THE VOLATILITY OF SOMALIA'S UNREGULATED EXCHANGE RATES

By

MOHAMED IBRAHIM NOR

Thesis submitted in fulfillment of the Requirements
for the degree of
Doctor of Philosophy

May 2015

ACKNOWLEDGEMENT

Alhamdulillah.All praises are due to Allah and peace and blessings be upon His Prophet Muhammad (S.A.W). Thanks to Allah for giving me His blessing, because without His mercifulness, I would never complete this thesis. My special gratitude goes to my supervisor, **Dr. Tajul Ariffin Masron**, for his continuous moral and material support, supervision, advice, motivation, patience in guiding me throughout my PhD journey. Without his constant untiring support, I would not have been able to complete this thesis. I consider myself to be very fortunate to be under his supervision. May Allah bless and repay his kind and valuable cooperation.

To my parents, **Habiba Hassan Mohamed** and **Ibrahim Nor Ali**, for their prayers (Duaa's), encouragement and continuous support and sacrifices during my PhD and throughout my life. Similarly, I am very grateful to the encouragement, supplications, and moral support of my parents-in-law, **Fatima Ali Mohamed** and **Sheikh Osman Moalim Hussein** during my PhD journey.

My sincere gratitude to my beloved wife, **Farhia Osman Hussein**, for her unconditional love, moral and material support, encouragement, patience, understanding, and constant sacrifices during my study period. Thank you my darling for everything. I am also thankful to my children, **Abdirahman**, **Abdirahim**, and **Yusra** for their support, patience and sacrifices during my study period.

My sincere thanks to the staff and administration of my sponsor, SIMAD UNIVERSITY, who paid almost all of the expenses of my PhD study. I'll never forget the moral and material support I have received from the Rector of the University, **Ustaad Abdurahman M. Hussein** during my study period. I am indebted to all of you.

I would also like to take this opportunity to thank all of the staff and administration of FAO-Somalia. Without its Food Security and Nutrition Analysis Unit (FSNAU)), I could not get my data. I appreciate their support and contribution to my people and my country. I am grateful to the sponsors and the staff, who facilitated the collection of such huge and important dataset.

Similarly, I am thankful to School of Management (SOM) staff and management, who have been supporting me technically and academically throughout my PhD journey. Without their continuous support, I would not have been able to complete this thesis.

Equally, I am indebted to **Dr. Sharif Yusuf**, my friend, whose support, academic advice and experience sharing were necessary for my study.

Last but not the least; I would like to express my appreciation to all of my friends and PhD colleagues, who have always been there to offer me moral support and academic advice. I'll never forget the help and memories that we have shared together. I hope that our friendship will last forever.

TABLE OF CONTENTS

CHAPTER THREE THEORETICAL ISSUES AND LITERATURE SURVEY

CHAPTER FOUR METHODOLOGY

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

M	Import
X	Export
MS	Money Supply
HM	Hot Money (Speculation)
DM	Domestic Prices
RSP	Regional Stock Prices
OP	Oil Prices
GSP	Global Stock Prices
GP	Gold Prices
WFP	World Food Prices
FAO	Food and Agriculture Organization
SOS	Somali Shilling
USD	United States Dollar
VOL	Volatility
KSH	Kenya Shilling
DJF	Djibouti Frank
TSH	Tanzanian Shilling
EB	Ethiopian Birr
SAR	Saudi Arabian Riyal
OR	Oman Riyal
UAED	United Arab Emirates Dirham
EGP	Egyptian Pound
IR	Indian Rupee
CY	Chinese Yuan
JP	Japanese Yen
UKP	United Kingdom Pound
GARCH	Generalized Autoregressive Conditional Heteroskedasticity
ARCH	Autoregressive Conditional Heteroskedasticity
EGARCH	Exponential Generalized Autoregressive Conditional Heteroskedasticity
TARCH	Threshold Generalized Autoregressive Conditional Heteroskedasticity
ARMA	Autoregressive Moving Average
AR	Autoregressive
MA	Moving Average
CHM	conditional heteroskedasticity models
ADF	Augmented Dickey-Fuller
PP	Phillips-Perron
OLS	Ordinary least squares
VAR	Vector Autoregression

VECM	Vector Error Correction Model
MASD	moving average standard deviation
NSE	Nairobi Stock Exchange
NYSE	New York Stock Exchange
BIS	Bank for International Settlements
FSNAU	Food Security and Nutrition Analysis Unit
IMF	International Monetary Fund
CV	Coefficient of Variation
SIC	Schwarz Information Criterion
DF	Dickey-Fuller GLS Test Statistics (1996)
ERS	Elliott-Rothenberg-Stock Point-Optimal (1996)
NP	Ng-Perron (2001)
KPSS	Kwiatkowski-Phillips-Schmidt-Shin (1992)
FX	Foreign Exchange
AIC	Akaike information criterion
MENA	Middle East and North Africa
ECT	Error Correction Term
GC& RT	General Classification & Regression Trees
AC	Autocorrelation
PAC	Partial Autocorrelation
APC	Absolute Percentage Change

KEMERUAPAN KADAR PERTUKARAN ASING TANPA KAWALSELIA DI SOMALIA

ABSTRAK

Sistem kewangan dan mata wang negara (Shiling Somalia) dahulunya stabil dan kukuh.Walau bagaimanapun, Shilling Somalia mula merudum selepas 1980-an, dan akhirnya tersungur ke tahap yang teruk.Kerajaan pusat negara Somalia runtuh pada tahun 1990 selepas tiga dekad menikmati kestabilan ekonomi dan sosial. Berikutan kegagalan itu, mata wang tersebut terus didagangkan tanpa kawalan kerajaan. Pasaran tukaran mata wang asing tempatan pula beroperasi tanpa seliaan mana-mana pihak.Walaupun rakyat Somalia berurus niaga mata wang dalam pasaran tersebut, ia dikritik kerana tidak memiliki asas pasaran tukaran dagangan. Semasa tempoh kemunduran ini, nilai Shiling mengalami fenomena ketidakaturan yang tidak boleh dijangka, lebih-lebih lagi pada tahun 1997, 2001, 2008, dan 2011. Objektif am kajian ini adalah untuk mengkaji ketidaktentuan mata wang Somalia yang tidak terkawal dan sumbangan faktor dalaman dan luaran ekonomi kepada ketidaktentuan ini. Selain itu, model GARCH juga digunakan untuk menyiasat dan menganggar ketidaktentuan pada kadar tukaran mata wang dalam Somalia.Kajian ini mendapati bahawa kadar tukaran mata wang Somalia mempunyai pertalian dengan kadar tukaran mata wang serantau dan antarabangsa. Dapatan kajian juga menunjukkan kadar tukaran mata wang Somalia yang tidak terkawal adalah sangat tidak tentu dan konsisten. Namun, ketidaktentuan tersebut tidak keterlaluan dan kembali kepada nilai purata mengikut masa.Hasil kajian ini mendapati bahawa perlunya reformasi padadasar kadar tukaran negara, serta perlunya wujud satu mata wang kebangsaan untuk memacu pembangunan pascaperang negara Somalia.

THE VOLATILITY OF SOMALIA'S UNREGULATED EXCHANGE RATES

ABSTRACT

Historically, the monetary system of Somalia was stable and its national currency (Somali Shilling) had very strong value but Somali shilling started to depreciate after 1980s and its value reached to a very low level. Somalia's central government collapsed in 1990 following three decades of stability. Following the collapse of the government, the national currency continued to circulate without sovereign support and the country's FX market has been operating without regulation. Though Somali people have been using this FX market, the market is criticized of not having the basic foundations of an FX market. During this period, the value of the Shilling experienced unpredictable volatility in particular in 1997, 2001, 2008, and 2011. The aim of this study is to examine the volatility of Somalia's unregulated exchange rates and whether internal and external factors of the economy can influence this volatility. This study utilized GARCH model to model the volatility of Somalia's unregulated exchange rates. The study found that the volatility of Somalia's unregulated exchange rates is influenced by its own shocks and the internal and external factors of the economy. On the other hand, the study found that the volatility of Somalia's unregulated exchange rates are highly persistent, indicating the existence of volatility clustering in the series. However, the volatility is not explosive and reverts to its mean over time. Therefore, the behavior of Somalia's unregulated FX market implies the existence of informal monetary mechanisms that was created naturally during the absence of regulatory authority in Somalia. Nevertheless, the existence of highly persistent exchange rate volatility in the context of Somalia challenges the assumption that Somali national currency gained positive value without sovereign

support. This study argues that though Somali shilling circulated without regulatory authority during the absence of effective government in Somalia, this circulation is not accompanied by healthy and stable bilateral exchange rates. These results suggest the need for re-building the federal central bank of Somalia and establishing central bank offices (braches) in each state. In addition, the new federal government should introduce a new national currency that can support Somalia's postwar re-building. Introducing a new currency is difficult and goes through a complex process but it can be completed if the commitment of top government officials is received.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Though historians are in different opinion about the origin of Somali ethnic, it is well known that inhabitants of this area have been in touch with Arabian Peninsula (Mukhtar, 1987). According to Mukhtar (1987), Somalis and Arabs have common ancestors, geographical location, physical features, nomadic heritage and above all a common religion. The ancient Egyptians described Somalia as the Land of Punt, which means "God's Land" (Jacquetta Hawkes, 1965) and Arab people used to name it as Berberi (Mohamed A. Mohamed, 2009). Historically, Somali society was basically nomadic and was politically organized around lineage and customary institutions rather than state institutions (Lindley, 2005). Somalis have been dependent on livestock for subsistence and luxuries; thus, the Camel[1] has been playing a curial role in their lifestyle wherein it is used as a symbol of wealth and medium of exchange in social transactions such as compensation and dowry (Rinehart, Whitaker, Tartter, & Ehrenreich, 1982).

As common for nomadic societies, constant movement across Somalia's borders with neighboring countries has been a familiar feature for centuries and searching graze for livestock, trade or work has been the purpose of the movements (Lindley, 2005). Somalis speak their own language but study Arabic Language (particularly writing and reading skills) in early childhood and since the acceptance

[1]a large animal that lives in the desert and has one or two humps

of Islamic religion, Somalis have been recording their dealings in the Arabic language until its use was abolished by the Military regime in 1969 (Mukhtar, 1987).

In 1800s, different colonial power have concurred different parts of Somalia; Italy colonized the South; British the North; and France controlled the Territory currently known as Djibouti (Rinehart et al., 1982). After more than 50 years of independence fighting, Western powers have finally given the independence to some territories of Somalia. In 1960, Somali state has been officially formed by joint effort of Italy Somaliland and British Somaliland (Rinehart et al., 1982).

Before the colony, people were dependent on agriculture and livestock and in coastal areas, fishery and trade sectors were existed but they were not active economic sectors compared to agriculture and livestock which were the basic source of life for most of inhabitants (JNA, 2006).

After the independency, the economy was very marginal and the state was struggling to find resources to run the fundamental government operations and basic public services (Samatar, 2008). In the first five years of its establishment, the state budget was mostly dependent on subsidiaries given by Western allies mostly Italy and British. After nine years of civil administration, Somalia became a military state in 1969 following SiadBarre's bloodless military coup (Leeson, 2007a). The new government asked the public to cooperate with the government while promising to fight against corruption and to upgrade the economic status of the nation.

In the first 10 years of his administration, Mr. Barre created an economy that was significantly growing in the areas of livestock exports and agriculture. The livestock export was enhanced following the simultaneous development of oil

resources in Saudi Arabia coupled with the increase of number of livestock-sacrificing pilgrim during Hajj season in 1960s (Samatar, 2008). Small scale industries were established, plantations (e.g. banana) increased, livestock exports grew and public service provision improved. As a result, the economic and development fundamentals of the country enhanced compared to that of preceding civil government.

Following the collapse of Somali state, some economic improvements have been observed after private education institutions were slightly established and small businesses started to emerge but with very slow growth. It has been observed that increased small business operations have actually created opportunities of social integration that was a key to restore normal life in the country. By 2000 many small businesses have had operations in Somalia with operation basis in Djibouti, Nairobi and Dubai and the service industry such as finance, transport and information technology has been emphasized (Cassanelli, 2010). On the other hand, the export-import oriented business and construction industries involving Somalia's neighboring countries have been created (Cassanelli, 2010).

In 2000, the Transitional National Government (TNG) was established in Djibouti with a three year term. During this period, the private sector (small and medium sized enterprises) flourished while providing almost all of the basic public services (Nenova, 2004). Services ranging from electric supply to water; from telephone to internet; and from money transfer to deposit services have been provided and the country become one of the best countries in Africa in the areas of mobile and internet services. In 2007 a survey covering 41 African countries has

been conducted while using various economic and development indicators, Somalia ranked 16th in mobile phone users and 11th in internet users (Cassanelli, 2010).

In 2004, a Transitional Federal Government (TFG) took over the power. During this period, the private sector boom that started in 2000 has continued to grow (Maimbo, 2006). In addition to the domestic private sector boom, an active cross-border trade, mainly in livestock sector, has been established by the Somali traders and this facilitated Somali entrepreneurs to introduce their businesses into some East African countries such as Kenya, Uganda, and Tanzania (Little, 2007). In 2009, new administration took over the Transitional Federal Government (TFG). During this period, the private sector has shown a new sign of flourishing, especially in 2011, as the institutions of the government became more functional. In this period, Somalia's Central Bank was officially re-opened and started its normal duties (Abdi, 2010).

Following the visit of the Turkish Prime Minister to Somalia, the economic prospects of Somalia changed as foreign investors (mainly from Muslim countries) and Somali Diaspora mounted to the country looking for investment opportunities. While responding to the massive humanitarian needs, Turkish government and its profit and non-profit organizations have started emergency aid distribution in Somalia in 2011. Besides, Turkish government has decided to make huge investments in Somalia after having received a friendly invitation from Somali government. A high profile delegate from Turkish corporate and industry have visited Somalia to assess the potential investment opportunities in Somalia. Though Turkish potential interest in Somalia is very diverse, Turkish Airways and some construction companies have already started their operations in Somalia. Turkey is

considered as the newest country to intervene in Somalia and the courageous visit of Turkish Prime Minister to Mogadishu in August 2011 has produced some positive results and it has given fresh impetus to efforts of establishing lasting peace in Somalia (ICG, October 8, 2012).

Somalia is a potential economy as it possesses strategic location and natural resources. Currently, Somalia owns one of the largest coastlines in Africa with about 3,000 km, longer than any other African country; so, fishing can be a major source of livelihood (Aljazeera, 2012). Livestock is counted the most crucial sector for Somali economy as it makes up about 40% of the country's GDP and an estimated 65% of its exports (CIA, 2006). Somalia is also good in agriculture production (with arable land of 1,100,000 hectares) and its major products include bananas, rice, maize, sorghum and semsem. Natural resources such as uranium, iron ore, tin, gypsum, bauxite, copper, salt, natural gas and likely oil are the largely unexploited reserves available in Somalia (CIA, 2012).

1.2 The Issue

Economically, financial markets are important because it's the place where funds are transferred from the surplus unit to the deficit unit (Mishkin, 2004b). Amongst the financial markets, the foreign exchange market (FX) is essential for investors as it facilitates funds to be transferred from a country to another or from a currency to another (Mishkin, 2004b). The behavior of an exchange rate is substantial for the citizens of every country since the fluctuations in the prices of currencies have a direct effect on the prices of basic commodities. It has been argued that people can only achieve their FX needs productively when financial markets are stable, so, there must be an effective financial system that supports the FX markets. According to

Robert Mundell, the 1999 Nobel Prize winner for Economics, the exchange rate is the single factor that could lead to the collapse of a country (Chwialkowska, July 25, 1998). Similarly, Abdurahman (2005) states that an exchange rate is a barometer that measures the performance of an economy because good economies are judged on the basis of the strength of their currencies. The collapse of the Bretton Woods exchange rate system had caused bilateral exchange rates to significantly fluctuate in both real and nominal terms (Chit, Rizov, & Willenbockel, 2010; Flood & Rose, 1999; Frömmel & Menkhoff, 2003).

The volatility of the exchange rate between currencies has been increasing as a result of a major changes taking place within the global economy. While the cause of the bilateral exchange rate volatility differs between developing and developed countries, these changes are, in most cases, occurring due to a direct result of fiscal and/or monetary policy undertaken by national governments of each economy (Devereux & Lane, 2003a).

Though the issue of exchange rate has been given special attention globally due to its detrimental effects on the economy, it also remains a hot issue in the emerging economies (Chit et al., 2010; Prasad, Rogoff, Wei, & Kose, 2003). Due to the multiple and recurrent currency crises that took place in the last two decades, exchange rates of the emerging economies have been investigated thoroughly. Following the currency crashes of Russia (1998), East Asia (1997), Mexico (1994-1995), Ecuador (1999), Argentina (2001-2002), Turkey (2000-2001) and Brazil (1998-1999), a number of policy makers and economists regarded volatile capital flows as the underlying source of currency instability in the emerging markets (Glick & Hutchison, 2005; Radelet & Sachs, 1999; Sachs & Radelet, 1998; Stiglitz, 2000). On the other hand, the choice of exchange rate regime is also argued to have some

contributions to the instability of the emerging market economies (Calvo & Mishkin, 2003).

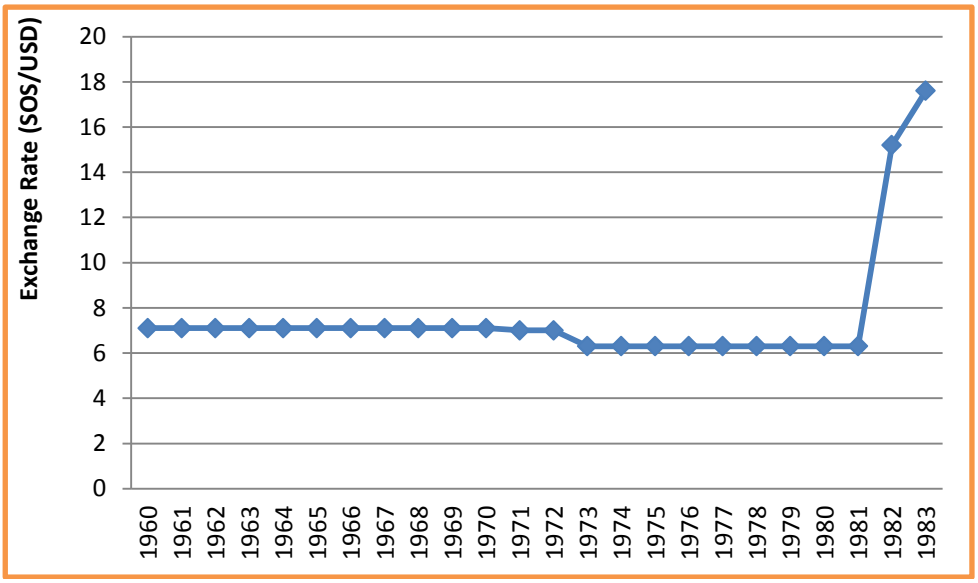
To find out a common policy prescription for such crises, many studies have examined the volatility of exchange rates in the context of the emerging economies (e.g. Chit et al., 2010; Devereux & Lane, 2003a; Edison & Reinhart, 2001; Edwards, 2007; Glick & Hutchison, 2005; Gregorio, Edwards, & Valdes, 2000). According to Devereux and Lane (2003b), in spite of the huge effort put in investigating exchange rate volatility, the findings of the Meese and Rogoff (1983) remain intact. The results of Meese and Rogoff (1983) reveal that movements in exchange rates are principally unpredictable. A number of factors have been found from the empirical studies, which contributes to the volatility of the bilateral exchange rates in the context of the emerging economies (e.g. trade interdependence, degree of commonality in economic shocks, country size, financial linkage, balance of payment effect, external debt, capital flows)[2].

In the context of emerging markets, macroeconomic policies are difficult to be designed typically as advanced economies do because emerging market economies are very different from the advanced economies (Calvo, 2001; Husain, Mody, & Rogoff, 2005; Mishkin, 2004a). So, when designing a macroeconomic policy, emerging economies consider their social, political and economic circumstances. For example, Chinese exchange rate policies are different from that of Japan. While China and some of East Asian nations achieved an export-led growth through exchange rate stability, Japan accomplished the same goal (export-led growth) by using different exchange rate policy. Chinese currency has been stable, as Japanese yen has been very volatile. However, the two countries have achieved their export-led economic growth. According to Haddad and Pancaro (2010), real exchange rate undervaluation can help countries achieve export-led growth but not for long term and it

[2] See for example Chit et al., (2010), Devereux & Lane, (2003b) and Glick & Hutchison, (2005)

works only for low-income countries. In addition, Haddad and Pancaro (2010) concluded that though such exchange rate policy has been key to success of East Asia's export-led growth model, the current debate over the value of China's currency is an evident on the kind of controversy such policies can generate. Such kind of policies can enhance domestic competitiveness but it is difficult to sustain economically and politically in the long run (Haddad & Pancaro, 2010).

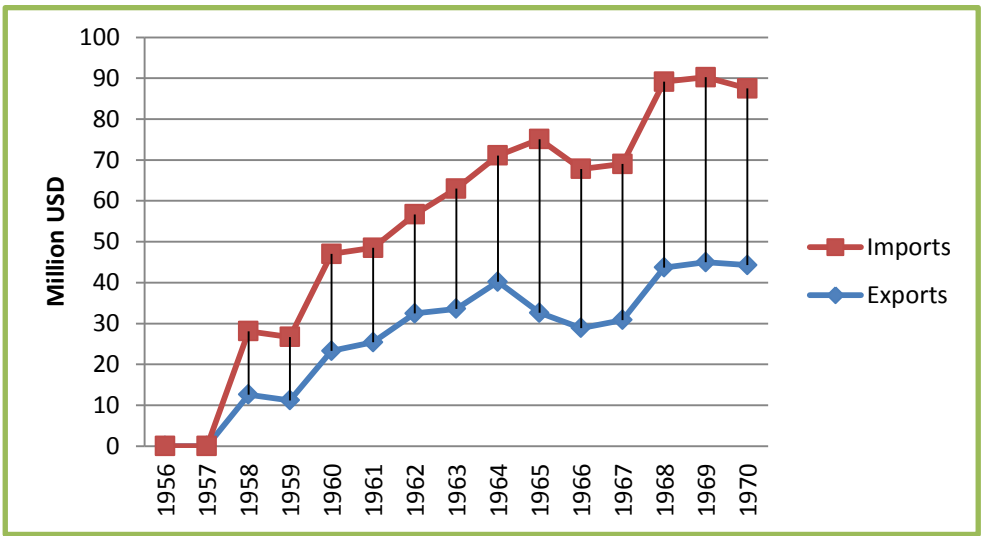
In the context of Somalia, the civil administration of 1960s achieved to relatively stabilize the foreign exchange market during that decade (1960-1970) as shown in Figure 1.1. The value of the shilling remained stable until 1982 in which the value of Somali shilling depreciated against U.S. dollar.



Source: IFS-IMF

Figure 1.1 Exchange Rate of Somalia

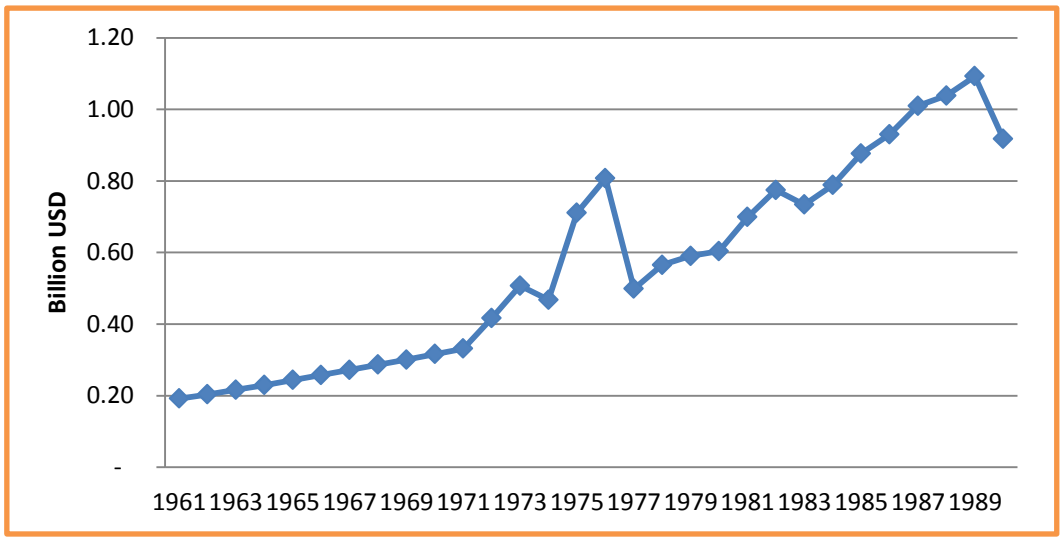
Accordingly, this relative stability encouraged Somali traders to enthusiastically export livestock and banana to Saudi Arabia and Italy respectively as shown in Figure 1.2. This relative currency stability did not only encourage the creation of a competitive international trade but also secured for the local people to maintain their purchasing power.



Source: IFS-IMF

Figure 1.2 International Trade (1957-1970)

During the military administration, the country established an economy that was significantly growing in the areas of livestock exports and agriculture. Following the simultaneous development of oil resources in Saudi Arabia in 1960s, Somalia became one of the biggest countries exporting livestock to Saudi Arabia (Samatar, 2008). As a result, the economic prospect of the country enhanced as the GDP of the country was growing steadily as shown in Figure 1.3.



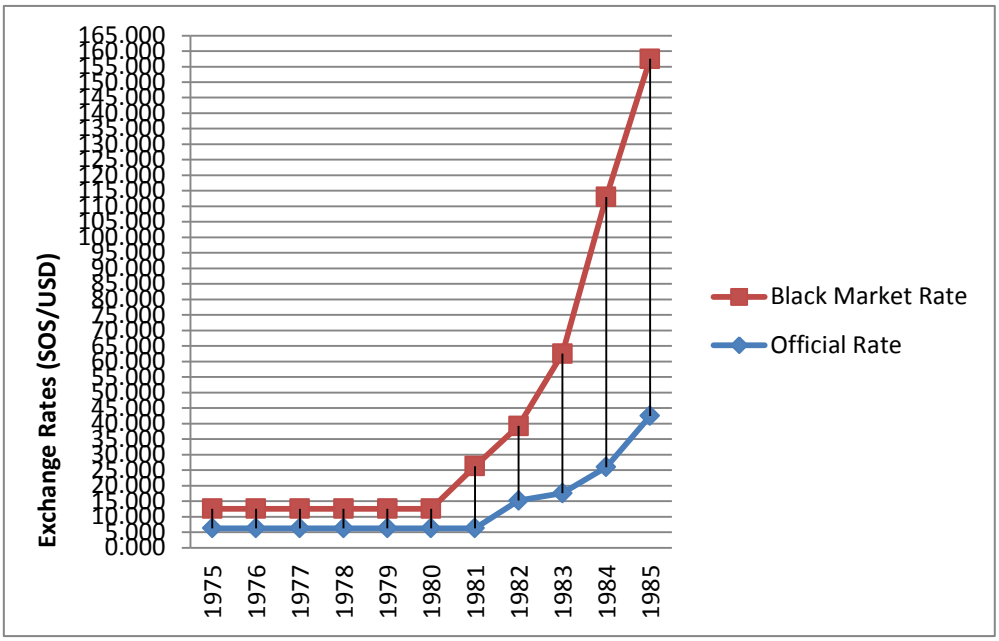
Source: World Bank

Figure 1.3 Somali GDP (1961-1989)

In this period, Somalia's foreign exchange market was probably one of the most stable exchange markets as the value of the shilling against US dollar remained approximately 7 shillings for about 10 years.

Nonetheless, these good days did not last longer and Somalia's economy, that was once growing, started declining due to number of reasons including poor policy making and resource mismanagement. The military regime's nationalization policy had negatively affected the economic prospect of the country as all import trade including foodstuffs, petroleum products, medicine, pharmaceutical, construction materials and clothes was controlled by twelve monopoly government agencies that were involved in foreign trade (Abdurahman, 2005). As these agencies suffered from poor distribution policies, weak inventory systems, lack of experience in foreign trade and business mismanagement, prices of imports went up and the balance of payment shifted from a surplus of SOS124 million in 1972 to deficits of SOS45 million and SOS66 million in 1973 and 1974 respectively (Abdirahman, 2007; Abdurahman, 2005).

As a result, the currency market started collapsing and the resultant inflation overvalued the Somali shilling, which pushed the emergence of a thriving parallel market that encouraged many traders to smuggle Somali banknotes to overseas. As illustrated in Figure 1.5, the gap between the official and black market rates has been growing in the late 80s, which shows how sever the currency crisis was.



Source: Abdurahman (2005)
Note: *this figure shows the difference between the official exchange rate and the black market rate and how the gap between the two rates was widening in the 80s as shown in the figure. Before 1981, there were no black market, thus, people used the official rate formally or informally. However, after 1981, a thriving black market started, where people can get a high exchange rate. As a result, the use of black market for seeking exchange rate services became common in Somalia until the government collapsed in 1991.*

Figure 1.4 Official Rate Vs Black Market Rate (1975-1987)

While the government introduced trade restrictions and punishments to limit the operations of the parallel currency market, it could not stop the operations of the parallel market (Abdurahman, 2005). Unexpectedly, the military regime went into a situation of deep economic crisis after implementing IMF's Structural Adjustment Policy (Ihonvbere, 1994). As a result, the shilling has radically lost its value against foreign currencies including U.S. dollar (the exchange rate dropped down from SOS7/$1 to SOS4500/$1) (IMF, 1992).

Consequently, the economy of the country continued declining until the government collapsed in 1991 leaving the country in a state of chaos and civil war. Since that time, Somalia remained undeveloped and almost 40% of its population live less than one dollar a day (UNDP, 2002). Whilst Somalia has remained

undeveloped and its people have been suffering from poverty and poor economic conditions, yet, Somalia could possibly be developed and the economic conditions of Somali people may perhaps be improved very fast if Somalis rely on themselves and build their own country without being dependent on international aid assistance. One way to achieve such development (in a short time period) could be to encourage international trade and investment by opening the economy and liberalizing its markets in a manner that accommodates foreign traders and investors effectively and efficiently. One of the essential factors that may attract international trade and investment is to have stable FX market, where traders and investors can have access to stable exchange rate services. In order for the government to maintain the stability of the FX market, they should thoroughly understand changes and fluctuations taking place in the market. The purpose of this study is to enhance understanding of Somalia's unregulated exchange rates and the empirical factors explaining its volatility.

After years of hardship and suffering due to lack of regulated markets that provide basic financial services such as exchange rate, money transfer and saving, the only choice left for Somali people (to meet their financial service needs) was to build and develop their own financial system, which provides them sustainable financial services. This was behind the evolution of Somalia's current unregulated FX market. The term "Unregulated market", which means black market or parallel market, has been used in the literature. While examining the economy of Taiwan and its foreign exchange market, Wade (1990) described the Taiwan black exchange rate as unregulated market exchange rate. In addition, Wade (1990) argued that though the difference between the official exchange rate and the unregulated exchange rate is a convenient, it is an imperfect indicator of exchange rate distortion because the

unregulated exchange rate is sensitive to couple of things including amount of policing, penalties and etc.

Unlike Somalia's regulated FX market that was properly regulated and effectively supervised by Somali central government[3] before state collapse in 1991, the current unregulated FX market experienced some exceptional fluctuations. Since there is no regulated FX market, Somali[4] people started using unregulated FX market for their FX needs after the state collapse in 1991.

Following to the fall down of the Somali central government, the country's central bank stopped functioning and as a result the national currency (Somali Shilling) was being issued by nongovernmental authorities such as warlords and businessmen (Luther & White, 2011a). While Somali traders export local products, mainlylivestock[5], to East Africa and Arab states, the economy is characterized of being small and open in which most of the necessities are imported (Abdurahman, 2005).

As Somalia's monetary authority is yet to fully oversee the operations of FX market and there is no other effective regulatory body that monitors the operations of the FX market, researchers have raised several relevant questions.These questions include; (1) is the market integrated with the regional and international FX markets? (2) What are the factors affecting Somalia's FX market? (3) How is the market vulnerable to external shocks? Answering these and other relevant questions will have important implications to the practitioners as well as policy makers.

[3] The value of the domestic currency was fairly stable and the exchange rate swings were immediately handled

[4] Somalia is considered as an emerging or developing economy in accordance with IOHA2012 (http://www.ioha2012.net/?page_id=1945)

[5] Livestock is an essential sector of the Somali economy and it constitutes an estimated 40% of Somalia's GDP and 65% of its exports (CIA, 2006; Leeson, 2007b)

1.2.1 Exchange Rate Volatility

Volatility is defined, in finance, as a measure for variation of price of a financial asset over a period of time. Historic volatility and implied volatility are the common types of volatility. Historic volatility is calculated on the basis of time series of past market prices, whereas implied volatility is based on market price of a market traded derivative. Since volatility is a measure of variation, it's commonly used as tool of risk assessment. As volatility is a measure of variation, it can occur in any security that rises or falls in value and it can be affected by market microstructure (Roll, 1984). Currencies are one of the mostly traded financial assets in the financial markets and since currencies appreciate or depreciate in value, its volatility is a major concern among traders and investors of each country. Exchange rate volatility can be defined as the tendency of a currency to rise (appreciate) or fall (depreciate) in value and this has not only immediate effect on the profitability of the currency traders but also foreign traders and investors. As exchange rate volatility is difficult to avoid in some circumstances, there are some tools to manage their volatility including futures, which can help mitigate the effects of price change.

As mentioned by Chit et al. (2010), there is no universal consensus among the researchers on what are the appropriate proxies used to measure volatility of exchange rates. As volatility is a latent variable, the following three different measures are used repeatedly when measuring volatility of exchange rates: The first measure is the standard deviation of the first difference of the long real exchange rate, which can be expressed as follows[6]:

$$VOL_{ijt} = \sqrt{\sum_{t=1}^{m} (\Delta e_{ijt} - \Delta \bar{e}_{ijt})^2 / m - 1} \qquad \textbf{(1.1)}$$

[6] See Dell' Ariccia (1999) and Chit et al. (2010)

whereVOL_{ijt}represents the volatility of Somali Shilling (*j*) in terms of US dollar (*i*), and Δe_{ijt} is the first difference of the log periodic exchange rate, and *m* is the number periods in a year.

The second measurement used for volatility of exchange rates is the moving average standard deviation (MASD) of the periodic log bilateral real exchange rate, which follows this equation[7]:

$$VOL_{ijt} = \sqrt{\sum_{k=1}^{m} \left(e_{ijt-k-1} - e_{ijt-k-2}\right)^2 / m} \qquad \textbf{(1.2)}$$

wheree_{ijt} is the log bilateral exchange rate, and *m* is the order of moving average.

The third volatility measure is based on GARCH model, which allows capturing volatility clustering. This measure follows the following model:

$$h_{it} = \beta_0 + \beta_1 \mu_{it-1}^2 + \beta_2 h_{it-1} + \varepsilon \qquad \textbf{(1.3)}$$

Where h_{it} is the conditional variance (volatility), β_0 is the mean, μ_{it-1}^2 is one-period lag of the squared residual from the exchange rate equation, which represents news about the volatility from the previous period (ARCH term), and $h_{it-1}$is the last period's forecast error variance (the GARCH term)[8].

This study measured the volatility of Somalia's unregulated exchange rates employing GARCH and two of its family members. This model enables to measure volatility in a systematic way and its limitations can be solved by employing some of its extended models.

Although there are many issues that need to be addressed in the context of Somalia's unregulated FX market, the scope of this study is limited to internal and

[7] See Klaasen (2004) and Chit et al. (2010)
[8] Sauer and Bohara (2004), Clark et al. (2004) and Chit et al. (2010)

external factors that can contribute to the volatility of the Somalia's unregulated exchange rates. Thought various internal factors might need to be taken into consideration when discussing the internal factors that can affect the volatility of Somalia's unregulated exchange rates, money supply, speculation, trade and domestic prices are considered as key internal factors that have direct or indirect effect on the volatility of the exchange rates in Somalia. On the other hand, the volatility of SOS/USD might be caused by external factors such as oil price, gold price, world food price, regional stock price and global stock price. As Somalia is a trade based economy[9], the volatility of regional and global stock and commodity markets may have an effect on the volatility of Somalia's exchange rates since shocks in these markets might be transmitted directly or indirectly to Somalia's FX market through different channels. It has been argued that due to the globalization effect, financial markets are integrated, thus, shocks and events are transmitted from a market to another (Schmukler & Vesperoni, 2006).

1.2.2 Volatility of SOS/USD and Internal Factors

Thought various factors might need to be taken into consideration when discussing the internal factors that can affect the volatility of Somalia's unregulated foreign exchange market, money supply, behavior of speculators, trade and domestic prices might be considered as potential internal factors that have direct or indirect effect on the volatility of the exchange rates in Somalia.

Following to the fall down of the Somali central government, the country's central bank stopped functioning and as a result the national currency (Somali Shilling) was being issued by nongovernmental authorities such as warlords and

[9] According to Leeson (2007), Somalia accounted for more than 60% of all livestock exports in East Africa in 1990s

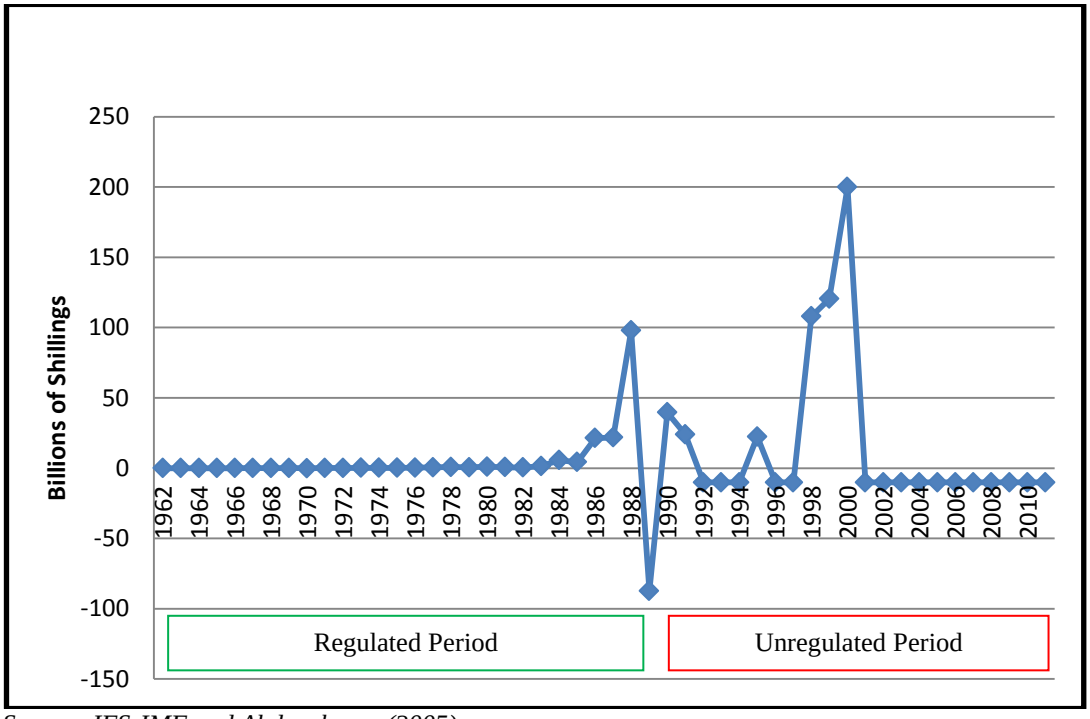
businessmen (Luther & White, 2011a). While Somali traders export local products, mainly livestock[10], to East Africa and Arab states, the economy is characterized of being small and open in which most of the necessities are imported (Abdurahman, 2005). There are several issues that need to be addressed here as these issues may contribute to the volatility of the Somalia's unregulated foreign exchange market.

Firstly, issuing a currency without regulatory authority may possibly lead into a state of total currency collapse as it can be observed from Figure 1.7, where the supply of money unevenly increased as businessmen utilized the absence of government authority and printed more money without considering the money supply needs of the country. If such events occur, the market remains un-equilibrium and the volatility of the exchange rates affects the real sector (goods and service) leading into huge business losses and unbearable inflation (W. J. Luther, 2012). Historically, the late Mohamed SiadBarre's government started printing more money in 1980s to cool down the national economic crisis of that time. However, the policy had resulted undesirable outcome as the currency market went into deep crisis and the national currency lost its value against foreign currencies (Abdurahman, 2005). The issuance of Somali banknotes was not stopped following the collapse of Central Bank as faction leaders and businessmen competed over printing Somali banknotes. General Aideed and businessmen close to him issued the largest amount of banknotes supplied to the economy in 1990s by using Canadian banknote printing companies (Mubarak, 1997).

In 2001, businessmen associated with the Transitional National Government led by former president, Abdikasim Salad, imported billions of Somali banknotes to the economy (Abdurahman, 2005). As a result of such polluted monetary policy, the

[10] Livestock is an essential sector of the Somali economy and it constitutes an estimated 40% of Somalia's GDP and 65% of its exports (CIA, 2006; Leeson, 2007b)

money supply of the country is expected to be very volatile[11] as shown in Figure 1.7 particularly after the collapse of the central government. Though there are little accurate statistics during this period due to the absence of national monetary authority, it's evident from the available data that the increase of money has an effect on exchange rate movement (Abdurahman, 2005). From Somalia's total stock of money, it can be observed that the trend of money supply is very ugly, which indicates poor policy making and monetary side miscalculations.



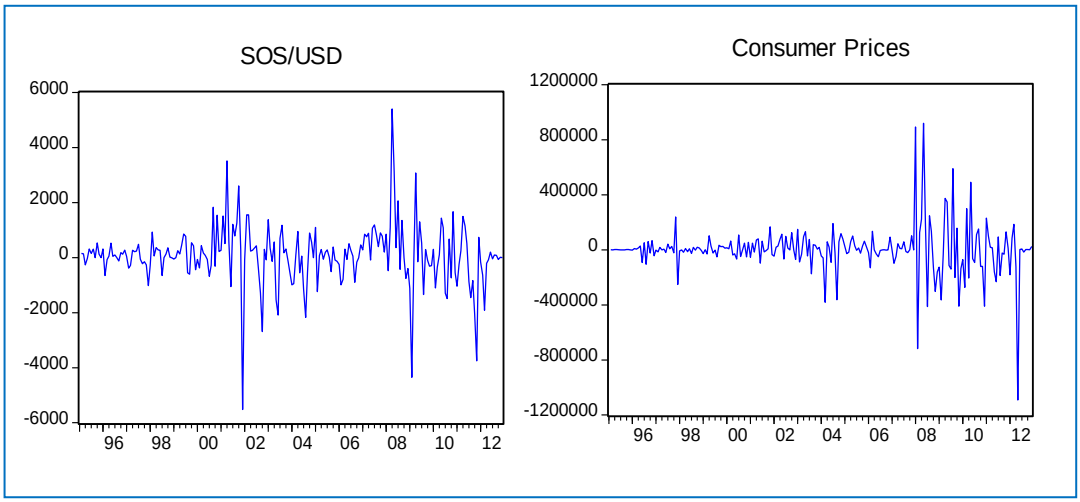
Source: IFS-IMF and Abdurahman (2005)
Note: *The figure shows the 1st difference of Somali money supply (M2) since 1962. Since the data are in difference, values are zero when there is no change and they are either above or below the zero line when there is change. If the money supply of 1990 became zero, this means the amount of money supply went down in 1990 compared to 1989.*

Figure 1.5 Money Supply

Secondly, as Somalia's foreign exchange market has been functioning without monetary authority that regulates, supervises and protects the national market (W. J. Luther, 2012), the possibility of establishing speculators whose interest is to make huge profits by excessively decreasing or increasing the value of the local currency

[11] For further details, please refer to chapter 2.

in accordance with their plan is most likely. Nevertheless, uncontrolled currency speculation can lead into currency crisis and short-term or long-term speculation bubbles (Abdurahman, 2005). This currency crisis may sometimes be in the form of basic commodity price bubbles as it has been observed in 2008 and 2011 in which exchange rate fluctuation is accompanied by commodity price fluctuations. See Figure 1.8.



Source: FSNAU
Note: *both exchange rate and consumer prices are in 1st difference, thus, indicating the changes of the series over the time. The data indicates the existence of high fluctuations in 2008 and 2012 in both series.*

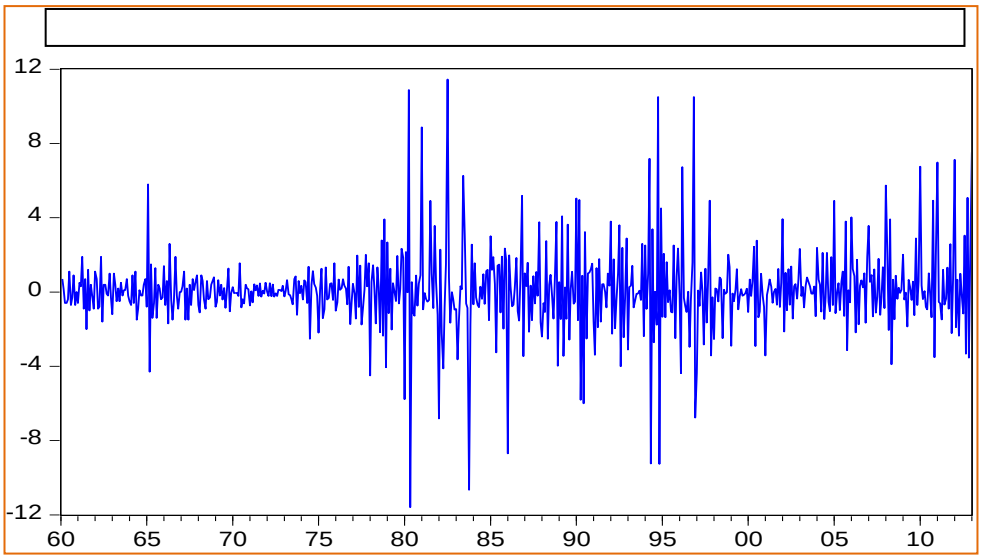
Figure 1.6 Exchange Rates and Consumer Prices

Moreover, speculative attacks erode the value of the government's foreign reserve until the government becomes unable to defend its exchange rate; then, the currency will automatically start depreciating. In the case of Somalia where there is no effective monetary authority and the government's foreign reserve is very weak, speculative attacks can easily penetrate the foreign exchange market. To capture the behavior of speculators, hot money is used. Hot money is described as the flow of funds from a country to another to earn a shorter profit on either interest rate differences or anticipated exchange rate shifts and these capital inflows are called "hot money" because they move very quickly in and out of markets (Martin &

Morrison, 2008). These speculative capital inflows potentially lead to market instability (Martin & Morrison, 2008).

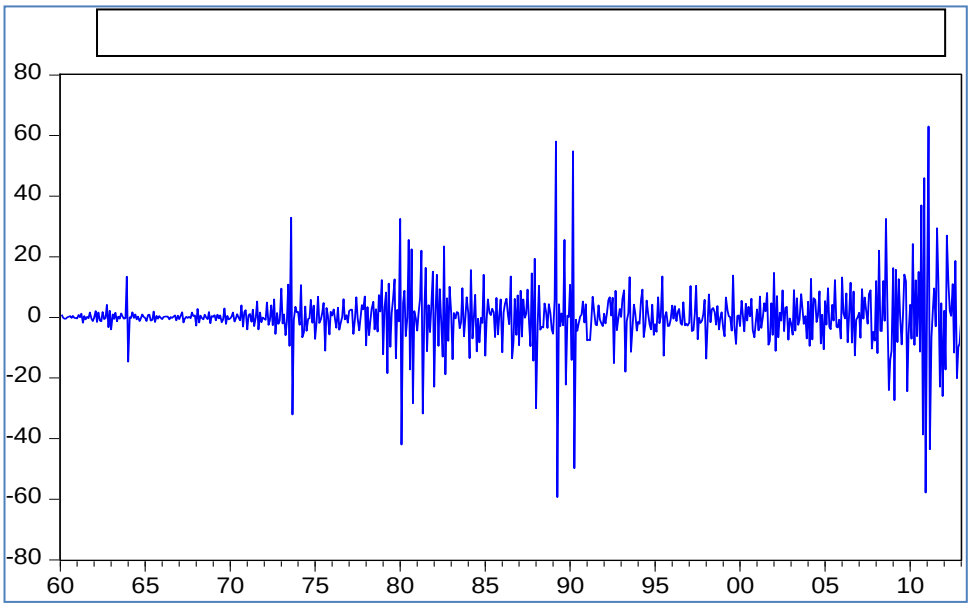
Thirdly,the stability of Somalia's foreign currency exchange market is vital for the economy of Somalia as the economy of the country is mainly dependent on trade (export and import). According to Abdurahman (2005), a small and open economy such as Somalia, in which most of the necessities are imported, a depreciating currency increases the prices of basic commodities and consequently erodes the purchasing power of the people. Although USD has been used as a medium of trade exchange for large transactions in the past 20 years, livestock and agriculture markets are not affected by this behavior and traders in these markets have remained using Somali shilling as the basis of their transactions. Furthermore, these two sectors of the economy are considered as the main suppliers of both Somali shilling and US dollars in the domestic foreign exchange market since traders need to convert their US dollar (from export proceeds) to Somali shilling before they go to the livestock or agriculture markets.

On the other hand, as the main necessities are imported and consumers use local currency for the purchase of their daily necessities, importers need to convert their SOS into USD to import from overseas. Livestock, agriculture and consumer markets can be important contributors to the volatility of SOS/USD. Though the link between Somalia's FX and trade is observable, very little is known whether trade (import and export) have some effect on the volatility of FX market. As shown in Figure 1.9 and 1.10, Somali imports and exports have been volatile especially in 1980s, 1990s and after 2005.



Source: IMF - Direction of Trade Statistics
Note: The figure illustrates the 1st difference of Somali imports since 1960. As shown in the figure, the imports to Somalia have fluctuated over the time. There were huge changes in 80s, 90s and after 2005.

Figure 1.7 Somali Imports (1960-2012)

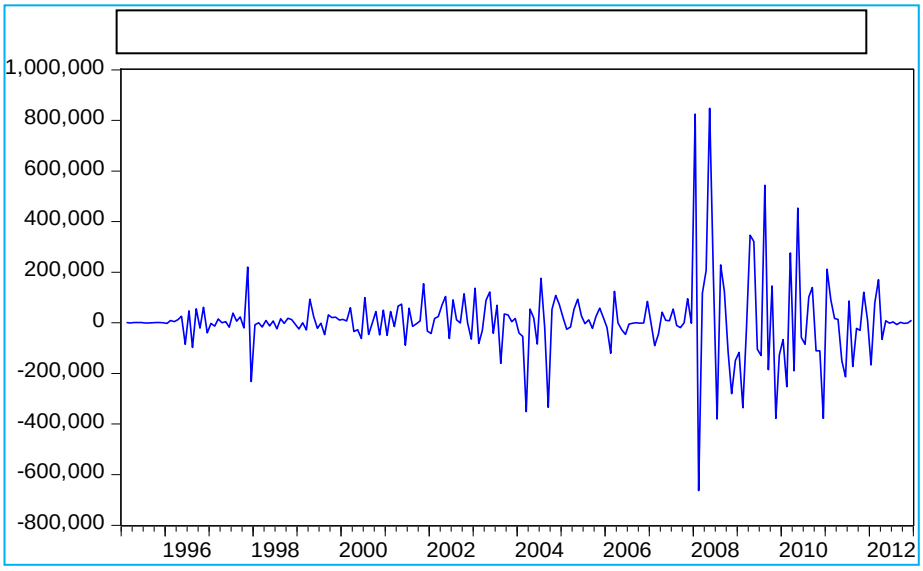


Source: IMF - Direction of Trade Statistics
Note: the data, which are in 1st difference, show that Somali exports have fluctuated historically and there were huge fluctuations in 80s, 90s and after 2010.

Figure 1.8 Somali Exports (1960-2012)

Fifthly, as Somalia is a small and open economy, which is dependent mainly on imports, consumer prices are considered one of the essential economic indicators of the country. Consumer prices may possibly provide important implications for urban consumers. Figure 1.11 illustrates Somali domestic prices become volatile after

2000. As Somali domestic prices fluctuate over time, they may contribute to the volatility of the exchange rates directly or indirectly.



Source: FSNAU
Note: the figure depicts local prices changes since 1996. As illustrated in the figure, the country is suffering from huge prices changes since 2008.

Figure 1.9 Somali Domestic Price Changes (1995-2012)

1.2.3 Volatility of SOS/USD and External Factor

The volatility of SOS/USD may probably be caused by external factors including stock, and commodity markets. As Somalia is a trade based economy[12], the volatility of oil price, gold price, world food price, regional stock and global stock markets may possibly have an effect on the volatility of Somalia's exchange rates since shocks in these markets might be transmitted directly or indirectly to Somalia's FX market through different channels. It has been argued that due to the globalization effect, financial markets are integrated, thus, shocks and events are transmitted from a market to another (Schmukler & Vesperoni, 2006).

Many empirical studies have been conducted examining whether there is correlation between exchange rate and stock markets. While using Markov-

[12] According to Leeson (2007), Somalia accounted for more than 60% of all livestock exports in East Africa in 1990s

Switching EGARCH model, Walid, Chaker, Masood, and Fry (2011) provide evidence that the relationship between stock and foreign exchange markets is regime dependent. This concludes that volatility in the stock market reacts asymmetrically to events in the foreign exchange market. Similarly, Wua, Lub, Jonoc, and Perezd (2012) found that there is stable long-term relationship between USD exchange rate and the stock market in the context of Philippine's stock market.

Equally, commodity markets such as oil and gold have direct link to foreign exchange markets. Oil is considered one of the vital commodities for the global economy and its price dynamics has influence on all economic activities as it affects both real and financial sectors. Aloui, Aïssa, and Nguyen (2013), found the existence of a significant and symmetric dependence between oil prices and exchange rates. While using monthly panel of the G7 countries, Chen and Chen (2007) proved that exchange rates are cointegrated with real oil prices. Similarly, both theoretical and empirical studies on the relationship between gold and exchange rates indicate the existence of linkage between these markets. However, the degree and direction of linkages are different across currencies (Sjaastad, 2008; Sjaastad & Scacciavillani, 1996). In their study, for example, Pukthuanthong and Roll (2011) found the existence of negative relationship between gold and the US Dollar. While using the FAO cereal price index, Shortland (2011) found that international rise in food prices that took place in 2008 had some effects on the depreciation of the Somali shilling (SOS). It can be established from these studies the existence of relationship between exchange rates and commodity prices such as oil, gold and food.

As Somalia is part of the global economy and its economy is based on trade, it is FX market might be directly or indirectly affected by the shocks in the regional and international markets. Reports from IMF staff notes indicate how Sub-Saharan

African economies are being hit by the recent global financial crisis. The report suggest that these countries can overcome the effect of this crisis through effective fiscal policy formulation (Berg et al., 2009). Similarly, OECD's 2010 report on the impact of global financial crisis on fragile states illustrate that these states are suffering from the cumulative effect of three consecutive and inter-related shocks (food price crisis, escalating oil prices and the global financial crisis).

This indicates that fragile economies are more integrated into the world economy than previously thought (OECD, 2010). Apart from the effect of these crisis on development assistance, remittance, trade, and foreign direct investment, these states experienced depreciation in the value of their currencies caused by exchange rate movements (OECD, 2010). As Somalia is part of Sub-Saharan Africa, it may possibly not be safe from the effect of the global financial crisis and as it is stated in the report, Sub-Saharan African states are more integrated into the world economy than previously thought. Hence, volatilities in global equity and commodity markets are more likely to be transmitted into Somali economy, which is possibly contributing to the volatility of SOS/USD.

Alternatively, Somalia's exchange rates are possibly affected by volatilities of the regional and international foreign exchange markets due to several reasons. Firstly, Somali economy is mainly dependent on imports; thus, exchange rate movements in international FX markets most likely affect the domestic markets including the FX market. Secondly, Somalia's FX market is likely to be affected by the regional and international FX markets as Somali currency traders directly or indirectly linked to currency traders in other countries. Thirdly, as there is no central bank that regulates and supervises the FX market, the only benchmark left for the players of the domestic FX market to value the domestic currency is to use the