph.D		
Title of Thesis: Analysis of the dynamic and causal relationship between Exchange rate and selected macroeconomic variables in Somalia. ARDL and Toda-Yamamoto methodologies				
Author of Thesis: Abdikani Abdullahi Sheikdon Supervisor: Prof.Dr. Ali Kabasakal				
Accepted Date: 29 June 2021			Number of Pages: vii (pre text) +62 (main body) + 1 (app)	
Department: Economics				
The main target of this study is to analyze the long and short-run interaction between the exchange rate and the selected macroeconomic indicators like the gross domestic product, inflation rates, domestic investment, government spending, and the trade openness in Somalia. The study covers 50 years ranging from 1970 to 2019 and applied various econometric techniques to estimate the dynamic and the causal relationship between the said variables. At the outset, to avoid being encountered the problem of spurious regression, it has been tested the presence of a unit root in the series using augmented Dickey-Fuller and the Phillips-Perron unit root tests. Afterwards, it has been specified the autoregressive distributed lag models (ARDL) and then followed by testing the causality using Toda-Yamamoto techniques. As the ARDL bound test findings depict, there's a long-run relationship among the analyzed series. The findings found a positive relationship between exchange rate and economic growth. Likewise, the trade openness variable has been ascertained that it has a positive relationship with exchange rates. A negative relationship has been observed between the exchange and inflation rate. Similarly, according to the results of the ARDL, the same nexus is found between domestic investment and the exchange rate. The government expenditure variable was found to have a mixed impact on the exchange rate. Notably, the study revealed the negative impact of the civil war, as it's likely to cause the exchange rates to depreciate against the US dollar.				
Keywords: Exchange rate, ARDL model, Macroeconomic variables, Somalia.				

Sakarya Üniversitesi

Sosyal Bilimler Enstitüsü Tez Özeti

Yüksek Lisans	X	Doktora	
Tezin Başlığı: Somali'de Döviz Kurları İle Seçilmiş Makroekonomik Değişkenler Arasındaki Dinamik ve Nedensel İlişkinin Analizi: ARDL ve Toda-Yamamoto metodolojiler.			
Tezin Yazarı: Abdikani Abdullahi Sheikdon		Danışman: Prof.Dr. AliKabasakal	
Kabul Tarihi: 29 Haziran 2021		Sayfa Sayısı: vii (önkısım)+62 (tez)+1 (ek)	
Anabilim Dalı: İktisat			
Bu çalışmanın amacı, Somali'de döviz kuru ile gayri safi yurtiçi hasıla, Enflasyon oranı, Yurtiçi yatırım, devlet harcamaları ve ticari açıklık gibi seçilmiş makroekonomik değişkenler arasındaki uzun ve kısa vadeli etkileşimi analiz etmektir. Çalışma, 1970'den 2019'a uzanan 50 yıllık bir dönemi kapsamaktadır ve söz konusu değişkenler arasındaki dinamik ve nedensel ilişkiyi analiz etmek için çeşitli ekonometrik teknikler uygulanmıştır. Başlangıçta sahte regresyon problemiyle karşılaşmamak için serilerin durağan özellikleri Augmented Dickey-Fuller ve Phillips-Perron birim kök testleri kullanılarak test edilmiştir. Daha sonra Otoregresif Dağıtılmış Gecikme Modelleri (ARDL) belirlenmiş ve ardından Toda-Yamamoto teknikleri kullanılarak nedensellik test edilmiştir. ARDL sınır testi analizinin sonuçlarının gösterdiği gibi, analiz edilen değişkenlerin arasında uzun dönemli bir ilişki mevcuttur. Elde edilen bulgulardan döviz kurlarıyla iktisadi büyüme arasında olumlu bir ilişki bulunmuş ve aynı şekilde ticari dışa açıklık değişkeninin döviz kurları ile olumlu bir ilişkisi varlığı tespit edilmiştir. Döviz ve enflasyon oranı arasında negatif bir ilişki gözlemlenmiş ve benzer şekilde ARDL sonuçlarına göre de yurtiçi yatırım ile döviz kuru arasında aynı bağ bulunmuştur. Devlet harcaması değişkeninin döviz kuru üzerinde karışık bir etkisi olduğu tespit edilmiştir. Ayrıca, çalışma, döviz kurlarının ABD doları karşısında değer kaybetmesine neden olduğu için iç savaşın ve istikrarsızlığın olumsuz etkisini ortaya koyulmuştur.			
AnahtarKelimeler: Dövizkuru, ARDL modeli, Makroekonomik değişkenler, Somali.			

INTRODUCTION

Economists have known for ages that imperfectly administered exchange rates can have devastating implications on economic growth. As globalization deepens, the interaction between the countries gets stronger, and the world countries' economies become more intertwined and affect each other. Thus, the trades between countries become more fragile to the economic events or even the structural and regime changes implemented in a country other than the executing nation. As countries start being open and trade with the world, irrefutable exchange rate considerably influences the behaviors of the key macroeconomic indicators.

There's a rising consensus that persistent exchange rate instability typically leads to serious macroeconomic disequilibrium. As a result, recent discussions emphasize the undeniable effect of the real exchange rate on the economy at large. When narrowed the overall perspective to Africa, the interaction and the nexus between the real exchange rate and the would-be used macroeconomic indicators such as trade openness, public expenditure, and the inflation rate must have different impact levels compared to the developing or the advanced countries. In the context of Somalia, though in the last decade dollarization has become a factor, yet Somali shilling remains and serves as the sole means of exchange and the unit of account in the transactions of the undersized businesses (Nor et al. 2020).

However, to dive deeply into the concepts related to exchange rates, the structure that the study follows is that, in its first section, the description the exchange rates, the various sorts of exchange rates, the exchange rate regimes of pegged exchange rate system, floating exchange rate system, and mixed exchange rate systems, as well as some background of Somalia's exchange rate regime and the recent dollarization phenomenon, are discussed. The second part has reviewed the recent empirical research that discusses the relationship among exchange rates, trade openness, inflation, investment, public expenditure, and economic progress. While in the third part, the analysis and the results section were given the space to examine the causal relationship between exchange rates and the indicated macroeconomic variables in Somalia. At the outset, to avoid being encountered in spurious regression or, in other words avoiding the use of none stationary series in the regression, augmented Dickey-Fuller (ADF) unit root and some theoretical

explanations were made regarding the autoregressive distributed lag (ARDL) models and the Toda-Yamamoto causality techniques. In the concluding part, the findings obtained from the applied econometric analysis are interpreted, while it has been finalized with some comments and discussion.

Research Topic

The research topic discusses the “dynamic and the causal relationship between the real exchange rate and the selected macroeconomic variables in Somalia between 1970 and 2018”.

Problem Statement

The interaction of the exchange rate with other macroeconomic indicators of any economy is all inclusively given an exceptional consideration due to its unfavorable cost on the economy. In recent discussions, it has kept being a focal point issue in the promising economies. Ideally, the presence of an effective central bank authority or monetary board could help initiate and set useful policies that regulate the amount of money in circulation. However, given the lack of strong public financial institutions and functioning central bank in Somalia from the decline of the military regime in 1991, the circulation of banknotes throughout the country was determined by actors other than the state’s central bank (Luther, 2015). The disappearance of the central bank led the country to face a cash shortage as the only notes in circulation were those that the late government had printed before it toppled in 1991. To cover that need for banknotes, both private business owners and some federal member states have commenced printing banknotes abroad on their discretion and later importing them into the country to replace the old damaged banknotes that were already in circulation and consequently the lack of the central bank authority. The monitoring board has resulted in the Somali shilling being over printed, which eventually led the Somali shilling to depreciate against the dollar. However, the depreciation of the Somali shilling, its recurrent fluctuations, and most notably, its vulnerability to being forged have resulted in people losing faith in the local currency and have shifted to have greater confidence in the US dollar (USD) and use it as a store of value. Even in the last decade, businesses' use of the USD as the price tags of goods & services have shown a substantial increase. Therefore, since no enough study

has been made on the dynamic and causal link between the exchange rates and the selected macroeconomic indicators in Somalia, the study seeks to fill up the gap as well as suggest recommendations to the policymakers.

Significance of the Study

Needless to say that foreign currency exchange has an undeniable impact on the economic activities in every country, and it interacts with other macroeconomic indicators through various transmission channels consequently; in this study, it has been discussed the long and the short-run nexus between the real exchange rate and the selected predictors of, trade openness, inflation rate, investment, government expenditure, and the economic progress, and what's more the study attempts to determine the causality behavior among the variables. Therefore, now that the study incorporates all these variables in one setting, it calls attention to its importance. Moreover, the study seeks to contribute to the existing literature on the link between exchange rates and these accumulated bunches of other predictors.

Purpose of the Study

The study's main intention is first to review the theoretical framework of the variables used in the study and afterward, using the econometric models to explore the long and short-run linkages between the real exchange rate and the macroeconomic variables and investigate their causal relationship.

Research Methodology

For determining the stage at which the series is stationary, the study used various stationarity tests such as the ADF and the Philips-Perron (PP) unit root test. Henceforward, autoregressive distributed lag models were used to explore the dynamic behavior of the variables in both the long and short-run, and finally, the Toda-Yamamoto causality approach was applied.

CHAPTER ONE: DEFINITIONS, THEORETICAL AND CONCEPTUAL FRAMEWORK

1.1. Exchange Rate Definition

The price of one country's currency in terms of another's currency is known as the exchange rate (Mankiw, 2007. 135). For instance, how many Somali shillings does one need to get 1 USD? Or, in other currency's elucidation, how much Turkish Lira does it cost to buy 1 USD? As can be extracted from both the definition of the exchange rate and the followed guiding questions, it entails that one should consider the exchange rate before any economic transaction such as investment decision, trade, and Et cetera. Because the exchange rates involve an essential position in the economy, it has been given much attention to discussing its impact and relationship with the other macroeconomic indicators.

In understanding the exchange rates, there many entailing and relevant concepts that help understand how the exchange rate works, such as the exchange rate's quoting methods, the different exchange rate types, the PPP (purchasing power parity), and the various exchange rate regimes. There are two approaches or styles to quoting exchange rates in the financial markets, that is to say, direct quoting and indirect quoting.

1.1.1. Direct Quoting of the Exchange Rate

A direct quote is a kind of quotation that expresses the home or the domestic currency prices in terms of a foreign currency (Investopedia, 2021). To put it another way, in the direct quotation system, it's asked the literal load of domestic currency that is desired to acquire a unit of the foreign currency. In the direct or straight quotation system, the foreign currency serves as the base currency, whilst the domestic currency is the quoted one.

For example, let's consider the following rates.

8.68 TL/USD

This rate demonstrates the amount of Turkish Lira that one needs to purchase one US dollar.

1.1.2. Indirect Quoting of the Exchange Rate

Indirect quoting states the variable quantity of a foreign currency one needs to buy and trade a unit of the home currency, and this kind of quotation system is called the “Quantity Quotation” as it says the literal quantity or the literal amount of the foreign currency desired to purchase a single unit of the home currency. In other words, in the indirect quote, home currency serves as the base currency.

For example, 8.69 TL: 1 USD

This rate shows the quantity of USD that can be purchased for the stated amount of the Turkish Lira.

In the same way, another imperative distinction that should be brought to the target audiences’ attention when discussing exchange rates is the differentiation between spot and forward exchange rates.

1.2. Conceptual Frame Work

Regarding the understanding of the laymen or those unfamiliar with the main concepts of economics, it’s often confusing for them to comprehend the exchange rate and the related concepts. Furthermore, there are various ways to be applied to gauging the different kinds of exchange rates. This section concentrates on giving the basic definitions for the key terminological terms of the exchange rates and the multiple alternatives in measuring the exchange rate. In figure 1.1, it is shown a very comprehensive conceptual framework that outlines the diverse measurements of the exchange rate that are common and practiced in the foreign exchange markets.

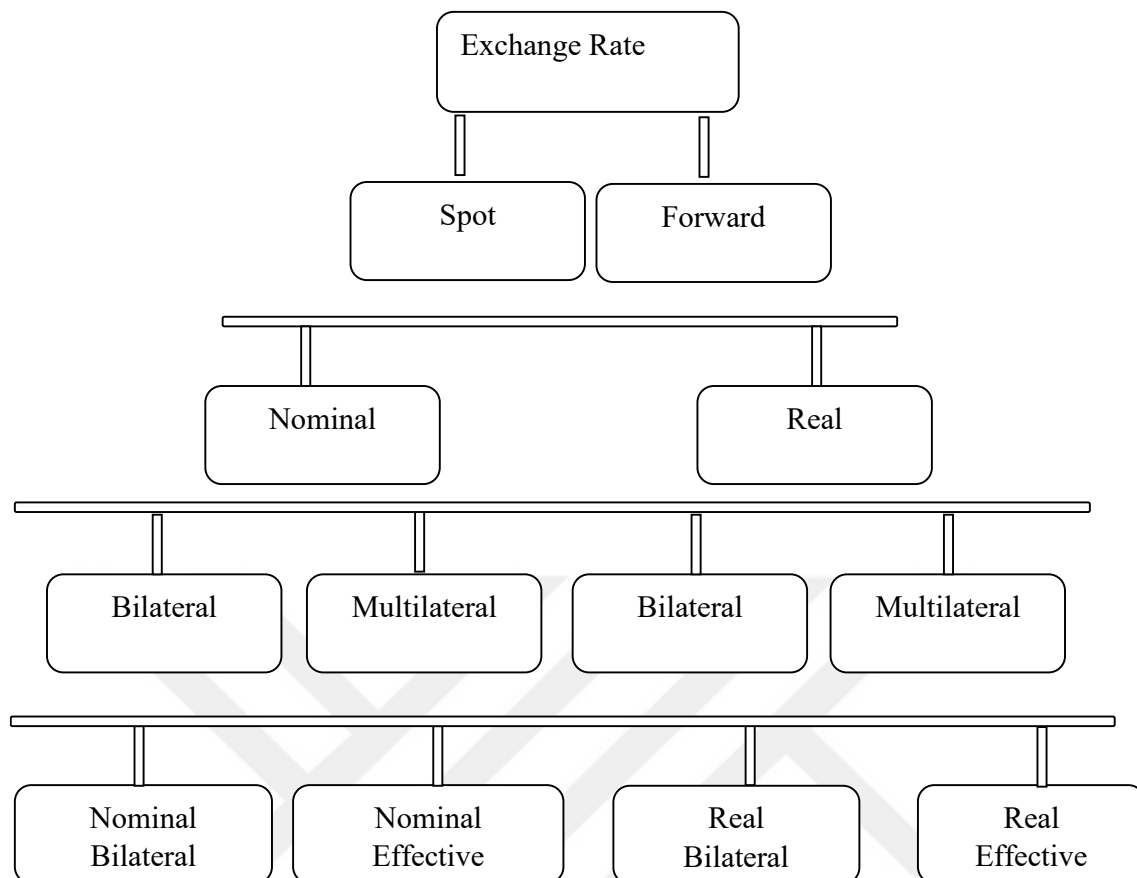


Figure 1: A Comprehensive Framework of the exchange rates

Source: (Takaendesa, 2006)

1.2.1. Spot Exchange Rates

The spot exchange rate refers to the price whereupon a foreign currency is sold and acquired instantly on the spot without any delay (Hassan & Mano, 2019). The spot exchange rates could additionally be divided into nominal and real exchange rates.

1.2.2. Forward Exchange Rates

The forward exchange rates also refer to exchange rates whereupon foreign currencies are purchased and sold. Nevertheless, the deliverance of the currency crops up for a moment in the future, not instantaneously (Hassan & Mano, 2019).

1.2.3. Types of the Exchange Rates

Different classifications are made regarding the different types of exchange rates. In this sub-section, the intent is to illustrate the various exchange rate sorts: The real exchange

rates, the nominal exchange rates, the bilateral exchange rates, and the multilateral exchange rates.

1.2.4. Nominal Exchange Rate

The nominal exchange rates could be exemplified like those rates, more precisely real rates, usually being given in the markets of the foreign exchanges (Catão, 2007). These aforesaid exchange rates, of course, state the literal quantity of local currency which is desired so as to be exchanged smoothly for foreign currency. To make a distinction, the key property that nominal exchange rates have is that being the unaltered weighted or accumulated aggregate value of a local currency compared to alternative relative foreign currency aggregated together in a single index (Catão, 2007).

1.2.5. Real Exchange Rate

The real exchange rates could be defined as the kind of exchange rates that demonstrate the price discrepancies among two commodities exchanged or traded (Catão, 2007). The rates are gauged using the price indices, which subsequently reflect the comparative price discrepancies from a specified base period. The real exchange rate could be precisely said as the nominal exchange rate accounted for inflation (Catão, 2007).

1.2.6. Purchasing Power Parity (PPP)

The term purchasing power parity (PPP) was initially introduced by the prominent economist from Sweden, Karl Gustav Cassel (1866-1945). The PPP assumption or the law of one price assumes that the purchasing power of the currencies of two comparable countries' when purchasing a certain package of goods and services. To say it differently, the theory is anchored in the postulation that the two identical commodities ought to be sold at an identical price once the currencies have been changed into a common currency (Chen & Hu, 2018). The theory is anchored in avoiding the arbitrage opportunity; for example, let's assume that a loaf of bread costs 2 US dollars in the United States and its corresponding amount in Turkish Lira 17.38 TL, while a loaf of bread in Turkey costs only 3 TL that corresponds to 0.34 USD cents. Therefore, this extreme cheapness motivates what is called arbitrage opportunity, which are the Turkish people to start trading the bread and ship it to the United States to make higher profits.

1.2.7. Absolute Purchasing Power Parity (APPP)

The APPP theory could be enlightened through the following equation.

$$E = \frac{P^*}{P}$$

P= indicates the foreign-price

P*= represents the domestic price

E = is the sports exchange rate.

Consequently, the APPP indicates that the real exchange rate equals 1.

This assumption could be considered relevant in the long-run; conversely, for the short-run, this could not be sensibly regarded as a viable theory (Maepa, 2015). In the case that the rate of the exchange is above the value of the purchasing power parity of one, the currency under consideration is said to be overvalued. On the other hand, vice versa is considered an undervalued currency (Maepa, 2015).

Except for the stated critics of the absolute purchasing power parity theory that this assumption isn't realistic in the short-run, the theory doesn't consider the existence of other inevitable costs, for example, the transportation costs, trade duties such as the tariffs, and so on.

1.2.8. Relative Purchasing Power Parity (RPPP)

Following the drawbacks of the APPP, the RPPP was afterward proposed. The relative purchasing power parity theory predicts a link between the price rises of two countries in a certain period and the exchange rate changes between currencies of the two countries during the matching time (Rogoff, 1996). It is a dynamic sort of absolute purchasing power parity theory.

This theory could further be illustrated in the following equation.

$$\Delta E = \pi - \pi^*$$

Where ΔE represent changes in the exchange rates.

π Indicates the inflation rate for the domestic country while π^* denotes the inflation rate for the foreign country.

1.3. Exchange Rate Regimes

The preference of exchange rate regime and its impact on the other macroeconomic indicators' performance is considered among the unsettled arguments and divisive issues in the economic policy, and its determination could be an exclusive authority for the governments or the monetary authorities to decide or, one that is directed by the market forces of the demand and supply. In the recent literature discussions, choosing the optimal exchange rate regime that stimulates growth became an unsettled debate in developing and emerging economies. Generally, exchange rate regimes can be broadly categorized into pegged exchange rate regimes and flexible exchange rates regimes.

1.3.1. Pegged Exchange Rate Regime

The Pegged exchange rate system happens to be a regime typically implemented by the monetary authorities of a country, in search of tackling the adverse impact of the exchange rates or higher currency instability, as well as to attain a goal for the nominal exchange rate where money authorities get involved the market place in achieving this objective (Marí del Cristo, 2014). The pegged exchange rate, which is otherwise known as the fixed exchange rate, is considered to be useful in certain aspects, such as eliminating exchange rate uncertainty which distresses or imposes an unfavorable impact on the perception of the potential investors that would invest in the country, as well as retaining the existing investments.

Table 1: Advantages and the Disadvantages of the Pegged Exchange Rate Regime

Advantages	Disadvantages
Uncertainty and Risk Elimination In this type of regime, since exchange rates are fixed, firms engaged in trade won't suffer about lack of competitiveness due to exchange rate volatility.	Foreign Currency Reserves Adequacy For the fixed exchange rates to be effective, the adopting authority should hold adequate foreign currency reserves.
Discourages Speculation As the exchange rate stays unvarying for a long period, people anticipate that such a rate would stay the same for some other time and won't move instantly.	Lack of International Competitiveness To make the home products and the domestic firms more competitive in the overseas markets and get a larger foothold in the exports, adopting an economic policy that copies with the trading counterparts are needed.
Currency depreciation is avoided In poor or underdeveloped countries, frequent changes in the exchange rate may worsen the balance of payment of that country. Therefore, it could be prevented by adopting a stable exchange rate	Current account Imbalances Fixed or pegged exchange rates may result in imbalances in the current account. For instance, an over rated currency exchange rate may lead to current account deficits.
Attraction of investors Stability in the exchange rate may encourage foreigners to invest, which would, in turn, result in economic growth through the multiplier effect.	Inconsistence with other macroeconomic goals Sustainment of the exchange rates on a fixed value may conflict with other macroeconomic goals.

Source. www.economicshelp.org

1.3.2. Floating Exchange Rate Regime

In contrast to the pegged or fixed exchange rate regimes, under the floating exchange rate regime, market factors of demand and supply relative to other foreign currencies exert Influence on the exchange rates, which means that as the conventional law of demand and supply assumes, if demand for that currency is high, its value will rise. In contrast, if the demand for that money is low, its value would decline; the same holds for the supply law (Krugman, 1989). The floating exchange rate has dichotomous sub-divisions, which are the free-floating exchange rate regimes and the managed or handled floating exchange rate regimes.

Under the application of the managed floating exchange rates regime, it is regarded as the current international financial setting where the exchange rates fluctuate as usual daily.

Still, the monetary authorities or the central banks try to manipulate their countries' exchange rates through purchasing and selling currencies to preserve a definite range (IMF, 2008).

Table 2: Benefits and the Drawbacks of the Floating Exchange Rate Regimes

Advantages	Disadvantages
Automatic Stabilization Any disequilibrium that is experienced at the balance of the payment, floating exchange rate regime would help fix automatically	Increased uncertainty Frequent exchange rate change may increase uncertainty.
Freeing domestic Policy For the floating exchange rates system, the regime may follow the interior policy goals, such as expansion in an economic wise and job creation in the nonexistence of the inflation arising from excess demand.	Reduction in Investment Uncertainties experienced in the floating regime may dishearten the multinational companies' invest.
Lower Reserves Contrasting to the fixed-rate regime, the floating system doesn't necessitate having large or adequate reserves.	Increased Speculation The frequent fluctuation under the floating system may incentivize speculative movements of the hot money, thereby resulting in extra fluctuations.
Flexibility The floating system can easily cope with the changes in the government policies or the trading counterpart.	Lack of Discipline Due to the repetitive fluctuations, there will be a lack of financial pattern or discipline that will also result in instability in interest rates.

Source: www.economicdiscussion.net

1.3.3. Mixed Exchange Rate Regime

Under the appliance of the mixed exchange rate regimes, the currency is fixed around a certain value. At the same time, it's allowed to fluctuate usually within a certain interval when necessary. In that sense, the market determiners of demand and supply are effective and settle on the currency behavior; however, when necessary, the monetary authority intervenes in the foreign exchange rate market and makes the optimal decision. Usually, the central bank or the monetary authorities do the exchange rate market intervention to prevent or control the extreme fluctuations and stabilize the exchange rate (Dornbush& Fisher, 1990).

1.3.4. The Impossible Trinity

When it comes to thrashing out about a country's preference for one of the exchange rate systems, it's noteworthy to discuss the theory of the impossible trinity.

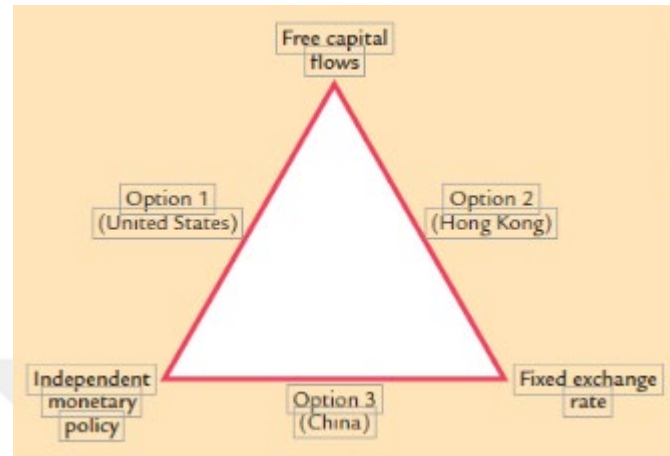


Figure 2: The Impossible Trinity. N. Gregory Mankiw, Macroeconomics textbook

As the above figure implies, the analysis of the exchange rate regimes incites a single conclusion that no authority can have the entire three regimes simultaneously. In economics, this concept is called the impossible trinity, also known as the Macroeconomic Trilemma. The impossible trinity concept argues that it's unfeasible for a nation to have the three regimes at the same time, to put in another way, it's not viable for a country to practice free movement of capitals, a pegged exchange rate, and also to have an independent monetary policy. Therefore, a country ought to prefer a single edge of the demonstrated triangle while foregoing the opposing corner (Mankiw, 2013). The first preference allows free movement of capital and adopts an independent monetary policy as the US did, but in this condition, it's unfeasible to have a pegged regime; instead, the exchange rate should fluctuate to balance the foreign currency market exchange rate. As Hong Kong did, the subsequent preference aims to accept free capital movement and peg the exchange rate. In that case, the country loses or would be unable to exercise an independent monetary policy. The third option is as China adopted recently, is to limit the international movement of capital. In this respect, interest rates are determined by domestic forces, and it will previously exert influence by world interest rates, much like a closed economy. In that case, it's feasible to both peg the exchange rate and adopts an independent or autonomous monetary policy.

1.4. Dollarization in Somalia

Bogetic (2000) describes the dollarization as a portfolio shift where the domestic country shifts from the use of its currency to the use of the USD in fulfilling all the functional purposes of the money, which is to use as the store of value, medium of exchange and the unit of account. A heightened domestic risk resulted from the uncertain exchange rates and high volatilities typically induce the preference of the dollar to avoid the unanticipated loss of value of the local currency. Banks giving loans in dollars, customers depositing in dollars, price tags of the goods and services using USD, and exchanging in dollars are considered the noticeable signs of basically dollarizing the economy (Musoke, 2017).

When the military regime in Somalia is toppled in 1991, the country descended into a chaotic situation, a period of prolonged statelessness, where the main public institutions became idle and non-functional. Consequently, among the major public institutions whose role was missed include the Central Bank of Somalia (CBS). This sole authority had the right to set rules for the other commercial banks, monitor them, and intervene in the market. Luther (2015), the absence of an effective central bank since 1991 has resulted in Somalia not have new currency printed to cover the cash shortage in the country and replace the old banknotes.

However, the central bank's missed role was attempted to be filled by businessmen who were printing banknotes at their discretion and some federal member states (FMS) in various times who were taking advantage of the lack of effective central government. Zhang et al. (2016) argue that printing banknotes, to an extreme extent, yield domestic currency holders to convert their money into USD, which eventually leads to local currency depreciation. The Somali shilling (SHSO) began to depreciate and lose its value against the US dollar. The wealthy private businessmen overprinted and installed an uncountable number of Somali shillings into the market. The excess supply of the Somali shilling that has been printed domestically and imported from abroad resulted in recurrent currency fluctuation and uncertainty, which eventually led Somali people to lose their faith in it (Luther, 2015). Unofficially people gradually started dollarizing every business transaction until it has reached a level where minor business deals and the informal sector businesses even operate and conduct their transactions in dollars. In the present day, given

the fact that almost all price tags of the goods and services appear in USD, in the same way, those businesses pay their tax levies to the government in dollars. The government workers are paid in USD; families pay their house rents in dollars; school fees are also paid in dollars, making the overall conclusion that dollarization is a real phenomenon in Somalia.

1.5. Exchange Rate Regime in Somalia

Considering the different economic and financial structures of the governments, it has been well documented that de facto exchange rate arrangements, monetary policy as well as the flow of capital customarily depart from genuine practices (Calvo et al., 2002) indicate that for many countries that made self-declaration in their choice to describe their foreign exchange market and the exchange rate regimes as floaters, were nearly impossible to differentiate from those countries that openly operate under the fixed exchange rate regime. Reinhart & Rogoff (2004) pointed out that measuring the accurate magnitude of the exchange rate flexibility necessitates slotting in the parallel exchange rate market during the Bretton Woods period to classify the exchange rate arrangements in some of the exchange rate arrangements developing and the developed countries.

Leeson, (2007) historically, since Somali was colonized by Italy; it had officially adopted a pegged exchange rate regime in 1976, where the Somali shilling was pegged with Italian lira, and at that moment 1 Italian lira was pegged to 8 Somali shillings. Before the central government of Somalia was toppled in 1991 when the center of Somalia had the full authority and ability to make an intervention into the exchange market and set the policies for financial markets.

According to the International Monetary Fund's (IMF) currency rate arrangements and exchange restrictions report (2019), pertaining to the aspect of Somalia, given the fact that the Somali shilling is the official currency, the de facto currency in extensive use in Somalia is the USD. All government transactions are carried out and denominated in USD; most financial transactions are conducted in dollars. When it comes to the smaller payments between private and small-scale businesses, the Somali shillings catalyze transactions. Such banknotes are utilized sub-denominations to USD, and the currencies of the bordering countries are conducted transactions along with border areas. Of course,

this extensive use of the dollar in all transactions in Somalia doesn't mean that giving up the Somali shilling and use the USD as an alternate currency is chosen as the ultimate and the everlasting option, but rather the CBS is being brought to life on a gradual basis. The central bank is putting into operation a comprehensive and extensive financial and currency reform to restore the lost confidence in the national currency and combat the existing counterfeiting banknotes.

The effectiveness of Somalia's central bank resulted in the bank not to have a considerable role in exchange markets, and the rate is freely market established rate since the Somali exchange market is made up of private money traders. Depending on the domestic liquidity and demand-supply conditions, exchange rates may differ even among the regions within Somalia.

However, given that Somalia's central bank had an inoperative status in the last three decades and the absence of its role to control the exchange market, the de jure exchange rate arrangement is yet irresolute and undetermined. Nevertheless, the de facto exchange rate arrangement or the one in practice is considered a free-floating arrangement, and the market-clearing rate freely determines the rate.

CHAPTER TW0: RELATED LITERATURE REVIEW

Exchange rate arrangements have numerous impacts on an assortment of variables and economic activities in the mission of any country to reach both sustained growths in economic wise and development. Accordingly, plenty of empirical studies have been made regarding the exchange rate on various scopes and study areas; therefore, this chapter discusses the literature review about the exchange rate and the variables selected in this research study.

2.1. Exchange Rate and Inflation

Numerous studies that have been conducted through various scales and different study areas evaluating the nexus between exchange rate and inflation and their joint impact on the other key macroeconomic variables have been conducted. Kataranova (2010) applied the Granger causality test and distributed lag model technique in investigating the connection between the exchange rate and inflation in Russia. Using monthly dataset 2000 to 2008, the author discovered that the exchange rate exerted negative effects on inflation in the country. A unidirectional causality flowing from exchange rate to inflation was identified. In addition to that, their study found out that as a result of the pass-through, consumer prices respond to depreciation instantly than the national currency's appreciation, and that's firmly true in the case of food prices. In recommending to the policymakers, they've suggested that regular decrease in general prices or inflation can be solely attained by combining macroeconomic kind policies of controlled fiscal and monetary policy.

Ahmad & Ali (1999) did similar research by taking Pakistan as their case study; they investigated the cause & effect relation between inflation and the exchange rate in Pakistan. The authors applied the Granger causality technique on quarterly data from 1982 to 1996 to assess the causal connection between the aforementioned variables. They confirmed a bidirectional relation between both variables in the short and long-runs, i.e., inflations Granger causes exchange rates and exchange rates Granger causes inflations. They also pointed out that the speed at which the prices adjust and exchange rate responds to local or even exterior impulses were slow; the policies that are intended to fight the

inflation or the anti-inflationary policies would not be noticed their impact instantly, but rather on a gradual basis.

Asari et al. (2011) employed a set of econometric techniques (vector error correction model, co-integration tests, testing causality via Granger, as well as impulse response functions) to study the link between exchange rate and other selected variables (inflation rate inclusive) in Malaysia in the period 1999-2009. They concluded that exchange rate shock exerts an adverse long-run impact on the Malaysian inflation rate.

Odusola et al. (2001) adopted the vector autoregression (VAR) and impulse response function technique while utilizing quarterly data series spanning from 1970.1 to 1995.4 from Nigeria to explore the nexus between naira depreciation by the official exchange rate, output, and inflation. Their results revealed a long-run relation (co-integration) between the variables under study. In other words, the impulse response functions that gauge the effects of the shocks and the variance decomposition brought to bear that an expansionary impact on exchange rate downgrading in the output throughout both medium and long-terms. While in the short-run the opposite case has been observed, indicating that there was a contractionary impact.

Madesha et al. (2013) applied the Johansen Cointegration technique and Granger causality approach on time series data between 1980 and 2007 to examine the empirical nexus between inflation and exchange. Their study found a long-run association among the variables, as well as bi-directional causation. Immoles & Enoma (2011), using a dataset from Nigeria that ranges from 1986 to 2008, employed the ARDL model technique to ascertain the long-run and short-run interactions among the money supply, depreciation of exchange rates, and gross domestic product. Their study results revealed that the loss of naira value exerted positive impacts on inflation in Nigeria.

Udoh & Egwaikhide (2008) conducted a study using a yearly data set from 1970 to 2005 to evaluate the impact of exchange rate shocks on inflation and foreign direct investment. According to their findings, currency rate volatility and inflation uncertainty have a considerable detrimental impact on foreign direct investment.

Adetiloye (2010) used the causality approach to ascertain the causal nexus consumer price index and official and parallel exchange rates in Nigeria. They reported that a cord of

causal relationships exists. The parallel exchange rate influenced the official exchange rate, subsequently resulting in a pull on the rates, while both the parallel and the official rates impact the consumer price index.

Abdurehman & Hacilar (2016) tried to evaluate the nexus among exchange rates regarded by Great Britain's Pound and the Turkish Lira and inflation in Turkey. The researchers applied the OLS technique and GARCH model to assess the connection between inflation and exchange rate. The OLS method results revealed that purchasing power parity (PPP) does not hold for Turkey. However, ARCH and GARCH effects were proven to be present, implying that divergences from the PPT are not random or accidental and goes after a certain pattern (Bayraktutan & Arslan, 2003) employed co-integration and causality tests to examine the link between exchange rate and other selected variables (inflation inclusive) in Turkey from 1980 to 2000. Their findings showed a long-run connection between the variables; however, no causal link was discovered in either direction.

Gül & Ekinici (2006) examined the relationship between inflation and the nominal exchange rate in Turkey using monthly series from 1984.1 to 2003.12. Their findings demonstrated the presence of a co-integration connection between inflation and the exchange rate, as well as unidirectional causation flowing from the exchange rate to inflation. Albuquerque and Portugal (2005) used more sophisticated generalized autoregressive conditional models GARCH to evaluate the link between exchange rate and inflation uncertainties. The researchers concluded that the relationship between inflation shocks and exchange rates was semi concave.

Bailliu & Fujii (2005) examine whether it follows a shift to an environment with lower inflation, stimulated by a change in financial stance, brings in a noticeable decline in the pass-through level of the exchange rate movements to the end-user prices. To differ from the existing literature, the researchers used a panel data approach that consists of 11 industrialized countries that cover from the period 1977 to 2007, and their result holds the assumption that the exchange rates pass-through takes a rain check through a change to a lower-inflation environment passed through a change in the monetary policy regime. Consequently, the results also put forward that pass-through to the producer, the imports,

and consumer prices decreased following the strategies designated to stabilize the inflation in many industrialized countries at the beginning of the early 1990s.

Asad et al. (2012) investigated the nexus between the exchange rates and many other macroeconomic factors such as real income, money supply, inflations, swiftness of income circulation, and the real effective exchange rates in Pakistan. The researcher's time interval of dataset covered 1970-2007, and the results concluded that the consequence of exchange rate on the inflation in Pakistan was insignificant; in other words, from the inference of the correlation matrix, it has been discovered a strong positive association between the exchange rates and inflation.

Stone et al. (2009) study on the IMF's occasional papers has explored the policy and operational position of the exchange rate within the wider inflation targeting monetary framework in the developing economies. Their analyses were about case studies and comprehensive documentations of exchange rate performance in different countries while utilizing a small model tailored to inflation targeting economies. The mentionable outcomes include. The model-based analyses offer precise support for an open but some degree of role for the exchange rate. Secondly, the gains of a more explicit policy position for the exchange rate rely on how that economy has been structured. The shocks to which is encountered are taken into account in the policy rule.

Telatar & Kazdagli (1998) attempting to investigate the long-run purchasing power parity hypothesis; the researchers used the major trading partners of Turkey as their case study & utilized a dataset from 1980 to 1993. They've considered France, Germany, the United Kingdom and, the United States as the key counterparts in trading partnerships to examine the long-run PPP hypothesis. From the inference of their analyses, the PPP hypotheses did not hold, and there were no long-run bilateral exchange rates and price nexus among Turkey and its major trading partners.

2.2. Exchange Rate and Trade Openness

A stable real exchange rate could be assumed to be a key and most essential element in determining a country's economic openness and interaction with other economies. A body of literature has focused on investigating how trade openness indicator affects other macroeconomic indicators and what kind of relationship it has with other variables.

Zakaria & Ghauri (2011) studied the effects of trade openness on Pakistan's exchange rate. The researchers utilized quarterly data that spans from 1972Q1 to 2010Q2, and the researchers have applied the Generalized Method of Moments (GMM) in making the estimations. The findings point out a substantial positive link between trade openness and Pakistan's exchange rate.

Aizenman & Riera-Crichton (2008), in their study, researchers weighted up the impact of the terms of trade shocks TOT, international reserves, and capital movements on the exchange rates. Using a panel dataset that composes developing and developed countries, their study observed that global reserves mitigate the adverse footprint of the trade shocks on the exchange rates and that this impact is more crucial for the emerging economies than for industrialized countries. Their study also revealed that contingent upon the countries' economic progress, the real exchange rate appears designated more responsive and sensitive to shifts in reserve assets. At the same time, industrialized economies show a significant connection between real exchange rates and hot money.

Aizenman & Jinjark (2011) conducted a cross-country study that attempts to estimate the variation in the fiscal incentive with the exchange rate change proliferated through the global crises that the world economies experienced during the year 2008-9. The results of their study exposed that higher openness in trade had been linked with minor fiscal stimulus, and in addition to that, greater exchange rate depreciation is associated.

Obiechina et al. (2013), using different econometric techniques, they've examined the dynamic and causal nexus between economic progress, the flow of capitals, the Naira & USD exchange rate, and trade openness in Nigeria for the period between 1970-2010. The researchers tested the co-integration by employing the Engle-Granger two-step technique. They found out that the variables under consideration have a long-run connection, specifically that the exchange rates and trade openness share a common trend.

Chowdhury et al. (2016) re-examined the nexus among the exchange rate system choices and the fiscal regulation targeting the trade openness and wanted to test the conventional view of fixed or pegged exchange rate regime yields bounteous fiscal disciplines. In contrast, the contemporary view stresses flexible or floating exchange rate regimes are more fiscal disciplines. The researchers used a panel dataset that comprises copious of

developed and developing nations; on top of that, they've also used pooled panel ordinary least square (OLS) to include instrumental variable estimation techniques. They documented that a pegged exchange rate regime is punitive at a minor intensity of openness in trade. In contrast, an inelastic exchange rate system yields a bigger fiscal discipline higher than a limited amount of trade openness, and this identified relationship only to the industrialized nations.

Wilson (2001) has studied the relationship between Singapore's real exchange rates and real trade balance and a group of bilateral commercial partners such as Malaysia, Korea, the United States, and Japan from 1970 to 1996 on a quarterly basis. The researcher found out that, regarding the case of Korean trade with the USA, there's no evidence that the real exchange rates affect the real trade balance.

Gantman & Dabós (2018), in using an innovative econometric method that could handle and take into account the heterogeneity problem and the potential cross-sectional dependence, the researcher used the datasets of 101 countries throughout 1960-2011. Their research looked at the connection between real effective exchange rates REER and several predictor factors such as trade openness, terms of trade, trade balance, factor productivity, productivity of factor production, and exchange rate system. The findings of their investigations got enough evidence to shore up the hypothesis that a boost experienced in trade openness yields depreciation in the real effective exchange rates. Brada et al. (1997) have performed research to estimate the linkage between exchange rates and trade balance in Turkey and its responsiveness of trade balance to currency devaluation. They've used high-frequency data of quarterly series from 1969.1 to 1993.1. Their results revealed that the predictors that have been selected to include in analyses are all co-integrated and have long-term relationships and after modeling the short dynamic relationship. Their findings indicated that after the 1980s, liberalized trade regime allowed both world and domestic incomes to influence the trade balance in the long term.

Bleaney & Tian (2014), in assessing the responsiveness of trade sense of balance against exchange rate fluctuations across copious countries, the researchers used annual panel data of 87 countries for 1994 to 2010. They grouped the chosen countries in the sample into three categories. Developing, industrial, and emerging markets to draw a multi-

country empirical inference. Their findings point out that trade balance progresses considerably after experiencing real depreciation and to a comparable extent in the long-run for the whole countries in the specified sample. Still, in the case of industrialized countries, the adjustment is notably slower. For instance, Boyd et al. (2001) took quarterly data for eight countries to look into the effect of the exchange rates on the balance of trade. The quarterly data interval used in the analyses had been on different years such as France (1975Q1–1996Q4), Germany (1978Q3–1996Q4), Canada (1975Q1–1996Q4), Japan (1975Q1–1994Q4), Italy (1975Q1–1996Q4), the Netherlands (1977Q1–1994Q4), USA (1975Q1–1994Q4), and the UK (1975Q1–1994Q4). In their paper, they used three econometric methods; in the first stage, they've used a co-integrating VAR that accounts for the whole variables in the analyses as endogenous, and after that method, they also utilized a sophisticated technique of vector error correction model VECM moreover; the ultimate model was the ARDL models. The researchers concluded and found out that; for the countries Germany, Canada. And the USA demonstrated that exchanges have a statistically considerable effect on the balance of trade.

Yusoff & Febrina (2014) used the Johansen methodology of testing co-integration and the Granger causality technique from 1970 to 2009. The researchers observed the nexus between exchange rate and trade openness with other predictors such as domestic investment and economic progress in Indonesia. The empirical findings discovered the occurrence of a common trend or long-run relationships among the variables under consideration.

Omojinite & Akpokodje (2010), by utilizing the Generalized Method of Moments and OLS as their analysis method, with a dataset that covers the period between 1986-2007, the researchers attempted to look into the collision of the exchange rate reforms on trade performance in Nigeria. The researchers found out that contingent upon Nigeria, the reforms in the exchange rates have accounted for notable progress in terms of the trade balance. However, their study couldn't find enough evidence that supports the view that exchange rate reform policies discourage or disheartens the imports of consumable goods, and opposite to that view, the study implied that during the implementation of the reforms, the importations of the raw materials for manufacturing usage and the capital goods, exceeded the pre-reform period.

Bahmani-Oskooee (2001), with the purpose to explore the influence of the nominal and real effective exchange on trade performance of up to 11 Middle Eastern economies and whether the real currency downgrading improves the trade performance of the countries in the analyses, therefore the researchers used a high frequency and a repetitive quarterly data that covers the period of 1971.1-1994.4. By employing Engle-Granger and Johansen's co-integration testing techniques, the researchers found out that the real currency downgrading has a favorable long-term upshot on the trade performance in most Middle Eastern countries that are non-oil exporters.

Aftab (2002), on the other hand, used a quarterly dataset to determine the short and long-run impact of the exchange rate depreciation on Pakistan's trade effectiveness and whether the Marshall-Lerner ML conditions are satisfied or hold for Pakistan. The researchers' findings reaffirmed that in the distant future Marshall-Lerner condition holds for Pakistan. Furthermore, the researchers stressed that in the light of the findings, the authentic depreciation of the Pak rupee could be a crucial element that could be exercised as a policy means to develop the trading effectiveness of Pakistan.

Longe et al. (2019), using secondary data ranging from 19880 through 2016, analyzed the short-run and long-run links between the official exchange rates and openness in Nigeria. The researchers investigated the relationship using non-linear ARDL models. They discovered that trade openness has an adverse influence on the official exchange rate of the Naira against the dollar in Nigeria in both the short and long term. Moreover, the researchers came to the conclusion that is guiding trade policies in Nigeria aren't in the positive direction of the exchange rates of Naira.

2.3. Exchange Rate and Investment

Fluctuations in the currency rates have an irrefutable effect on the economies of our intertwined and highly interdependent world. Macroeconomic actors such as the inflation rates, GDP, unemployment, the exports & the imports, and the different components of the investment of whether it would be private domestic investment, foreign direct investment, or the government domestic investment and other macroeconomic indicators instantly react and are vastly responsive and reactive to the shifts in the exchange rates. From the theoretical aspect, currency devaluation is usually anticipated to boost domestic

investment due to increasing global and domestic demand as exports turn out to be comparatively cheaper, eventually leading to a well-performing economy, increasing domestic investment. However, such an economic assumption might appear contradictory as the available pieces of literature have given mixed findings. Panda & Nanda (2019), by drawing an extended sample of 1222 firms representing the Indian manufacturing industry for the period 2000-2016, researchers studied the nonlinear connection between the exchange rates and the investment in six pivotal Indian manufacturing sectors considered under various conditions of financial elasticity while utilizing the two-step Generalized Method of Moments estimator 2SGMM. Their study revealed concave bonds involving the real exchange rates and the durable investment, specifically machinery, construction, chemical, and textile sectors. Moreover, the study discovered that investment in these sectors experienced an incremental increase with the value decline in the real exchange rate.

Harchaoui et al. (2005) have investigated the nexus between the exchange rates and investment at the industry level for a panel of 22 Canadian manufacturing industries from 1981-97. According to their empirical outcomes, the exchange rate has a statistically negligible impact on investment. Moreover, their results revealed that various investment portfolios respond to exchange rate shifts via three routes. The number one route is that through changes that are experienced in total output demands when the exchange rate volatility is stumpy, currency downgrading could have a favorable impact on the overall asset investment. The second channel is through the movements in equipment and machinery changes other than investments in technology. Thirdly, investments made through the industries with lower markup ratios are probably affected by the shifts in the exchange rate.

Contrary to those arguments, Bahmani-Oskooee et al. (2018) considered the case of 6 emerging economies in Latin America, Asia, and South Africa, and utilizing quarterly dataset for the period 1980 to 2014; the researchers examined the asymmetric reactions of local investment to the actions in the real exchange rate. In general, the researchers found out that, in the short-run, in almost all countries, there's the asymmetric effect of the exchange rate changes on domestic investment. Furthermore, using the non-linear co-integration has been established a considerable long-run asymmetric effect in the case of

three countries to be precise, Hungary, Mexico, and Malaysia and following the outcomes of the non-linear co-integration model, it's been revealed that in the case of Mexico and Hungary, real currency appreciation has a considerable unfavorable effect on domestic investment while real depreciation doesn't. However, in the case of Malaysia, the opposite holds.

Nucci et al. (2001) proposed a comprehensive and simple theoretical model to elucidate the association between exchange rate instability and decisions made regarding the investment, based on a panel sample of manufacturing firms in Italy. According to their findings, their results supported the hypothesis that currency depreciation is associated with a favorable effect on investment in the course of generating revenue; then again, depreciation had an adverse effect through the costs channel. Landon & Smith (2009) carried out research attempting to shed light on the nexus between the investment and the exchange rate in both the short and the long-run in a panel sample of 17 countries covering an annual period of 1971 to 2003. Using the ARDL models and the Error correction methods, the researchers estimated the aggregate and sector-based investment. They discovered that the real currency downgrading is linked to a decline in overall investment and the investment in all sectors that have been included in the analysis in the short and the long-run. They also found out that a decrease in investment is relatively unrelenting in service-providing sectors.

Campa & Goldberg (1999) assessed the investment pass-through and the exchange rates based on a cross-country comparison to provide evidence on the potential effect that the exchange rate fluctuations could have on different investment activities made by the manufacturing industries in the US, the UK, Japan, and Canada. In both theoretical manner and empirical, the researchers demonstrated that the extent to which investment responds to exchange rates differs in due course. They discovered that it responds positively concerning the sectoral dependence on the share in exports and negatively with the inputs imported in production.

Swift (2006) similarly presents a comprehensive quantitative gauge of the magnitude and the directions of the exchange rate movements on investment of Australia's manufacturing industries over 1998 and 2001. Their empirical findings confirmed that for Australian manufacturing, a 10% percent real currency gain of the Australian dollar tends

to yield an average 8% decline in the overall investment via the export share medium and similarly an average 3.8% percent boost via the imported input share channel.

Soleymani & Akbari (2011), using a panel dataset from selected fifteen Sub-Saharan African countries, researchers examined the nexus between the exchange rate uncertainty and the home investment. The researchers employed GARCH (1, 1) model to obtain the indicator representing the uncertainty of the exchange rate. They used the fixed-effects model to capture the heterogeneity between the countries under consideration. However, their results revealed an unfavorable relationship between the exchange rate uncertainty and investment. Moreover, their findings demonstrated that investments made into the countries under study are very responsive to the exchange rate uncertainty.

For example, Byrne & Davis (2005) worked on quarterly panel data from G7 member countries and investigated the short-run and the long-run impact of the exchange rate uncertainty on investment. The researchers used Generalized Auto-regressive Conditional Heteroskedasticity GARCH to derive the uncertainty component from the main exchange rate indicator. They found out that for the pooled subsample of the European countries, that by no means, the permanent component of the volatility that affects negatively the investment, but rather it's the transitory component. Furthermore, they've exposed that the short-term exchange rate uncertainty GARCH model typifies considerable higher frequency shocks created by unstable short-run capital flows. Bhandari & Upadhyaya (2010) used an annual panel time-series dataset that spans from 1972 to 2001. Researchers looked into the impact of the real exchange rate insecurity on the non-public investment in the South-East Asian economies, to be precise, Malaysia, Indonesia, Thailand, and the Philippines. The researchers employed both random and fixed effects estimators, and their findings suggest that real exchange rates had an unfavorable effect on private investment in the stated countries.

2.4. Exchange Rate and Government Spending

In essence, the argument that government expenditure is considered among the core fiscal policy tools that trace a multiplier effect through a sequence of channels could be broadly comprehended by referring back to the underlying economic theories. In the recent

discussions, the nexus between government expenditure and the real exchange rates have been a subject of great debate showing its essentiality and keenness of the researchers to reach a conclusive inference but, given the so far available pieces of literature, the debate seems to be inconclusive. To this end, the main theoretical arguments for the previously discussed literature could be summarized into these three findings that got a large consensus in the literature; the first issue relates to the temporary impact of the government expenditure on real exchange rates, and the literature predominantly predicts the real exchange rates experience appreciation in the transitory period in return to an increment in government spending, while contrastingly in the long-run real exchange rate stays unaffected. By contrast, some other empirical studies have argued that government spending creates a real depreciation of the exchange rate in the short-run. Second, significant works of literature have also recorded the recurrence of real exchange rate volatility, indicating an incredibly extended period of adjustment after shocks. On the contrary, some other substantial literature argues that; the estimated divergences of the real exchange rate from its mean stated in the theoretical model are very transitory.

Thirdly, an arguable policy subject in the contemporary literature concerns the connection between government expenditure and private or non-state consumption in the transitory period. The hypothetical models anticipate a negative correlation in the transitory due to the private sector's decision to withdraw its resources. Government spending increases the marginal utility of the wealth, which causes the firms to raise their labor supply and cut the consumption of goods in the short-run. On the contrary, considerable literature has also recorded a positive and favorable correlation between private consumption and public spending in the short-run. Given this contrasting literature, the research revisits the most recent empirical findings discussing the effect and the nexus between government spending and the exchange rate.

Monacelli & Perotti (2010), employing the VAR methodologies, the researchers evaluated the impact of government spending on the real exchange rate by taking three OECD countries and the US as their case study. Their empirical findings delivered two conclusions; the first is that increases in government expenditure tend to stimulate a real exchange rate appreciation and a trade balance deficit that has a noticeable effect in the other OECD countries but less effective in the US. The second findings the researchers

explored is that; in all the countries that have been included in the study, private consumption experiences an increase in reaction to the government spending shock, consequently co-moves in the same direction with the real exchange rate.

Miyamoto et al. (2019), with the use of panel datasets that incorporate a copious sample representing up to 125 countries, researchers intended to investigate the effect of the government spending, specifically the Military spending component, on the real exchange rate in both advanced and emerging economies for the period 1989-2013. In presenting their empirical findings, the researchers documented that an increment in government expenditure would lead the real exchange rates to appreciate and raises the consumption considerably in the emerging economies. In contrast, on the other aspect in the case of the developed countries, government spending is linked with real exchange rate depreciation plus a decline in consumption.

Ravn et al. (2007), for instance, used a quarterly dataset from four industrialized economies, Australia, Canada, the US, and the UK, and analyzed the effect of the government expenditure alarming on the balance of trade, overall productivity, and the real exchange rates by using a panel structural vector autoregression (SVAR) technique. To summarize the researchers' findings, they found that a favorable increment in government spending tends to cause a sequence of effects such as the output to expand, consumption to increase, depreciation in the real exchange rates, and a decline in the trade balance.

Bajo-Rubio et al. (2020), attempting to study the factors that determine Spain's exchange rates, demonstrated fresh evidence from it by using a dataset that spans from 1995 and covers up to 2016. The researchers incorporated in their study the real effective exchange rates in respect of the eurozone along with other predictors such as the relative government spending of Spain, the real GDP, the relative public investment, and the balance of trade in Spain. Anchored in their empirical findings from evaluating the connection between fiscal policy and the real exchange rates, the researchers observed that a reduction in government expenditure relative to the eurozone would generate a depreciation of the real exchange rates. In contrast, a reduction in government investment would appreciate the consumer price index-based real exchange rates and depreciation of the real exchange rates derived from export prices.

For instance, Lane & Perotti (2003) study the effects of the fiscal policies in the macroeconomic aspect of an open economy by employing a panel dataset for OECD countries from 1964-1993; the researchers emphasized the cost and the real exchange rate channels as the two transmission channels. The researchers documented that an increment in government wages increases the real product wage and discourages the potential productivity in the sectors traded, which implies a considerable cost transmission channel of the fiscal policy. Furthermore, their findings suggest that the favorable impact of the product and the unfavorable impact of the potential profitability are considerably greater in the aspect of the flexible exchange rate system, which additionally indicates the existence of the exchange rate channel.

Galstyan & Lane (2009), intending to shed light on the argument that the composition of government expenditure has a substantial effect on the long-run dynamics of the exchange rate, the researchers investigated the empirical effect of the fiscal policy on the real exchange rate on a panel set of 19 developed economies and reporting their empirical results the researchers argued that; considering the accounted panel, growth in government expenditure is associated with appreciation in the real exchange rate and also leads to an increment in the relative prices of the non-tradable goods.

Di Giorgio et al. (2018), in the two-country model, the researchers revised the reaction of the real exchange rates to the government spending shock. Consistent with the previous consensus of the literature, the empirical evidence of the researchers confirmed that the real exchange rate experiences depreciation after an increment in domestic government spending, and the depreciation happens on both impact and the transition. Gidey & Nuru (2021) analyzes the effect of the government expenditure shocks on the real exchange rate in the East African country of Ethiopia by collecting quarterly data that ranges from quarter one 2000 up to quarter one 2016. Using the VAR model, the researchers modeled the effect of the public expenditure shocks in the company with its components such as the government investment and the government consumption upon the exchange rate. However, their conclusions are consistent with the Neo-Keynesian school of thought, which argues that a boost in government expenses likely drives the real exchange rate to appreciate. While in contrast, insignificant exchange rate depreciation is experienced following the shock in government investment; moreover, in the case of Ethiopia, the

researchers found out that government consumption shock results in the exchange rate appreciating.

Chen & Liu (2018) similarly revisited the nexus between government expenditure shocks and the real exchange rate of China quarterly for the period between 1995Q1 and 2015Q2 by employing an SVAR technique. The researchers concluded that; both expansionary government shocks and expansionary government investment shocks result in appreciation in the real exchange rates of China, which contradicts the empirical literature consensus for some advanced economies. However, their findings are in line with the conventional hypothesis of the Mundell-Fleming model. Furthermore, they revealed that positive and favorable public expenditure plus investment shocks tend to decline the balance of trade and greater public budget shortage, which eventually generates twin deficits.

2.5. Exchange Rate and Economic Growth

The relation involving exchange rates and economic progress has been an unsettled issue of great controversy in the literature. The discussions and findings in the eminent papers include that of Razin & Collins (1997), Eichengreen (2007), Rodrik (2008), which all discussed the theoretical and the empirical nexus between the exchange rates and the economic expansion in various scales and study areas. However, a significant piece of literature seems to have gotten systematic and almost similar inferences from their empirical findings.

Rodrik (2007), making use of panel datasets that comprises 184 countries from the period of 1950-54 through 2000-04, the researcher provided evidence that sustained undervaluation, or in other words, a maintained high real exchange rate boosts the relative profitability to invest in tradable goods which eventually triggers economic progress. This conclusion holds for the developing countries. Rapetti et al. (2012) showed that D Rodrik's findings are insightful and used an empirical approach to investigate potential asymmetries among the groups of the countries under consideration. The researchers confirmed that undervaluation or higher exchange rate on economic progress is larger in emerging economies. Furthermore, the researcher stresses that the nexus between

currency undervaluation and economic growth doesn't solely confine to the developed countries. The relationship holds in the richest and the least developed countries.

Missio et al. (2015) evaluated the link between the real exchange rate and economic growth in their empirical study. The researchers categorized their sample into two groups and used unbalanced panel data to estimate the different techniques of the panel data analysis, such as the fixed and random effects and the panel co-integration technique. Their findings suggest a quite tentative illustration that the link doesn't exist or holds for the developed economies. Concerning the policy implications, the researchers suggested that sustaining a competitive real exchange rate for the emerging economies could generate crucial effects on the production pattern of these countries as it results to change their specialization model, lightens up the balance of payments, and hence eventually allowing for a privileged long-term economic growth.

Razzaque et al. (2017), aiming to look into the impact of the exchange rate movements on the economic progress in Bangladesh, the researchers used the co-integration technique and to drive the specification of the empirical model. Their results revealed the factors under consideration have a common trend and are co-integrated. However, their findings put forward that, in the long-run, a real exchange rate depreciation of ten percent is expected to generate an average of 3.2% increments in the overall output. Furthermore, the researchers found out that unlike the long-run response of the exchange rate against the economic expansion, in the short a contractionary effect is detected, and the same extent of the real currency depreciation is expected to generate a half percent decrease in the gross domestic product.

Ahmad et al. (2013) looked into the effect of the exchange rate along with other predictors such as the inflation rate, foreign direct investment, the capital stock on the economic progress of Pakistan. They have used a time series dataset covering the period ranging from 1975 to 2011 and have employed a simple OLS model. To spotlight the coefficient estimators that concern our literature, the researchers found out that the exchange rate has an unfavorable effect on the economic growth of Pakistan. As a policy implication, the researchers suggested the government of Pakistan take crucial steps that encourage the country's export to increase, which would result in a smoother balance of trade in the long-run.

MacDonald (2000), for instance, examines the exchange rates' role in boosting the economic progress in the euro-zone, and the researcher emphasized the floating exchange rates system since the flexible exchange rate systems are professed to be exceedingly volatile. Its fluctuations may affect the economic progress via investment and trade channels. The researchers also investigated the connection between the aggregate and the growth of the various economic sectors by applying the Balassa-Samuelson hypotheses. However, the researcher concluded that the contemporary exchange rate systems for the eurozone economies are likely to drive and incentivize economic progress. Moreover, according to the findings, the researcher argued that there's enough evidence which suggests that Balassa-Samuelson kind of effects are statistically meaningful and important for the economies in the Euro-zone area. It would necessarily have potential implications for the external and internal exchange rate performance between the member states.

Habib et al. (2017) attempted to study the impact of the actual exchange rate shifts on the growth in the economy using a panel dataset of 150 countries. The researchers used country-specific instruments to deal with the heterogeneity problem. They considered capital flow between individual countries or financial openness, and the growth rate in the official reserves of each country, as their country-specific instruments. The researchers explored that a real appreciation is linked with a significant decline in the real gross domestic product. In contrast, contrastingly, a real depreciation is linked with a substantial increment in the real GDP.

Tang (2015) conducts a study on the long-run linkages between the real exchange rate and China's economic growth by using a co-integration VAR model for the period January 1994 to December 2012. The researchers specified a broad econometric model that incorporates real exchange rate RER indicator and real GDP along with several other explanatory variables such as the inflation rate, exports, imports, foreign currency reserves, and foreign direct investment. However, the researcher finds that contingent upon China, exchange rate and economic progress are not co-integrated; in other words, a long-run association has not identified, and consistent with the empirical findings, the researcher stresses that the Chinese economy is stirred and motivated by the growth in exports and foreign capital inflows.

Uddin et al. (2014) studied the causal link between the exchange rates and economic progress in Bangladesh by using a time-series dataset that covers 41 years ranging from 1973 to 2013. The researchers used Johansen co-integration technique to confirm the occurrence of a long-run connection. Afterward, they used the Granger causality methodology to ascertain the direction of the causation if it exists. Their findings suggest a long-run association between the variables under investigation. In addition to that, they found out the existence of a bidirectional or two-way causal link between the exchange rates and economic expansion. Uğurlu (2006), using the quarterly dataset of Turkey that covers the period between 1989.1 and 2005.2, the researcher assessed the nexus between real exchange rate and economic growth. From the empirical results of the Johansen co-integration test, the researcher finds evidence that there is a least one co-integrating equation; in other words, the variables under consideration share a common trend, and subsequently, the researcher proceeded to model the short-run dynamics by estimating additional econometric techniques. Moreover, the impulse response functions and the variance decomposition analysis put forward that a positive real exchange rate shock boosts economic progress.

Wong (2013) investigated the real exchange rate misalignment and the economic progress in Malaysia by using the ARDL models' approach. In addition, the researchers also employed the generalized forecast error variance decomposition. Their empirical findings suggest that an increment in the real exchange rate misalignment will decline economic growth. Moreover, their findings were consistent with the previous pieces of literature in the case that devaluation will boost the economic progress while alternatively, appreciation leads the economic progress to shrink.

For example, Lee & Yue (2017) evaluated the impact of the USD exchange rate on economic growth along with several other predictors by applying the SVAR technique and the Johansen co-integration test quarterly during the period between 1989 and 2015. The researchers concluded that the USD exchange rate significantly affects the economy and increases growth.

Ali et al. (2015), focusing on the Naira exchange rate misalignments on the economic progress in Nigeria, the researchers utilized quarterly time series data that ranges from 2000-2014, and they used the Gregory-Hansen co-integration test since it takes into

consideration the possible structural breaks the series may have during the specified period. Their findings suggest strong support that there's an unfavorable effect of real exchange rate misalignment on the economic progress of Nigeria. As a final point, the researchers recommended using a market-based exchange rate system to make sure that the Naira real exchange rate tracks its course of sustainable balance.

Munthali et al. (2010) found a result that contradicts the literature by analyzing the real exchange rate and the economic growth of Malawi. The researchers assessed the influence of the Malawian currency's real exchange rate on growth. Their findings show that real effective exchange rate volatility has a negative influence on Malawi's economic performance. Furthermore, the researchers found that Malawian currency's real exchange rate appreciation is considerably and favorably linked with better performance economic-wise. In contrast, the real exchange rate volatility is associated with a decline in economic growth, reflecting the potential investor's preference for a steady and non-fluctuating exchange rate. Conversely, the researchers couldn't find enough evidence that devaluation of the real exchange rate stimulates economic growth.

CHAPTER THREE: ANALYSIS AND RESULTS SECTION

In this unit of the study, the sources where the datasets have been obtained, description of the variables under study, and the methodology used to draw inferences from the results are discussed.

3.1. Dataset and Variables

The datasets that have been utilized in the study are sourced from the United Nations statistics division (UNSD). Reflecting the accessibility of the data, the frequency of the data is annually and spans from 1970 to 2019. Therefore, the whole variables included in the analysis have got an equal dataset of 50 years with no missing data in the indicated time. All the variables have been taken their logarithmic form to reduce the dispersion within the series and give interpretations as percentages later in the results section. The variables are. The real exchange rate of USD to Somali shilling as the dependent variable, gross domestic product GDP constant=2015 prices as a proxy for economic progress, GDP implicit price deflator as a measure for the inflation rate, Gross fixed capital formation as a proxy for investment, trade openness that is being derived as the sum of export and imports to the ratio of GDP, and finally government expenditure. Along with these variables in the analysis, it has also been included a dummy variable that takes into account the impact of the civil war in Somalia that erupted in the year 1991; thus, the incorporated dummy variables take 0 for the period between 1970 -1990 and one for the rest of the years.

3.2. Unit Root Tests

As per the procedure when analyzing time-series data, stationary properties of the variables should be given consideration; therefore, in this study, the unit root presence of the variables has been investigated using the ADF unit root test. Also, for robustness purposes, the PP unit root has been employed. Then ARDL model has been constructed to model the long and the short-run dynamics between the said variables. The Toda-Yamamoto causality method has also been used to investigate the existence of a causal link and the direction of the causality.

3.2.1. Augmented Dickey-Fuller (ADF) Unit Root Test

Macroeconomic series often are not stationary at the level, and if used when $I(0)$, it would lead to a spurious regression (Granger & Newbold, 1974). Therefore, the stationary properties of the series are investigated with unit root tests. Stationary time-series datasets have a stable mean and variance that do not change overtime. Trending in time, seasonality, and cyclical fluctuations cause the series to lose stability, and thus it is said to be non-stationary series (Gujarati & Porter, 1999).

Unlike the Dickey-Fuller unit root test, the augmented Dickey-Fuller is used to overcome the autocorrelation problem in the series, and the lagged version of the dependent variable is added to the DF equation (Dickey & Fuller, 1979).

The equation for the ADF unit root test could be specified as follows.

$$\Delta Y_t = \delta Y_{t-1} + \sum_{i=1}^m \alpha \Delta Y_{t-i} + \varepsilon_t \quad (1)$$

$$\Delta Y_t = \beta_1 + \delta Y_{t-1} + \sum_{i=1}^m \alpha \Delta Y_{t-i} + \varepsilon_t \quad (2)$$

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^m \alpha \Delta Y_{t-i} + \varepsilon_t \quad (3)$$

Here, three equations are presented; the first one ΔY series, is explained by its lagged value and its differenced form to eliminate the autocorrelation problem. The first equation is built on a random process as it doesn't carry any deterministic part, both constant and trend. Unlike the first one drift term, the second equation is included, while the last equation composes of both deterministic terms of constant and the trend.

The following two hypotheses are tested in the ADF unit root tests.

$H_0. \delta = 0$: Has a unit root.

$H_a. \delta < 0$: Does not have a unit root.

According to H_0 hypothesis, the series is not stationary since the series contains a unit root. While the alternate hypothesis H_a says the series is stationary since it doesn't contain a unit root (Dickey & Fuller, 1979).

3.2.2. Philips-Perron (PP) Unit Root Test

Phillips and Perron (1988) have put forward a nonparametric test that takes into account the autocorrelation between the error terms by modifying the conventional Dickey-Fuller method. Philips & Perron unit root testing is a renovation of the ADF test, and this transformation removes the parameter dependency asymptotically. The conversion is made to the test statistics, not the regression equation in the procedure (Phillips and Perron, 1988).

For the Philips-Perron unit root test, the following equation should be considered.

$$Y_t = \alpha_0^* + a_1^* y_{t-1} + \varepsilon_t \quad (4)$$

$$Y_t = a_0^{\sim} + a_1^{\sim} y_{t-1} + a_2^{\sim} \left(t - \frac{1}{2} T \right) + \varepsilon_t \quad (5)$$

In the equation, T depicts the number of observations, and ε represents the pure error process.

The method is based on the postulation that the expected error terms ($E(\varepsilon_t) = 0$). However, with the basic assumption of the PP data generating process, $y_t = y_{t-1} + \varepsilon_t$ the coefficients of the a_0^* , and a_1^* is tested through the test statistics (Phillips-Perron, 1988).

3.3. ARDL Model

There are various methods that are used for testing the existence of long-term relationships between the variables, among the most familiar approaches that are employed in the econometric analysis include the methodology proposed by Johansen (1988) and Johansen & Juselius (1990) test of co-integration, Engle & Granger (1987) co-integration test, as well as the co-integration test technique developed by Pesaran et al. (2001).

In doing co-integration analysis, variables with different integration orders could be observed their co-integration feature by employing the model developed by Pesaran & Shin (1995). The method is known as ARDL that is used to expose the co-integration existence between the variables in the analysis, while the model incorporates a mixture of both variables that are $I(0)$ and $I(1)$ integrated. The main motive why the study

implements this methodology could be summarized in these three points. First, the model is appropriate in the case of undersized sample datasets (Pesaran et al., 2001). Secondly, the ARDL model is able to capture both the long and short-run links between the variables, and finally, the model is a better estimator when variables under consideration are a combination of both I (0) and (1).

In the case of this study, the ARDL ($p, q_1, q_2, q_3, q_4, q_5$) model could be specified as follows.

(6)

$$\begin{aligned} \Delta LNEXC_t = & \alpha + \sum_{i=j}^p \phi \Delta LNEXC_{t-1} + \sum_{i=j}^{q_1} \beta \Delta LNGDP_{t-1} \\ & + \sum_{i=j}^{q_2} \vartheta \Delta LNINF_{t-1} + \sum_{i=j}^{q_3} \gamma \Delta LNGEX_{t-1} + \sum_{i=j}^{q_4} \delta \Delta LNINV_{t-1} + \sum_{i=j}^{q_5} \phi \Delta LNOPN_{t-1} + \lambda LNEXC_{t-1} \\ & + \lambda LNGDP_{t-1} + \lambda LNINF_{t-1} + \lambda LNGEX_{t-1} + \lambda LNINV_{t-1} + \beta WAR + \lambda LNOPN_{t-1} + \varepsilon_t \end{aligned}$$

Where LN is the natural log sign, Δ indicates the difference operator, α represents the constant term and $\phi, \beta, \vartheta, \gamma, \delta, \phi$, are the coefficient parameters of the short-run estimations while λ is the long-run estimator of the model, and ε is the error term. It's noteworthy and irrefutable the impact that the civil war had on the financial system and the economic progress in Somalia. Therefore; to avoid ignoring that impact, the model has been included a dummy variable that counts the outbreak of the civil war in Somalia. In this regard, the created dummy variable takes zero before the eruption of the civil war and one from 1991, which was the time Somalia descended into chaos.

3.4. Bounds Test

To look into the presence of a cointegration link, the Bound test is applied, and the overall significance of the coefficients is tested. The Bounds test sets upper and lower limits; therefore, if the computed F-statistics is a value that is below the lower limit of the critical value, the H_0 of no-integration is accepted. Similarly, contingent upon the computed F-statistics is a value that exceeds the upper limit of the critical value, then the H_0 is rejected, and it said that the variables under consideration are co-integrated, Pesaran et al. (2001).

Once the co-integration relationship is assured, the error correction model specification could be stepped on as the next step. The short-run dynamics model is constructed as follows.

(7)

$$\begin{aligned}\Delta LNEXC_t = & \alpha + \sum_{i=j}^p \phi \Delta LNEXC_{t-1} + \sum_{i=j}^{q_1} \beta \Delta LNGDP_{t-1} \\ & + \sum_{i=j}^{q_2} \vartheta \Delta LNINF_{t-1} + \sum_{i=j}^{q_3} \gamma \Delta LNGEX_{t-1} + \sum_{i=j}^{q_4} \delta \Delta LNINV_{t-1} + \sum_{i=j}^{q_5} \varphi \Delta LNOPN_{t-1} + \beta WAR \\ & + \lambda ECM_{t-1} + \mu_t\end{aligned}$$

In the above model, the α represents the constant term and $\phi, \beta, \vartheta, \gamma, \delta, \varphi$, are the coefficient parameters of the short-run estimations. In this case, λ term placed before the error correction term depicts the long-run disequilibrium adjustment in the system. The coefficient of the ECM term should be negative and significant to be interpretable estimation (Engel & Granger, 1987).

3.5. Toda-Yamamoto Causality Test

For analysis on the causal relation, the study employs the Toda–Yamamoto causality test. According to Toda-Yamamoto (1995), this approach has dominance over the frequently practiced conventional Granger causality procedure as the maximum lag length is thoroughly decided based on the VAR system, which does not change, consequently yields consistent and reliable inferences. This method of the Toda & Yamamoto causality test involves applying a modified Wald statistic (MWALD) from the non-causality hypothesis of the traditional Granger (1969). After establishing the VAR model, the causality link among the variables is investigated using the Toda-Yamamoto causality technique.

Toda-Yamamoto's (1995) causality analysis was developed based on the corrected VAR model to investigate Granger causality. In the Toda-Yamamoto test, the length of the lags included (k) and the maximum integration order (d_{max}) are important to determine. After determining these two values $k + d_{max}$ the VAR model is estimated, and causality could also be tested.

To perform the Toda Yamamoto causality test, the VAR $k + d_{max}$ the model could be specified as follows.

$$Y_t = \gamma_0 + \sum_{i=1}^{k+d_{max}} \alpha_1 i y_{t-1} + \sum_{i=1}^{k+d_{max}} \beta_2 i x_{t-1} + \varepsilon_{1t} \quad (8)$$

$$X_t = \gamma_0 + \sum_{i=1}^{k+d_{max}} \alpha_2 i y_{t-1} + \sum_{i=1}^{k+d_{max}} \beta_2 i x_{t-1} + \varepsilon_{2t} \quad (9)$$

The null hypothesis of the model equation 4 says that variable X doesn't Granger cause variable Y; in other words, there's no direct causality from X to Y. The null hypothesis $H_0. \beta_{1i} = 0$. While the alternative hypothesis is established as X Granger causes Y, which indicates that there's causality running from X to Y. The alternative hypothesis $H_1. \beta_{1i} \neq 0$.

3.6. Findings

This study employed the ARDL models and the Toda-Yamamoto causality techniques to investigate the dynamic and causal link between exchange rate and the selected macroeconomic variables. At the outset of every analysis with time series structure, the presence of unit root in the series is tested, therefore using the ADF and PP unit root tests, the stationarity properties of the series were investigated.

3.7. Unit Root Tests

Stationarity properties of the real exchange rates and the other selected variables were tested by employing the ADF unit root. The outcomes of the ADF and PP unit root test were interpreted by considering the probability value. Consequently, if the absolute value of the ADF is less than the critical value, the H_0 hypothesis won't be rejected, and since it is found a unit root in the series, it is said that the series isn't stationary. In the unit root outcome, if the ADF absolute value is higher than the given critical value, then the alternative hypothesis H_1 which states that the series contains a unit root is accepted. To put it another way, it indicates that the series is stationary (Dickey & Fuller, 1979). For robustness purposes, it has also been employed PP unit test for cross-checking the result of the ADF test.

Table 3: Results of the ADF and PP unit root tests

Variables	Level		First difference	
	ADF	PP	ADF	PP
LOGEXC	-1.23910	-0.993846	-3.259349 ***	-3.237164***
LOGINF	-2.35914	-1.954650	-5.837778***	-5.954975***

LOGGEX	-4.314783***	-4.313781***	-1.728509	-7.073519***
LOGINV	-2.149790	-2.095707	-8.397852***	-8.390040***
LOGTOP	-1.424415	-1.600809	-8.814509***	-11.09343***
LOGGDP	-1.072030	-1.235569	-7.353065***	-7.356879***

Note. *** denotes significance at %5 level

When the figures in Table 3 are examined, the findings of the ADF and PP unit root tests have been presented. The left side of the table demonstrates the level value of the variables for both the ADF and PP unit root tests. The exchange rate variable, which is the main variable of the study, is abbreviated as LOGEXC. Similarly, the predictors LOGINF, LOGGEX, LOGINV, LOGTOP, and LOGGDP also respectively express inflation rate, government expenditure, investment, trade openness, and gross domestic product that are usually used as a proxy variable or indicator for economic growth.

The results of both ADF and PP stationarity tests have proved that the entire variables under consideration integrated of order one (1) except the government expenditure variable, which is stationary at the level, and the rest of the variables turn out to be stationary after when their first differences are taken. At the first difference, the P-value of all the series is less than 0.05, which indicates that the null hypothesis of the series is non-stationary or has a unit root should be rejected and accepted the alternative hypothesis. Since the orders of the integration of the whole variables are determined, the subsequent step that is being carried out is to run the already specified ARDL model. The following are the results of the ARDL Bounds-test

Table 4: Bounds test results

Null Hypothesis. No long-run relationships exist		
Test Statistic	Value	K
F-statistic	11.16138	6
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

According to the above results, the following hypothesis is tested. $H_0: \lambda = \lambda = \lambda = \lambda = \lambda = \lambda = 0$ The null hypothesis states that the coefficients of long-run parameters are all zero, which means no long-run association exists, against the alternative hypothesis that there is a cointegrating relationship.

$$H_1: \lambda \neq \lambda \neq \lambda \neq \lambda \neq \lambda \neq \lambda \neq 0$$

As the result shows, the Bounds test computed F-statistics has a value above all the upper critical limit values, which concludes that the null hypothesis of no long-run association is rejected. The alternative hypothesis states that the study variables are co-integrated and have a long-run connection is accepted. Once the existence of the co-integration is assured, the dynamics of the short-run model could be specified.

The following is the output estimation of the ARDL based ECM.



Table 5: Short-run results

Co-integrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (LOGEXC (-1))	-0.291824	0.091999	-3.172027	0.0089
D (LOGEXC (-2))	-0.254913	0.093298	-2.732257	0.0195
D (LOGEXC (-3))	-0.577924	0.100373	-5.757747	0.0001
D (LOGGDP)	0.605858	0.502636	1.205361	0.2534
D (LOGGDP (-1))	5.157485	0.506262	10.187381	0.0000
D (LOGGDP (-2))	4.052426	0.532560	7.609326	0.0000
D (LOGGDP (-3))	1.523065	0.433185	3.515968	0.0048
D (LOGGEX)	-1.153640	0.131709	-8.758987	0.0000
D (LOGGEX (-1))	1.721305	0.167299	10.288771	0.0000
D (LOGGEX (-2))	0.882677	0.091180	9.680565	0.0000
D (LOGGEX (-3))	0.810311	0.119011	6.808725	0.0000
D (LOGINF)	-0.582715	0.052471	-11.105519	0.0000
D (LOGINF (-1))	-0.584939	0.106367	-5.499236	0.0002
D (LOGINF (-2))	-0.581722	0.104887	-5.546197	0.0002
D (LOGINF (-3))	-0.729978	0.119014	-6.133551	0.0001
D (LOGINV)	1.844028	0.198698	9.280547	0.0000
D (LOGINV (-1))	-3.292257	0.329719	-9.985032	0.0000
D (LOGINV (-2))	-3.468943	0.398839	-8.697597	0.0000
D (LOGINV (-3))	-1.653321	0.414155	-3.992034	0.0021
D (LOGOPN)	0.055726	0.079234	0.703302	0.4965
D (LOGOPN (-1))	1.811803	0.184708	9.809003	0.0000
D (LOGOPN (-2))	1.537661	0.165864	9.270619	0.0000
D (LOGOPN (-3))	1.066521	0.120987	8.815141	0.0000
D (WAR)	1.302939	0.192128	6.781616	0.0000
D (WAR (-1))	-0.164409	0.195024	-0.843017	0.4172
D (WAR (-2))	0.368407	0.215078	1.712895	0.1147
D (WAR (-3))	0.458432	0.145927	3.141512	0.0094
CointEq (-1)	-0.612250	0.050651	-12.087704	0.0000
Cointeq = LOGEXC - (-3.1005*LOGGDP-4.7603*LOGGEX + 0.3500				
*LOGINF + 9.2965*LOGINV-2.3029*LOGOPN + 3.9822*WAR-31.8828)				
Long-run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGGDP	-3.100535	1.611745	-1.923713	0.0806
LOGGEX	-4.760326	0.894115	-5.324063	0.0002
LOGINF	0.349968	0.306349	1.142386	0.2776
LOGINV	9.296530	2.519332	3.690077	0.0036
LOGOPN	-2.302900	0.523502	-4.399032	0.0011
WAR	3.982167	0.530667	7.504082	0.0000
C	-31.882762	12.694481	-2.511545	0.0289

As the results above show, the error correction-based ARDL model is estimated, and all the coefficients represent the short-run behavior of the series while ECM terms represent the adjustment of the disequilibrium in the long-run. According to the estimation output,

the error correction term has satisfied both conditions as its coefficient is negative and significant.

The value of the ECM term is -0.612, meaning that the divergence of the series from their long-run equilibrium is not everlasting or permanent. Each year, approximately %61 of the short-run disequilibrium is adjusted to converge to the long-run equilibrium. The lags included in the model have been chosen according to the lag Akaike information criteria. The below figure is presented the 20 best models.

When Figure 1 is examined, the 20 best results according to the Akaike information criterion are given in the figure. When the results given in the figure are observed, ARDL (4, 4,4, 4,4,4.) model seems to be the best model that could be preferred. According to the Schwarz information criteria (SC), Akaike information criteria (AIC), and Hanna-Queen (HQ) lag length selection criteria, lag 4 has been selected as the optimal lag.

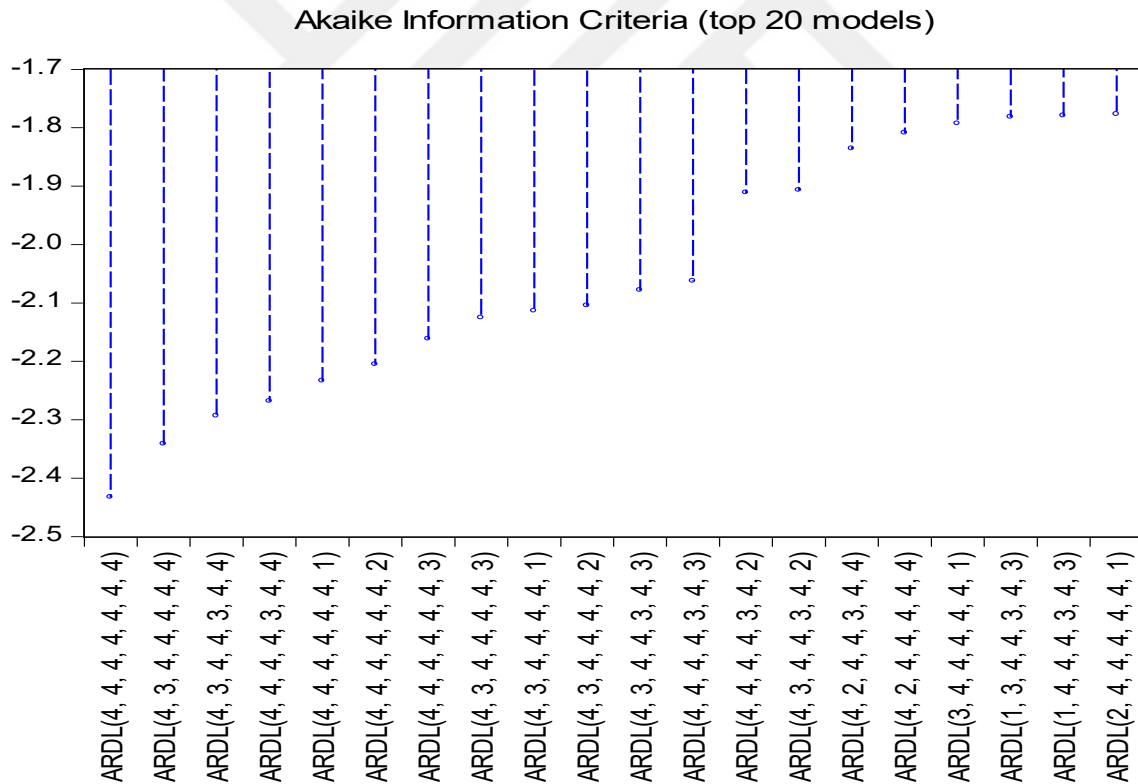


Figure 3: The 20 best models according to the Akaike information criterion

3.8. Diagnostics Tests

To draw a reliable inference from the results of the fitted autoregressive model, it should pass all the diagnostics tests and be assured that there's no serial autocorrelation, no heteroskedasticity, and the residuals should be normally distributed (Gerlach et al., 1999). Therefore, the employed ARDL model has passed all the tests, indicating that reliable inferences could be drawn. The outcomes of the diagnostics test are presented below.

3.8.1. Serial Correlation

Table 6: Serial Correlation Test Results

Breusch-Godfrey Serial Correlation LM Test.			
F-statistic	0.559058	Prob. F (1,10)	0.4719
Obs*R-squared	2.435508	Prob. Chi-Square (1)	0.1189
8			

As shown by the results in table 6, the model doesn't suffer any serial correlation problem since the null hypothesis, which states no serial correlation, couldn't be rejected as the p-value of the chi-square is greater than %5.

3.8.2. Heteroskedasticity Test

Table 7: Breusch-Pagan-Godfrey Heteroskedasticity Results

Heteroskedasticity Test. Breusch-Pagan-Godfrey			
F-statistic	0.574138	Prob. F (34,11)	0.8943
Obs*R-squared	29.42107	Prob. Chi-Square (34)	0.6916
Scaled explained SS	2.213649	Prob. Chi-Square (34)	1.0000

According to the results in table 7 of Breusch-Pagan-Godfrey's heteroskedasticity test, the fitted model doesn't have a heteroskedasticity problem since the P-values are higher than the specified 5% level.

3.8.3. Normality check

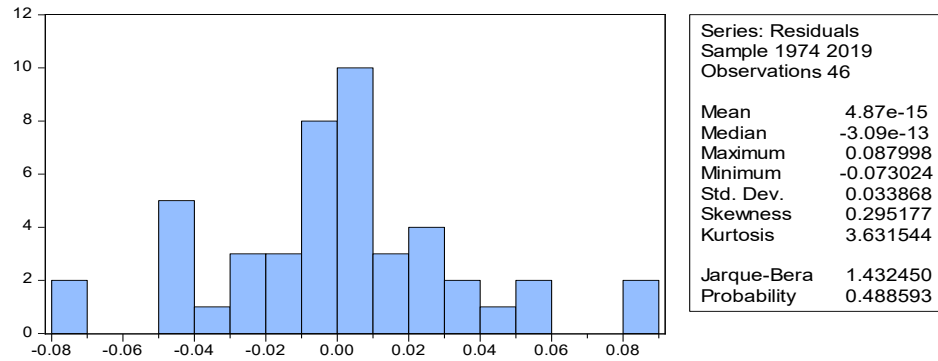


Figure 4: Normality check histogram

For the stage of normality checking, the null hypothesis of the normality test says that the residuals are distributed normally, while the alternative says the residuals are not distributed normally. Therefore, according to the above results, the null hypothesis couldn't be rejected since P-value is greater than the 5% levels, concluding that the residuals are normally distributed.

3.8.4. Model Stability

For the estimated model to be reliable and consistent, it has to undergo the model stability test. As Brown et al. (1975) developed, the CUSUM stability test is done to ascertain the permanence and consistency of the model. The following figure shows the steadiness feature of the model, and it points out that the model is relatively stable, and the presence of instability isn't the subject in this case, as the CUSUM statistics plots are within the critical bands of the confidence interval.

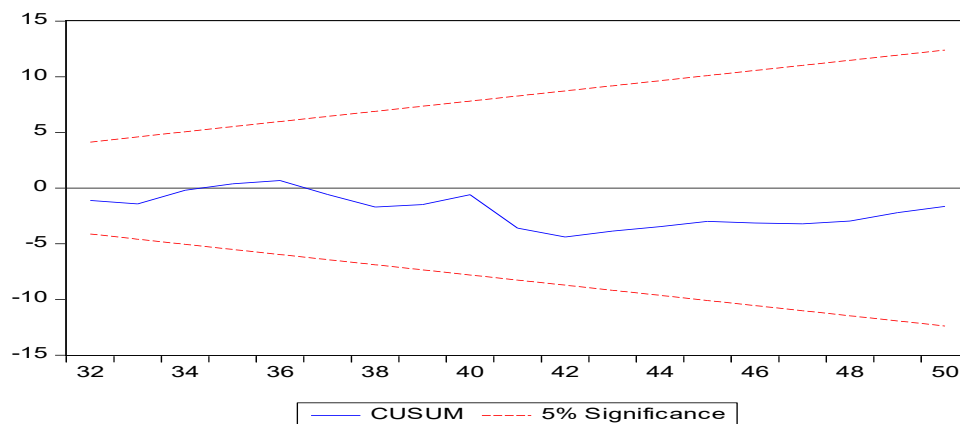


Figure 5: CUSUM Test

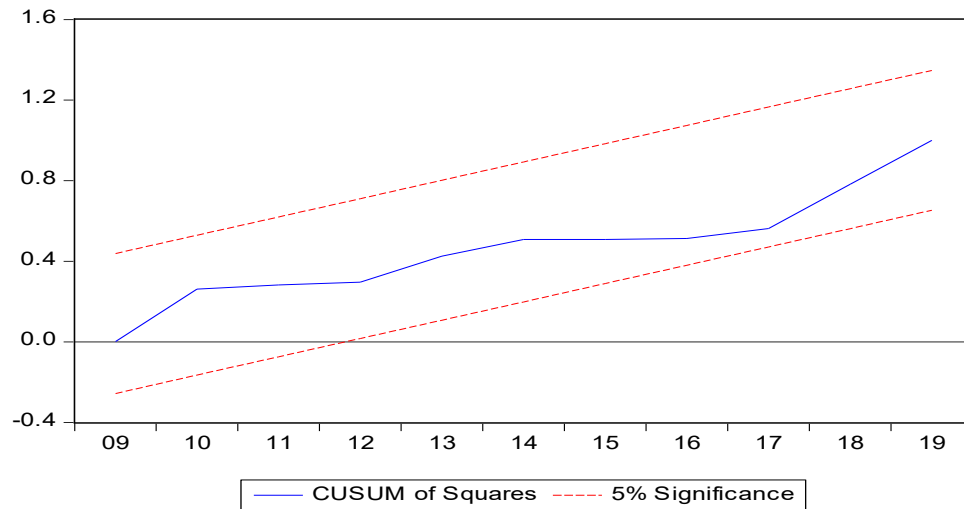


Figure 6: CUSUM Square Test

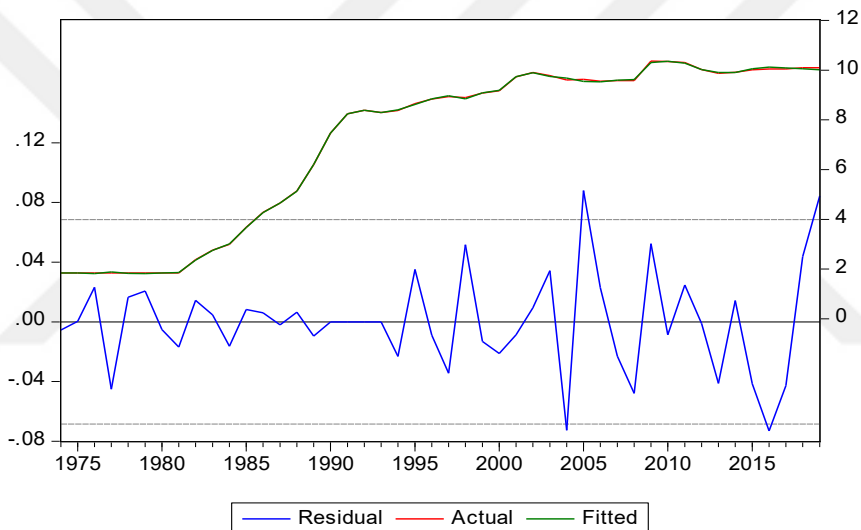


Figure 7: Examining the Graph of Residuals

Looking at the graph of the residuals, the lines of the observed values and estimated values overlap closely on one another till they became indistinguishable, thus pointing out that the model estimation was successful, and it can be said that the model gives good results.

3.9. Toda-Yamamoto Causality Test Findings

Unlike other causality tests, the one introduced by Toda-Yamamoto (1995) has the exclusive lead of allowing the variables to be tested their causal relationship regardless of their level of the order of integration since co-integration is ignored in this test. Once assured of the integration order of the series, the subsequent move is to estimate the VAR

model; therefore, how many lags to include in the model should be decided. The below table has presented the lags to be chosen.

Table 8: Lag length determination according to the lag selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-30.77660	NA	1.99e-07	1.598983	1.837501	1.688333
1	202.9337	396.2915	3.74e-11	-6.997119	-5.327490*	-6.371666
2	245.6449	61.28120	3.03e-11	-7.288908	-4.188168	-6.127352
3	315.4198	81.90974	8.68e-12	-8.757385	-4.225534	-7.059726
4	392.8277	70.67672*	2.30e-12*	-10.55773*	-4.594764	-8.323964*

Note. *depicts lag orders selected by the lag selection criterions

According to the lag result of the lag selection criteria, there's uniformity in the chosen lag order as all the criterions marked the 4th lag as the optimal lag to be included in the analysis of the Toda-Yamamoto causality test.

The following table demonstrates the output of the Toda-Yamamoto causality.

Table 9: Toda-Yamamoto Causality Test Findings

Null hypothesis	Chi-square	P-value	Granger causality
GDP doesn't granger cause EXC	5.258498	0.3852	Accept
EXC doesn't granger cause GDP	52.26370	0.0000	Reject
INF doesn't granger cause EXC	10.39830	0.0325	Reject
EXC doesn't granger cause INF	4.753046	0.4468	Accept
INV doesn't granger cause EXC	2.407219	0.7904	Accept
EXC doesn't granger cause INV	21.51971	0.0006	Reject
OPN doesn't granger cause EXC	6.772849	0.2381	Accept
EXC doesn't granger cause OPN	26.31030	0.0001	Reject
GEX doesn't granger cause EXC	5.891468	0.3169	Accept
EXC doesn't granger cause GEX	36.23222	0.0000	Reject

Source. Author's computations

The result in Table 9 demonstrates the Toda & Yamamoto causality analysis outcome between the exchange rate and the other predictors such as the gross domestic product, inflation rate, investment and government expenditure, and trade openness.

According to the test result, there's no causality from gross domestic product to the exchange rate since the P-values are greater than 0.05. In other words, causality running from exchange rate to gross domestic product has been observed as the P-values are less than 0.05 concluding to the rejection of the H_0 and accepting the H_1 hypothesis. Following

the test results, a causal relationship running from inflation rate to exchange rate has been detected as the P-values of the result is less than 5%. In comparison, the opposite of the exchange rate to inflation hasn't been true since the P-values are greater than 5%.

Regarding the test result, there's no causality from investment to the exchange rate as the P-value associated with the result is greater than 5%. In contrast, the opposite direction shows a causal link, meaning that there's a causality running from exchange rates to the investment since the P-value associated with it is less than 5%. Consistent with the Toda & Yamamoto causality test results, the established null hypothesis of trade openness doesn't Granger cause exchange rate couldn't be rejected since the P-value is greater than 5%. Meanwhile, the exchange rate to trade openness has been confirmed as the P-value is less than 5%.

DISCUSSIONS AND RECOMMENDATIONS

This research has been revisited the recent empirical studies on the exchange rate's interaction with other key macroeconomic variables in various countries and different periods. In our case, the study discussed the dynamic and the causal link between exchange rate and some selected predictors over the period between 1970 and 2019. The dataset used in the study has been sourced from the United Nations Statistics Division. The variables indicators were the real exchange rate that has been used as the dependent variable, the gross fixed capital formation that has been used as a proxy variable to represent domestic investment, the inflation rate, the government expenditure, and the trade openness. Because Somalia is recovering from prolonged insecurity and civil war of almost three decades, the study incorporates a dummy variable to count for the impact of the civil war on the currency and the exchange rate changes. The dummy variable has been fitted in between the most chaotic and stateless eras. It has been designated to take 0 for the time between 1970 and 1990 and 1 from 1991, which was the year Somalia descended into the civil war.

The study used an assortment of econometric techniques with the help of the E-views 9 software package and using the ADF unit root test to examine the integration order of the series. For robustness and consistency purposes, the PP test unit root test has been employed. Afterward, it has been specified ARDL to capture the long-run, and the short-run dynamics of said variables. After that, the Toda-Yamamoto causality test has been utilized to ascertain a causal link and the direction of the causality. Subsequently, to have healthy estimations, the fitted model has gone under several diagnostics tests such as the serial correlation test to make certain that the model doesn't suffer from auto-correlation problems and heteroskedasticity test normality check CUSUM and CUSUM square tests.

As expected, the findings of the dynamic model have been consistent with some of the previous empirical works of literature. From the reported results in Table 5, it can be drawn the inference of the short-run coefficients. According to the findings presented in Table 5, the coefficient of the GDP, which was representing economic growth, is lag sensitive. The associated coefficients are all positive and statistically significant at all lags, stating that being held everything else constant, a one percent change in the gross domestic product brings a depreciation in the exchange rates, and this outcome is in line

with the empirical research findings of Habib et al. (2017) from a panel analysis. However, the impact was not the same both in the short and long-run as the coefficient of the log run had a negative sign but statically insignificant, as also revealed by Tang (2015) in their study on China. In consistence with the results in Table 5, the coefficients of government expenditure are all statistically significant but had mixed signs. However, in the short-run, the coefficient of the government expenditure is negative, indicating that assuming everything else constant, a one percent rise in government expenditure will result in appreciation of the exchange rate by 1.1%. The findings are consistent with those of Galstyan& Lane (2009), Monacelli & Perotti (2010), Miyamoto et al. (2019), and contrary with those of Ravn et al. (2007) and Bajo-Rubio et al. (2020).

Similarly, the coefficients of the inflation rates are all negative and statistically significant. According to the results in Table 5, keeping everything else the same, a rise in inflation rates is expected to appreciate the exchange rates by %0.5. On the other hand, it had a contrary impact in the long-run but statistically negligible. Correspondingly, the coefficient representing investment had a statistically negative coefficient, and economic wise in it could be interpreted as, assuming everything else remains constant, a one percent rise in domestic investment is projected to generate the exchange rate to appreciate by %1.8 in the short-run, while in the long-run investment had a different impact on the exchange as it is estimated that a change in domestic investment leads the exchange rates to depreciate by %9.

Trade openness coefficients also had mixed effects in the long-run and the short-run terms. According to Table 5, the coefficient of trade openness is negligible in the short-run. In contrast, the coefficient associated with trade openness is negative and statistically considerable in the long-run, implying that assuming everything else stays the same, a one percent change in trade openness the exchange rate is expected to appreciate by %2.3 in the long-run. Another key indicator was in the model to capture the impact of the civil war on the exchange rate dynamics, and it had consistent results in both the long-run and the short-run. Its coefficients figures were negative and statistically significant. According to the output in Table 5, for each year of civil war, the exchange rate is anticipated to depreciate in both the short-run and the long-run by %1.3 and 3.9, respectively. The error correction term has met the conditions as it's statistically

significant and has a negative value, which indicates that the disequilibrium in the process isn't long-lasting and permanent. It is anticipated that the imbalances will self-adjust with an adjustment speed of % 61 each year.

From the Toda-Yamamoto causality analysis results in Table 9, the null hypothesis of exchange rate doesn't Granger cause GDP has been firmly rejected with strong P-value, indicating that there's a unidirectional causal relationship. According to the causality results in Table 9, the inflation rate Granger causes the exchange rate as its null hypothesis of no causality has been rejected. Correspondingly, the findings of the causality analysis imply that the exchange rates Granger cause the domestic investment. Similarly, the null hypothesis of no causality between the trade openness and exchange rates has been rejected, and according to the results in Table 9, the exchange rate Granger causes openness. Therefore, there's a one-way causal relationship. To end with, as its P-value is very small, the exchange rate Granger causes government spending; consequently, there's a unidirectional relationship between the said variables.

On a final note, it has been found that the variables selected for the study had different links with the exchange rate, and their impacts had also been mixed in both favorable and unfavorable effects. This research work adds fresh findings to the previous literature on determining the relationship and impact of variables under consideration with the exchange rate. The findings have been confirmed with some of the previous literature, while others had a contrary conclusion. In recommendation, the study suggests to the policymakers or the authorities of the central bank to be observant of their policies related to the fiscal and monetary policies as they might have both adverse and favorable effects depending on the period and the rationale behind its application, as well as the government, to consider policies that incentivize trade openness as it has favorable effect with the exchange rate contingent upon Somalia. It is also imperative to note the devastating effects of the civil war and the instability on the country's economy in general as the insecurity induces the large businesses to dissolve and stagnate, the key revenue-generating public sources to fade away, which eventually leads to a shortage of government revenue that harms the economic progress of the country. Consequently, to avoid economic hardship or even worse impact, elevated priority should be given to the stability and the general security of the country.

The study also recommends that future researchers consider including some other relevant variables into the model. There might be better predictors that could've been included in the study and would explain the exchange rate better but didn't happen due to constraints such as limited data availability. Moreover, the study suggests the future potential researchers reexamine the connection of the exchange rates with these variables in terms of industrial separation to gauge the impact and see whether it would lead to a different conclusion.



REFERENCES

- Abdurehman, A. A., & Hacilar, S. (2016). The relationship between exchange rate and inflation. An empirical study of Turkey. *International Journal of Economics and Financial Issues*, 6 (4), 1454–1459.
- Adetiloye, K. A. (2010). Exchange rates and the consumer price index in Nigeria. A causality approach. *Journal of emerging trends in economics and management sciences*, 1 (2), 114-120.
- Aftab, Z. (2002). The long-run and short-run impact of exchange rate devaluation on Pakistan's trade performance. *The Pakistan Development Review*, 277-286.
- Ahmad, A., Ahmad, N., & Ali, S. (2013). Exchange rate and economic growth in Pakistan (1975-2011). *Ahmad, Arslan, Najid Ahmad, and Sharafat Ali. "Exchange Rate and Economic Growth in Pakistan (1975-2011)." (2013), 740-746.*
- Ahmad, E., & Ali, S. A. (1999). Relationship between exchange rate and inflation. *Pakistan Economic and Social Review*, 139-154.
- Ahmad, E., & Ali, S. A. (2019). Pakistan Institute of Development Economics, Islamabad Exchange Rate, and Inflation Dynamics Author(s). Eatzaz Ahmad and Saima Ahmed Ali Source . The Pakistan Development Review, Vol . 38, No. 3(Autumn 1999), pp. 235-251 Published by . Pakistan, 38 (3), 235–251.
- Aizenman, J., & Jinjara, Y. (2011). *The Fiscal Stimulus of 2009–2010. Trade Openness, Fiscal Space, and Exchange Rate Adjustment. NBER International Seminar on Macroeconomics* (Vol. 8). <https://doi.org/10.1086/663626>
- Aizenman, J., & Riera-Crichton, D. (2008). Real exchange rate and international reserves in an era of growing financial and trade integration. *Review of Economics and Statistics*, 90 (4), 812–815. <https://doi.org/10.1162/rest.90.4.812>
- Albuquerque, C. R., & Portugal, M. S. (2005). Exchange rate and inflation. a case of sulkiness of volatility. *UFRGS, Departamento de Economia, texto para discussão*, (1).
- Ali, A. I., Ajibola, I. O., Omotosho, B. S., Adetoba, O. O., & Adeleke, A. O. (2015). Real exchange rate misalignment and economic growth in Nigeria. *CBN Journal of Applied Statistics*, 6 (2), 103-131.
- Arrangements, E., & Restrictions, E. (2019). *Exchange Arrangements and Exchange Restrictions*.
- Asad, I., Ahmad, N., & Hussain, Z. (2012). Impact of real effective exchange rate on inflation in Pakistan. *Asian Economic and Financial Review*, 2 (8), 983.
- Asari, F. F. A. H., Baharuddin, N. S., Jusoh, N., Mohamad, Z., Shamsudin, N., & Jusoff, K. (2011). A vector error correction model (VECM) approach in explaining the

relationship between interest rate and inflation towards exchange rate volatility in Malaysia. *World Applied Sciences Journal*, 12 (3), 49-56.

Bahmani-Oskooee, M. (2001). Nominal and real effective exchange rates of Middle Eastern countries and their trade performance. *Applied Economics*, 33 (1), 103-111.

Bahmani-Oskooee, M., Halicioglu, F., & Neumann, R. (2018). Domestic investment responses to changes in the real exchange rate. Asymmetries of appreciation versus depreciation. *International Journal of Finance & Economics*, 23 (4), 362-375.

Bailliu, J., & Fujii, E. (2011). Exchange Rate Pass-Through and the Inflation Environment in Industrialized Countries. An Empirical Investigation. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.560762>

Bajo-Rubio, O., Berke, B., & Esteve, V. (2020). Fiscal policy and the real exchange rate. some evidence from Spain. *Empirica*, 47 (2), 267-280.

Bayraktutan, Y., & Arslan, İ. (2003). Exchange rate in Turkey, imports and inflation relationship. econometric analysis (1980-2000). *AfyonKocatepe University, Journal of II BF*, 5 (2), 89-104.

Bhandari, R., & Upadhyaya, K. P. (2010). Panel data evidence of the impact of exchange rate uncertainty on private investment in South-east Asia. *Applied Economics*, 42 (1), 57-61.

Bleaney, M., & Tian, M. (2014). Exchange rates and trade balance adjustment. a multi-country empirical analysis. *Open Economies Review*, 25 (4), 655-675.

Bogetic, Z. (2000). Official dollarization. Current experiences and issues. *Cato J.*, 20, 179.

Boyd, D., Caporale, G. M., & Smith, R. (2001). Real exchange rate effects on the balance of trade. cointegration and the Marshall–Lerner condition. *International Journal of Finance & Economics*, 6 (3), 187-200.

Brada, J. C., Kutan, A. M., & Zhou, S. (1997). The exchange rate and the balance of trade. the Turkish experience. *The Journal of Development Studies*, 33 (5), 675-692.

Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society. Series B (Methodological)*, 37 (2), 149-163.

Byrne, J. P., & Philip Davis, E. (2005). The impact of short-and long-run exchange rate uncertainty on investment. A panel study of industrial countries. *Oxford Bulletin of Economics and Statistics*, 67 (3), 307-329.

Calvo, G. A., & Reinhart, C. M. (2002). Fear of floating. *The Quarterly journal of economics*, 117 (2), 379-408.

- Calvo, G. A., & Reinhart, C. M. (2002). Fear of floating. *The Quarterly journal of economics*, 117 (2), 379-408.
- Campa, J. M., & Goldberg, L. S. (1999). Investment, pass-through, and exchange rates. a cross-country comparison. *International Economic Review*, 40 (2), 287-314.
- Cassel, G. (1918). Abnormal deviations in international exchanges. *The Economic Journal*, 28 (112), 413-415.
- Catão, L. A. (2007). Why real exchange rates?. *Finance & Development*, 44 (003).
- Chen, M., & Hu, X. (2018). Linkage between consumer price index and purchasing power parity. Theoretic and empirical study. *The Journal of International Trade & Economic Development*, 27 (7), 729-760.
- Chen, Y., & Liu, D. (2018). Government spending shocks and the real exchange rate in China. Evidence from a sign-restricted VAR model. *Economic Modelling*, 68, 543-554.
- Chowdhury, M. T. H., Bhattacharya, P. S., Mallick, D., & Ulubaşoğlu, M. A. (2016). Exchange rate regimes and fiscal discipline. The role of trade openness. *International Review of Economics and Finance*, 45, 106–128. <https://doi.org/10.1016/j.iref.2016.04.013>
- De Facto Classification of Exchange Rate Regimes and Monetary Policy Frameworks, April 31, 2008 <https://www.imf.org/external/np/mfd/er/2008/eng/0408.htm> Date accessed May 2021.
- Di Giorgio, G., Nisticò, S., & Traficante, G. (2018). Government spending and the exchange rate. *International Review of Economics & Finance*, 54, 55-73.
- Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American statistical association*, 74 (366a), 427-431.
- Dornbush, R., & Fisher, A. (1990). Macroeconomics, New York, McGraw-Hill, Coll. *Economics series*.
- Eichengreen, B. (2007). The real exchange rate and economic growth. *Social and Economic Studies*, 7-20.
- Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction. representation, estimation, and testing. *Econometrica. Journal of the Econometric Society*, 251-276.
- Galstyan, V., & Lane, P. R. (2009). The composition of government spending and the real exchange rate. *Journal of Money, Credit and Banking*, 41 (6), 1233-1249.
- Gantman, E. R., & Dabós, M. P. (2018). Does trade openness influence the real effective exchange rate? New evidence from panel time-series. *SERIEs*, 9 (1), 91-113.

- Gerlach, R., Carter, C., & Kohn, R. (1999). Diagnostics for time series analysis. *Journal of Time Series Analysis*, 20 (3), 309-330.
- Gidey, H. T., &Nuru, N. Y. (2021). The effects of government spending shocks on real exchange rate in Ethiopia. *Journal of Economic and Administrative Sciences*.
- Granger, C. W., Newbold, P., &Econom, J. (1974). Spurious regressions in econometrics. *Baltagi, Badi H. A Companion of Theoretical Econometrics*, 557-61.
- Gujarati, D. N., & Porter, D. C. (1999). *Essentials of econometrics* (Vol. 2). Singapore. Irwin/McGraw-Hill.
- Gül, E., &Ekinci, A. (2006). Türkiye’de enflasyon ve döviz kuru arasındaki eşlik ilişkisi. 1984-2003.
- Habib, M. M., Mileva, E., &Stracca, L. (2017). The real exchange rate and economic growth. Revisiting the case using external instruments. *Journal of International Money and Finance*, 73, 386-398.
- Harchaoui, T., Tarkhani, F., & Yuen, T. (2005). *The effects of the exchange rate on investment. Evidence from Canadian manufacturing industries* (No. 2005-22). Bank of Canada.
- Hassan, T. A., & Mano, R. C. (2019). Forward and spot exchange rates in a multi-currency world. *The Quarterly Journal of Economics*, 134 (1), 397-450.
- Imimole, B., &Enoma, A. (2011). Exchange rate depreciation and inflation in Nigeria (1986–2008). *Business and Economics Journal*, 28, 1-11.
- ImranaAsad, Ahmad, N., & Hussain, Z. (2012). Impact of Real Effective Exchange Rate on Inflation in Pakistan. *Asian Economic and Financial Review*, 2 (8), 983–990.
- Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of economic dynamics and control*, 12 (2-3), 231-254.
- Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52 (2), 169-210.
- Kataranova, M. (2010). The Relationship Between the Exchange Rate and Inflation in Russia. *Problems of Economic Transition*, 53 (3), 45–68. <https://doi.org/10.2753/PET1061-1991530303>
- Krugman, P. (1989). The case for stabilizing exchange rates. *Oxford Review of Economic Policy*, 5 (3), 61-72.
- Landon, S., & Smith, C. E. (2009). Investment and the exchange rate. Short-run and long-run aggregate and sector-level estimates. *Journal of International Money and Finance*, 28 (5), 813-835.

- Lane, P. R., & Perotti, R. (2003). The importance of composition of fiscal policy. evidence from different exchange rate regimes. *Journal of Public Economics*, 87 (9-10), 2253-2279.
- Lee, J., & Yue, C. (2017). Impacts of the US dollar (USD) exchange rate on economic growth and the environment in the United States. *Energy Economics*, 64, 170-176.
- Leeson, P. T. (2007). Better off stateless. Somalia before and after government collapse. *Journal of comparative economics*, 35 (4), 689-710.
- Longe, A. E., Muhammad, S., Ajayi, P. I., & Omitogun, O. (2019). Oil price, trade openness, current account balances and the official exchange rate in Nigeria. *OPEC Energy Review*, 43 (4), 446-469.
- Luther, W. J. (2015). The monetary mechanism of stateless Somalia. *Public Choice*, 165 (1), 45-58.
- MacDonald, R. (2000). The role of the exchange rate in economic growth. a euro-zone perspective. *National Bank of Belgium working paper*, (9).
- Madesha, W., Chidoko, C., & Zivanomoyo, J. (2013). Empirical Test of the Relationship Between Exchange Rate and Inflation in Zimbabwe, 4 (1), 52–59.
- Maepa, M. M. (2015). *The effects of exchange rate volatility on South African investments* (Doctoral dissertation).
- Management, B., Mara, U. T., Asari, F. F. A. H., Baharuddin, N. S., Jusoh, N., Mohamad, Z., ... Jusoff, K. (2011). A Vector Error Correction Model(VECM) Approach in Explaining the Relationship Between Interest Rate and Inflation Towards Exchange Rate Volatility in Malaysia. *World Applied Sciences Journal*, 12, 49–56.
- Mankiw, N. Gregory (2013). *Macroeconomics*, 8th edition, Worth, New York, NY
- Mari del Cristo, M. L. (2014). *Essays on the optimal choice of exchange rate regime in emerging countries* (Doctoral dissertation, Universitat de Barcelona).
- Missio, F. J., Jayme Jr, F. G., Britto, G., & Luis Oreiro, J. (2015). Real exchange rate and economic growth. new empirical evidence. *Metroeconomica*, 66 (4), 686-714.
- Miyamoto, W., Nguyen, T. L., & Sheremirov, V. (2019). The effects of government spending on real exchange rates. Evidence from military spending panel data. *Journal of International Economics*, 116, 144-157.
- Monacelli, T., & Perotti, R. (2010). Fiscal policy, the real exchange rate and traded goods. *The Economic Journal*, 120 (544), 437-461.
- Munthali, T., Simwaka, K., & Mwale, M. (2010). The real exchange rate and growth in Malawi. Exploring the transmission route. *Journal of Development and Agricultural Economics*, 2 (9), 303-315.

- Musoke, Z. (2017). *An empirical investigation on dollarization and currency devaluation. A case study of Tanzania* (No. 2017-8). Economics Discussion Papers.
- Nipun [Shttps://www.economicsdiscussion.net/international-trade/finance/floating-exchange-rates-advantages-and-disadvantages-currencies/26267](https://www.economicsdiscussion.net/international-trade/finance/floating-exchange-rates-advantages-and-disadvantages-currencies/26267) Date accessed 11/05/2021
- Nor, M. I., Masron, T. A., & Alabdullah, T. T. Y. (2020). Macroeconomic fundamentals and the exchange rate volatility. empirical evidence from Somalia. *SAGE Open*, 10 (1), 2158244019898841.
- Nucci, F., & Pozzolo, A. F. (2001). Investment and the exchange rate. An analysis with firm-level panel data. *European Economic Review*, 45 (2), 259-283.
- Obiechina, M. E., & Uzodinmaukeje, E. (2013). Economic Growth, Capital Flows, Foreign Exchange Rate, Export and Trade Openness in Nigeria. *International Journal of Economics and Management Sciences*, 2 (9), 1–13.
- Odusola, A. F., & Akinlo, A. E. (2001). Output, inflation, and exchange rate in developing countries. An application to Nigeria. *Developing Economies*, 39 (2), 199–222. <https://doi.org/10.1111/j.1746-1049.2001.tb00900.x>
- Omojimite, B. U., & Akpokodje, G. (2010). The impact of exchange rate reforms on trade performance in Nigeria. *Journal of social sciences*, 23 (1), 53-62.
- Panda, A. K., & Nanda, S. (2019). The nexus between exchange rate and long-term investment in Indian manufacturing industry. *Management Research Review*.
- Pesaran, M. H., & Shin, Y. (1995). An autoregressive distributed lag modelling approach to cointegration analysis.
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, 16 (3), 289-326.
- Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 75(2), 335-346.
- Rapetti, M., Skott, P., & Razmi, A. (2012). The real exchange rate and economic growth. are developing countries different?. *International Review of Applied Economics*, 26 (6), 735-753.
- Ravn, M. O., Schmitt-Grohé, S., & Uribe, M. (2007). *Explaining the effects of government spending shocks on consumption and the real exchange rate* (No. w13328). National Bureau of Economic Research.
- Razzaque, M. A., Bidisha, S. H., & Khondker, B. H. (2017). Exchange rate and economic growth. An empirical assessment for Bangladesh. *Journal of South Asian Development*, 12 (1), 42-64.

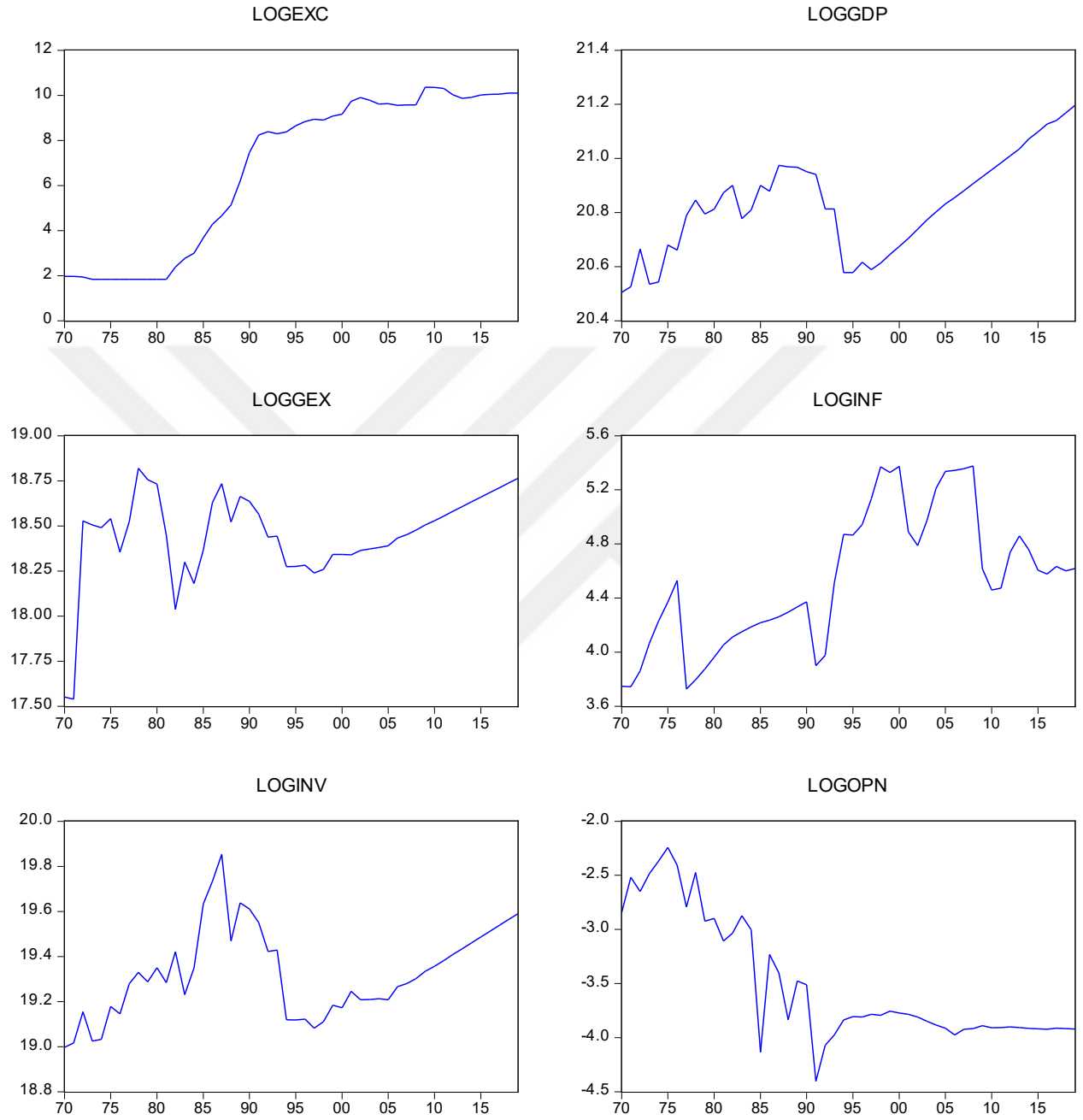
- Reinhart, C. M., & Rogoff, K. S. (2004). The modern history of exchange rate arrangements. a reinterpretation. *the Quarterly Journal of economics*, 119 (1), 1-48.
- Rodrik, D. (2007). The real exchange rate and economic growth. theory and evidence.
- Rogoff, K. (1996). The purchasing power parity puzzle. *Journal of Economic Literature*, 34 (2), 647-668.
- Shruti <https://www.economicdiscussion.net/fixed-exchange-rate/fixed-exchange-rate-system-advantages-and-disadvantages/11964> Date accessed 11/05/2021
- Soleymani, M., & Akbari, A. (2011). The relationship between exchange rate uncertainty and investment in some of Sub-Saharan African Countries. *International Journal of Business and Public Management*, 1 (1), 51-57.
- Stone, M., Roger, S., Shimizu, S., Nordstrom, A., Kişnbay, T., & Restrepo, J. (2009). *The role of the exchange rate in inflation-targeting emerging economies*. IMF Occasional Papers.
- Swift, R. (2006). Measuring the effects of exchange rate changes on investment in Australian manufacturing industry. *Economic record*, 82, S19-S25.
- Takaendesa, P. (2006). *The behaviour and fundamental determinants of the real exchange rate in South Africa* (Doctoral dissertation, Rhodes University).
- Tang, B. (2015). Real exchange rate and economic growth in China. A cointegrated VAR approach. *China Economic Review*, 34, 293-310.
- Telatar, E., & Kazdagli, H. (1998). Re-examine the long-run purchasing power parity hypothesis for a high inflation country. the case of Turkey 1980–93. *Applied Economics Letters*, 5 (1), 51-53.
- Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of econometrics*, 66 (1-2), 225-250.
- Uddin, K. M. K., Rahman, M. M., & Quaasar, G. A. A. (2014). Causality between exchange rate and economic growth in Bangladesh. *European Scientific Journal*, 10 (31).
- Udoh, E., & Egwaikhide, F. (2010). Exchange Rate Volatility, Inflation Uncertainty and Foreign Direct Investment in Nigeria. *Botswana Journal of Economics*, 5 (7). <https://doi.org/10.4314/boje.v5i7.60304>
- Ugurlu, E. (2006). Real exchange rate and economic growth. Turkey.
- Wilson, P. (2001). Exchange rates and the trade balance for dynamic Asian economies—does the J-curve exist for Singapore, Malaysia, and Korea?. *Open economies review*, 12 (4), 389-413.

- Wong, H. T. (2013). Real exchange rate misalignment and economic growth in Malaysia. *Journal of Economic Studies*.
- Yusoff, M. B., &Febrina, I. (2014). Trade openness, real exchange rate, gross domestic investment and growth in Indonesia. *Margin. The Journal of Applied Economic Research*, 8 (1), 1-13.
- Zakaria, M. G. A. B., (2011). Trade Openness and Real Exchange Rate. Some Evidence from Pakistan. *Romanian Economic Journal*, (39), 201–229.
- Zhang, G., Marsh, I., & MacDonald, R. (2016). A hybrid approach to exchange rates. How do macro news and order flow affect exchange rate volatility?. *Studies in Economics and Finance*.



APPENDIX

The graphical visualization of the variables used in the analysis.



CURRICULUM VITAE

Abdikani Abdullahi Sheikdon received his undergraduate degree in economics from the University of Somalia in 2017. To pursue his education, in 2019, Mr. Sheikdon joined the Department of Economics at Sakarya University in Turkey. Mr. Sheikdon is an ingenious enough, result-oriented with strong sense of motivation driven by desire to achieve goals and objectives. Mr. Sheikdon has excellent records and technical practices throughout his student life. In addition to that he has published some of his works on international journals.

