ERF 2020
26TH Annual
Conference

The Dynamic Interaction of Exchange Rates and International Trade Flows in the MENA Region: GARCH Analysis

Marwa Elsherif & Mahmoud Mohieldin

ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية

The Dynamic Interaction of Exchange Rates and International Trade Flows in the MENA Region: GARCH Analysis

Marwa Elsherif [1] *Mahmoud Mohieldin*[2]

Abstract

This study examined the dynamics between real exchange rate volatility and the level of international trade in the MENA region, by employing Generalized Autoregressive Conditional Heteroscedasticity (GARCH) (1,1) and threshold-Generalized Autoregressive Conditional Heteroscedasticity (TGARCH) (1,1) models to measure the exchange rate volatility on panel annual data from 1990 to 2018. The study is also used Augmented Dicky Fuller (ADF) and Johansen Cointegration tests to check for stationarity of data and detect the long run cointegration between variables under study, respectively. Additionally, the paper examines the impact of other control variables on international trade, namely (i) economic freedom; (ii) inflation rate; (iii) interest rate; (iv) reserves; and (v) industrial development. The results revealed that, in the long-run, exchange rate volatility negatively affects international trade significantly in the sample countries, which is in line with economic theory, arguing that exchange rate volatility may hurt international trade. The paper is divided into six sections. Section I is the introduction. Section II briefly presents a literature review on links between exchange rate volatility and international trade. Section III then illustrates recent development in the Middle East and North Africa region. Section IV discusses the methodology of the analysis as well as the data. In section V, results of the econometric estimations are presented. Section VI reports some conclusions of the paper.

JEL Classification: C33; F10; F31; O47
Keywords: Exchange Rate volatility; International Trade; MENA; GARCH; Granger Causality

1. Introduction

The role of exchange rate and its impacts on macroeconomic performance is a subject of debate in literature and a core area of interest to economists, finance experts, and policy makers[3]. Most economists share the view that exchange rate stability enhances foreign investment, international trade, and economic growth[4]. The exchange rate plays an important role in a country's trade performance. Whether determined by exogenous shocks or by policy, the relative valuations of currencies and their volatility often have important repercussions on international trade, the

[1] Associate Professor of Economics, AASTMT, Egypt
[2] Professor of Economics and Finance, Faculty of Economics and Political Science, Cairo University, Egypt.
[3] Please see: World Bank. (1997), Goldstein and Mussa (1993). Rangarajan, C.(2000), Ibarra CA. (2004), De Vita G, Kyaw KS. (2008), and Jongwanich J, Kohpaiboon A. (2013).
[4] Please see: Combes J, Kinda T, Plane P. (2012). Calvo GA, Leiderman L, Reinhart CM. (1996). Razi A, Shafiq A, Ali SA and Khan H. (2012).

balance of payments, and overall economic performance (Nicita, (2013).

Theoretically, an ambiguous relationship is predicted as exchange rate volatility can either stimulate or depress trade (Cote, 1994; Odili, 2014). From a policy point of view, evidence of exchange rate uncertainty adversely affects trade balance especially in developing countries due to lack of hedging instruments which may compel governments to intervene in foreign currency markets. This is done in order to stabilize exchange rates as severe fluctuations in currencies can potentially affect the design of appropriate trade policies and thus undermine the achievement of specific economic goals such as export promotion and economic growth (Arize *et al.,*2000; Choudhry, 2008). The major policy of many economies exchange rate systems and trade policies, include, integrating the economy into the global market system, liberalization of trade and exchange rates to enhance competiveness of domestic industries, effective participation in trade negotiations to harness the benefits in the multilateral trading system, adoption of appropriate technology and support of regional integration and co-operation.

International trade is therefore reflected in the sequence of various exchange rate and trade policies employed over time. The unabated problems of exchange rate uncertainty, the fall in price of oil and the attendant economic depression, heralded the introduction of structural adjustment programs. As a result, trade and exchange rate policies were liberalized. (Obiora and Igue, 2006; Odili, 2014).

Research work on exchange rate volatility and international trade in MENA is scanty. Despite the fact an abundance of literature exists on international trade inflows, exchange rate, and growth in emerging countries, there is still a paucity of empirical studies on the dynamic interaction between the aforementioned variables. Against this background, this paper examines the impact of real exchange rate volatility on the international trade volume of 15 MENA economies from 1990–2018, and whether structural changes have weakened the impact of exchange rates on tradeusing the GARCH model.

2. Literature Review on Exchange Rate and International Trade

While much literature shows the significant impact of the exchange rate level and its volatility on trade, a myriad of research also points to ambiguous and counterintuitive results (Aristeriou, Masatci, & Pilbeam, 2016; Dell'Ariccia, 1999; Mukherjee & Pozo, 2011; Rose, 2000). Bacchetta and van Wincoop (2000) analyzed the relationship and found that the shocks causing changes in the exchange rate can lead to changes in other macroeconomic variables, which could offset the impact of exchange rate on trade. Alternatively, Koren and Szeidl (2003) looked at the covariance in the movement of exchange rates and key macroeconomic variables and found that what matters is not exchange rate volatility but rather how it magnifies or moderates the risks faced by firms or consumers. Aristotelous (2001) and IMF (2004) used a gravity equation specification to estimate

the impact of exchange rate volatility on trade and their empirical findings suggested that exchange rate volatility has no effect on export volumes.

One criticism of empirical work using exchange rate volatility is that volatility itself is not a critical issue for international trade as there are financial instruments that firms can use to hedge against this risk (Ethier, 1973); further, the presence of fixed costs in exporting (Franke, 1991; Krugman, 1989) undermines the relevance of the volatility of exchange rates on trade. UNCTAD (2013) investigated this issue by comparing two models – using (i) exchange rate volatility; and (ii)exchange rate misalignment (i.e., the difference between the observed real effective exchange rate (REER) and that rate adjusted for the Balassa-Samuelson effect), respectively. Using simple panel analysis, their results confirmed earlier findings that there is no effect of exchange rate volatility on trade; however, they do find a significant effect of currency misalignment, revealing that undervaluation results in a promotion of exports and a restriction of imports. Huchet-Bourdon and Korinek (2011) found that exports are more sensitive to changes in REER levels than their volatility, and the effect is more pronounced in the agriculture sector exports.

Gala (2008) reviewed the role of competitive currencies in the economic growth of East and Southeast Asian economies. Marquez and Schindler (2006) investigated how the real exchange rate affected the People's Republic of China's (PRC) share in world trade, suggesting that appreciation of the renminbi lowers the PRC's share in aggregate exports and increases its share in aggregate imports with smaller impact. Appuhamilage and Senanayake (2010) studied the bilateral exports of Sri Lanka and the PRC and concluded that the depreciation of Sri Lankan rupee against the Chinese renminbi had a significant positive effect on exports of Sri Lanka to the PRC, while the depreciation had negative effects on its imports from the PRC. Baek (2012) studies exports and imports of 71 products between the US and the Republic of Korea and concluded that exports and imports of the Republic of Korea from the US are affected by exchange rate levels. Hooy, Law, and Chan (2015) also used sector-level data to assess the impact of the Chinese renminbi on the exports of the Asean – as major trade partners in the global supply chains of the PRC; the results pointed to the significant positive impact of real exchange rate depreciation on exports of high-technology and medium-technology final and intermediate goods. Thorbecke (2006) found that exchange rate appreciation in developed Asia – as a result of the depreciation of the US dollar – could possibly disrupt complimentary trade relationship with developing economies in Asia, especially in technology intensive goods. Thorbecke and Kato (2011) explored a particular segment of exports (i.e., consumption goods), and their estimates suggested that an appreciation of the Japanese yen led to a reduction of consumption exports of Japan. Another strand of research considered the relationship between exchange rate level and international trade volume, after excluding the volatile price factor. Since academic and policy debates have revived and shifted from exchange rate volatility (nominal or real) to the real exchange rate level, concerns about global external imbalances, slow recovery, and the impact of sustained currency misalignments have arise (WTO, 2011). In other words, depreciation traditionally increases a

country's exports and reduce imports due to changes in terms of trade and the effect of price elasticity of demand. However, new patterns of international trade, for example, render the effect of exchange rates on trade as more complex than before. Findings in Ollivaud, Rusticelli, and Schwellnus (2015) and Ahmed, Appendido, and Ruta (2015a) suggested that the elasticity of manufacturing export volume to the real effective exchange rate decreased over time (Ahmed, Appendido, & Ruta, 2015b). But literature on this issue is still in its infancy.

IMF (2015a) provided a comprehensive analysis on the effect of the real exchange rate level on prices of traded goods and on trade volume, and whether the relationship among these variables were stable. Its findings supported evidence in earlier literature suggesting that currency depreciation led to lower export prices paid by foreigners and higher import prices, and these price changes in turn led to a rise in exports and a fall in imports. They also found that the increase in exports is higher when the exporting economy has a weaker financial system, especially in cases of banking crises. While the IMF found evidence to support the weakening relationship of exchange rate and trade due to global value chains for some economies, overall, little evidence is found on the hypothesized disconnect between trade and exchange rates. Structural factors, however, could also affect the exchange rate impact on trade. Some factors found in the literature include import composition and an economy's short-term external debt exposure.. Campa and Goldberg's (2005) empirical study found that an increase in the trade of primary goods as opposed to processed goods could lead to a stronger impact on exchange rates, and a shift to manufactured imports has contributed to the weakened link between the exchange rate and trade. The findings of Kearns and Patel (2016) suggested that high external debt could offset the effect on trade of exchange rate movements. Theoretically, changes in trade volume should capture this effect better than trade value by looking at the pure elasticity effect, and excluding the short-term, terms-of-trade effect.

The literature review approaches a general framework where exchange rate has a significant influence on the decisional process within the international trade practices, an instant reaction of the participants to international trade being possible when these fluctuations are very high, while a long-term appreciation or depreciation would influence international trade policies. In specialized literature, it is widely recognized that the exchange rate volatility tends to reduce the volume of international trading. Abrahams (1980) as well as Thursby and Thursby (1978) have observed a negative effect of exchange rate volatility on trading, while Hooper and Kohlhagen (1978) did not signal significant effects on trading but an important effect on products and prices in services. Thereafter, studies including those of Frankel and Rose (1996) and De Grauwe and Skudelny (1996), reported small or insignificant negative effects. Some studies tried to examine reverse causality, namely whether the exchange rate volatility can be diminished by the agency of international trading. In the analysis of optimal foreign currency zone, Mundell (1996) monitored primarily the reverse relation of causality, in which he observed trade flux diminished the volatility of the exchange rate. Over more than a decade ago, Hau (2000); Obstfeld et al. (1996) and Obstfeld

and Rogoff (2000), respectively, presented stochasticmacro-economic patterns for open economies, with nominal inflexibilities, to demonstrate the fact that economic opening and volatility of the exchange rate are counter-dependent.

Empirical arguments, formulated by Hau (2000) and Calderon (2004), validate this relation. At the dawn of 1970, the global economy experienced a growth in the level of integration of international financial markets bringing about changes such as the removal of capital control and the de-regulation of domestic financial markets. The improvement of the international communication network and informational technology also led to the natural removal of barriers posed by international financial transactions, as well as the obliteration of the difficult absorbance of direct foreign investment and trading (Obstfeld 1998; Baldwin and Martin, 1999).

Another important approach of specialized literature related to the impact of the exchange rate on international trading is furnished by the flexibility theory presented by Marshall and Lerner; the theory suggests that currency depreciation involves changes within the evolution of payment balance from consumer goods to prices of services involved in international trading. Meese and Rogoff (1983) indicated that, of all the above-referenced factor categories,, some have a short-term influence, while others, such as economic factors, influence the exchange rate evolution in the medium to long term. Depending on these considerations, the determinants of the exchange rate evolution can be fundamental or temporary[5].

The importance of these factors is highlighted by Beckman et al. (2010), who argue that their assertation holds true even if one accepts the absence of a long-term stable relation between the currency exchange rate and fundamental factors. Duarte and Stockman (2005) analyzed the exchange rate from a cost price perspective. In this dimension, the authors emphasized that the definition of the exchange rate is not conditioned by the evolution of international trading, as it is independent from former, present, or estimated values of macro-economic variables. Babecky et al. (2009; 2010) identified the many positive effects of direct foreign investments[6]. Frommel et al. (2005) showed that between 1973–2000, the inflation differential between partners from countries implicated in international trading, determined alteration of the exchange rate, one of the macro-economic factors with the most significant effects on the national currency's exchange rate. In the context of high inflation, it produces instability, where effects can be observed in the appreciation of national currency[7].

[5] The determinant factors, which usually have a medium to long term influence, are monetary matter, gross domestic product, rate of interest, rate of inflation and payment situation (Inci and Lu 2004).

[6] These positive effects include development and consolidation of financial markets, mending of payments' balance situations, the decrease of current account or stock account deficit, and appreciation of the effective exchange rate in a sustainable manner, respectively.

[7] In today's setting, when loans' denominations become important for assurance of efficient reimbursement, governmental and monetary authorities' actions must be based upon the following: assurance of financial stability to the detriment of indebtedness policies; stress upon short-term loans, denominated in national currency; and cautious handling of short and long-term debt denominated in foreign currency.

Bourguinat (2007) indicated three factors that contributed to built-up interest in the exchange rate and competitiveness, respectively, which influenced the approaches regarding the relation between these two variables, namely de-compartmentalization, de-regulation, and de-intermediation. These factors developed after the expansion of financial market department functions such as involvement of banks in various investment operations, removal of overplus regulations that determine the occurrence of serious difficulties of financial markets' development or the de-intermediation that refers to stock market involvement in business environment financing. This caveat has been previously studied by authors such as Combes (Combes et al. 2012), who empirically analyzed the exchange rate, authenticating its direct effect on incoming foreign funds (foreign investments). Moreover, Héricourt and Poncet (2015), conduced econometric studies that suggested developing countries should be cautious pertaining to relaxation in the exchange rate and embrace of the floating exchange rate, which can be dangerous for international trading performance without a highly developed financial system.

Different theories exist in literature regarding the impact of exchange rate volatility on exporter behavior. An increase in exchange rate volatility may be coupled with either an increase or a decrease in the volume of exports, given plausible alternative assumptions. Traditionally, it has been argued that exchange rate volatility has a negative influence on exports, as articulated by Clark (1973). In other words, the volume of production, and hence exports, would be reduced in this instance. This simple model is also developed by a number of authors, for example, Baron (1976b) and Hooper and Kohlhagen (1978), also pointed to the same conclusion in which exchange rate volatility has a negative effect on exports. However, all of the aforementioned conclusions result from several restrictive assumptions[8]. However, this is not the case with advanced countries, in which such markets are well-developed. For risk-adverse entrepreneurs who can hedge their contracts, a higher exchange rate volatility would not always deter exports, as noted by Ethier (1973) and Baron (1976a). Furthermore, companies can minimize exchange rate risk in other ways - take multinational cooperation to be a good case in point. Being involved in a wide range of trade and financial transactions over numerous countries would see an abundance of diverse opportunities to offset the movement of a bilateral exchange rate, such as the variability of other exchange rates or interest rates.

[8] One obvious criticism of the traditional models is that the exporter's risk exposure is attributed solely to the exchange rate volatility, whereas it may depend on the availability of hedging techniques, diversification possibilities, the existence of imported inputs, and other factors. The rationale of this assumption is that forward exchange markets are just in infancy or even not appear in developing economies. In addition, transaction hedging may prove relatively expensive and challenging for some manufacturing firms with a long time between order and delivery.

3. MENA Recent Developments

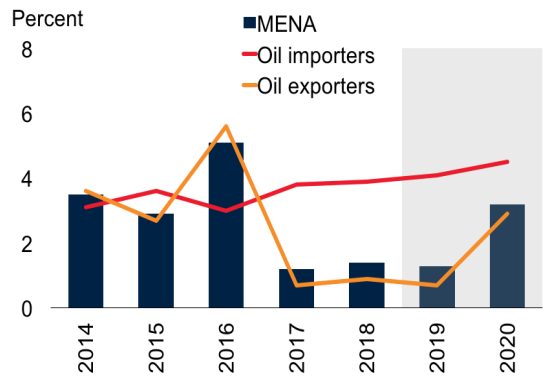
The World Bank's MENA aggregate includes 15 economies and is grouped into three sub-regions. Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates comprise the Gulf Cooperation Council (GCC); all are oil exporters. Other oil exporters in the region are Algeria, the Islamic Republic of Iran, and Iraq. Oil importers in the region are Djibouti, the Arab Republic of Egypt, Jordan, Lebanon, Morocco and Tunisia. Libya, Syrian Arab Republic, the Republic of Yemen and West Bank and Gaza are excluded from regional growth aggregates due to data limitations.

Growth in MENA is projected to remain subdued in 2019, at 1.3 percent. Activity in oil exporters has slowed due to weak oil sector output, and the effects of intensified U.S. sanctions on Iran, despite an easing of fiscal stance and positive prospects in non-oil sectors in some countries. Many oil importers continue to benefit from business climate reforms and resilient tourism activity. Regional growth is projected to pick up to around 3 percent a year in 2020-21, supported by capital investment and policy reforms. Risks to the outlook are tilted to the downside, including geopolitical tensions, reform setbacks, and a further escalation of global trade tensions (World Bank, 2019a).

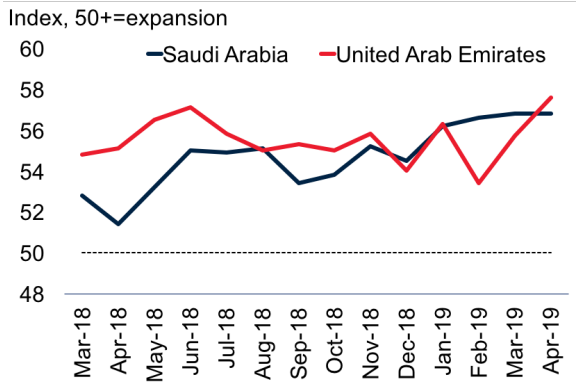
Growth is expected to remain subdued in MENA in 2019 (Figure 1.a). Among oil exporters, oil production cuts and a contraction in economic activity in Iran due to U.S. sanctions have weighed on activity. Growth is improving modestly in oil importers as policy reforms progress, despite long term structural challenges. While easing external financing conditions have supported regional growth, weakening external demand has softened export prospects. Oil exporters' growth has remained subdued. Oil production cuts implemented by OPEC and some non-OPEC members (OPEC+) to rebalance global oil markets have constrained oil sector growth in the Gulf Cooperation Council (GCC) economies; however, as suggested by rising Purchasing Managers' Indexes, non-oil activity in large GCC economies is picking up amid easier fiscal stances and higher government spending (Figure 1.b). Oil exporters' growth this year is also being dragged down by a further economic contraction in Iran as the effects of U.S. sanctions intensify and private consumption weakens. While high government spending has supported activity in Algeria, hydrocarbon sector activity has been muted. Current account balances have improved among oil exporters, supported by high oil prices in most of 2018.

Figure (1): MENA Recent Development

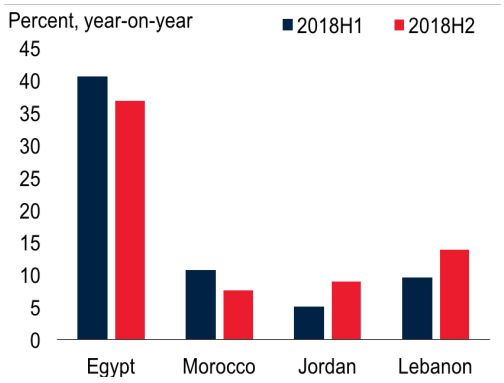
a. GDP Growth



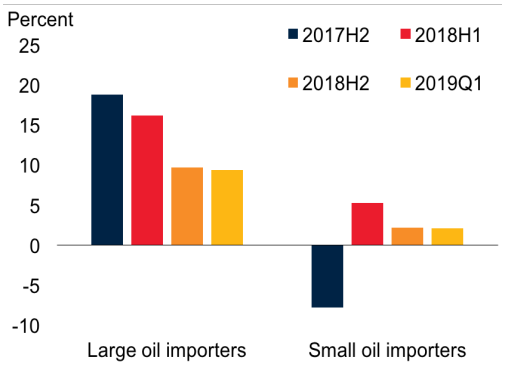
b. Composite PMI



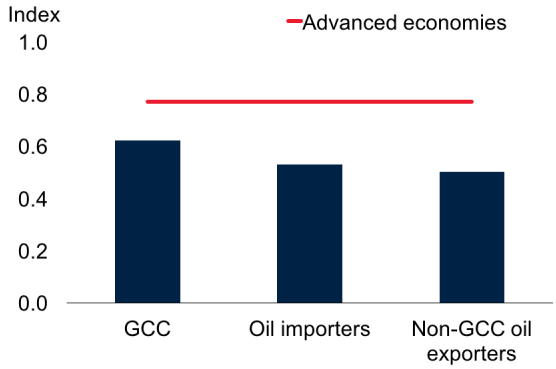
c. Tourism Growth



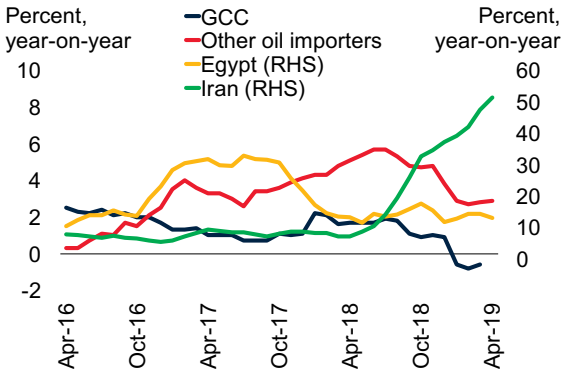
d. Good Exports Growth: Oil Importers



e. World Bank Human Capital Index



f. Inflation



Sources: Haver Analytics, International Monetary Fund, World Bank.

a. Shaded area indicates forecasts. Aggregate growth rates calculated using constant 2010 GDP weights.

b. Figure shows composite Purchasing Managers' Index (PMI). PMI readings above 50 indicate expansion in economic activity; readings below 50 indicate contraction. Last observation is April 2019.

c. Figure shows average year-on-year growth of 3-month moving sum of tourism arrival for the denoted periods. Last observation is end-2018.

d. Figure shows average year-on-year growth of 3-month moving sum of goods exports values. Large oil importers are Egypt, Morocco, and Tunisia; small oil importers are Jordan and Lebanon. "2019Q1" denotes January and February.

e. The Human Capital Index ranges between 0 and 1. The index is measured in terms of productivity of the next generation of workers relative to the benchmark complete education and full health. An economy in which a child

born today can expect to achieve complete education and full health will score 1 on the Index. Includes 6 GCC economies, 3 non-GCC oil exporters, and 6 oil importers.
f. CPI inflation rates. Other oil importers include Jordan, Lebanon, Morocco, and Tunisia, Last observation is April 2019.

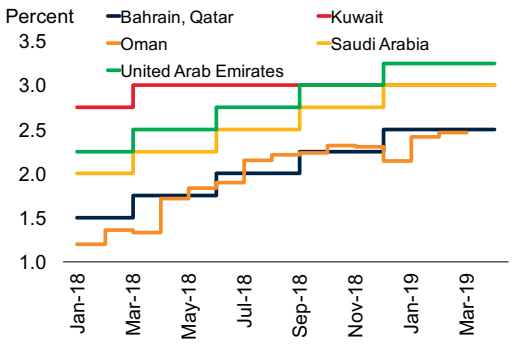
Growth has been steadily improving among oil importers, led by the largest economies. In Egypt, the largest country in this group, investment and natural gas output has remained strong (Youssef and Zaki, 2019). Tourism activity has been resilient and has supported the growth prospects of oil importers (Figure 1.c). However, export growth has softened somewhat as global demand weakened, particularly among small countries in this group (Figure 1.d). Oil importers continue to proceed with long-term adjustments, including areas that amend gaps in human capital development (Figure 1.e). Inflation is contained in most of the MENA region, with rates averaging less than 3 percent in the past year in the GCC countries and falling recently to about 3 percent in the smaller oil importers (Figure 1.f). Policy interest rates in these economies have mostly remained neutral. Moreover, in Egypt, inflation has subsided to about 13 percent (year-on-year) recently from a peak above 30 percent in July 2017; the Central Bank cut interest rates in February 2019. In contrast, Iran's inflation (year-on-year) has risen sharply from about 10 percent in mid-2018 to about 52 percent in April 2019, contributed by a depreciation of the Rial in the parallel market of more than two-fold compared to levels prior to the announcement of U.S. sanctions in April 2018. Financing conditions have eased this year as U.S. policy rate hikes pause and renewed risk appetite by international investors emerge. Bond issuance in the GCC remained robust this year, supported in part by Saudi Arabia's Aramco's bond debut. Government debt in many oil importers remains high, in some instances exceeding 100 percent of GDP, and continues to challenge their access to finance internationally via high credit risk.

The projected pickup over the next two years is largely driven by an assumed rebound in activity in Iran and by an expected ramping up of infrastructure investment in GCC economies. Growth in the rest of the region is projected to remain stable, with broadly resilient domestic demand in key economies partly offset by slowing external demand growth. Medium-term growth prospects are contingent on geopolitical tensions remaining contained and regional spillovers from conflict-ridden economies remaining limited. For oil exporters, growth in 2019 is expected to decrease slightly to 0.7 percent, with strengthening non-oil activity only partly offsetting constraints on oil sector activity. Growth is projected to pick up to 2.9 percent in 2020 before tapering slightly in 2021. The rebound in 2020 is partly driven by rising growth in Iraq as oil production increases. Stronger infrastructure investment (including an expansion of natural gas capacity in some economies), higher oil production, and eased financing conditions associated with slowed rate hikes are expected to support higher growth in GCC economies (World Bank 2019b; Figure 2.a). An improved regulatory and business environment in the GCC will remain supportive of private sector activity. Growth in Iran is expected to resume in 2020-21, albeit at weak rates, as the impact of U.S. sanctions tapers and inflation stabilizes. Algeria's growth is expected to remain subdued

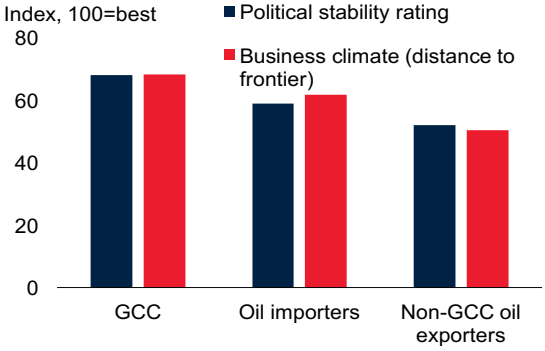
as an expected return to fiscal consolidation weighs on non-oil activity.

Figure (2): MENA Outlook

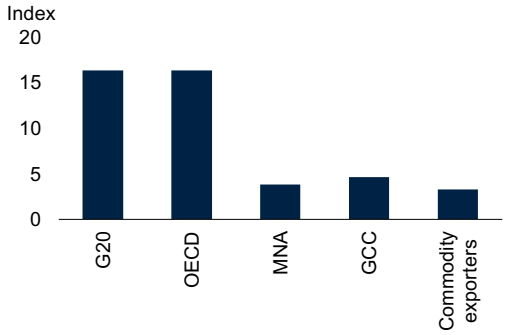
a. GCC Interest Rate



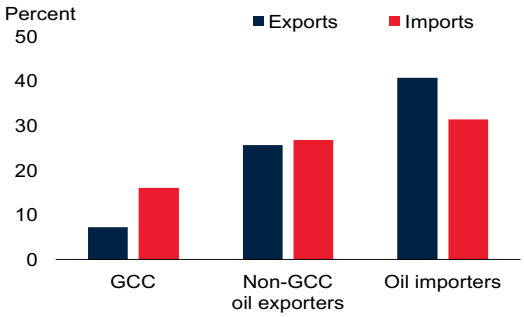
b. Political Stability and Business Climate



c. Export Market Penetration Index



d. Euro Area Trade Exposure



Sources: Haver Analytics, International Country Risk Guide, International Monetary Fund, World Bank.
a. GCC economies include Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. Bahrain and Qatar have the same deposit rate values during the period denoted. Last observation is April 2019.
b. Political stability rating denotes the political risk rating of the International Country Risk Guide. Business climate score denotes the overall Doing Business "distance to frontier" of the World Bank's Doing Business report. Figure shows unweighted averages. Latest observation in 2018.
c. Export Market Penetration index is based on the number of countries to which the reporter exports a particular product divided by the number of countries that report importing the product from global suppliers that year. Based on 2017 or latest available year of data. Includes 20 MENA economies.
d. Goods trade to Euro Area as a percent of total exports or imports for each subgroup denoted. Based on 2018 data. Includes 6 GCC economies, 3 non-GCC oil exporters, and 7 oil importers

Growth for oil importers is expected to rise steadily from 3.9 percent in 2018 to 4.7 percent in 2021, led by expansions in the larger economies. These projections are predicated on business climate reforms to support investment, healthy tourism activity, and a slight easing in political risks. Growth prospects in smaller oil importers (Jordan, Lebanon, West Bank and Gaza) are highly uncertain, however, as business and consumer confidence are contingent on anticipated reforms

or foreign financial assistance. Banking sector weakness and high public debt form significant constraints on growth in smaller oil importers. Nonetheless, tourism and renewed bilateral trade opportunities (for instance, between Syria and Jordan), aided by the easing of conflicts and by policy initiatives, are expected to continue supporting activity in most oil importers. Continued IMF-World Bank supported policy programs in many economies (e.g., Egypt, Morocco) will promote structural adjustment, such as stronger fiscal management frameworks, more vibrant small business entrepreneurship, and electricity access; however, in other cases, economic prospects are contingent upon successful policy resolution in some newly formed governments (for instance, Lebanon). New reforms, such as investment, industrial licensing and procurement laws in Egypt; small and medium enterprise financing liberalizations in the United Arab Emirates; and participation of Djibouti in the Convention on the Settlement of Investment Disputes between States and Nationals of Other States, are expected to help relieve constraints in the corporate sector and support investor confidence (World Bank, 2019c).

4. Methodology

Many studies support the notion that the net effect of exchange rate volatility on international trade is ambiguous, as differing results can arise from plausible alternative assumptions and modelling strategies. Increased exchange rate volatility can have no significant effect on trade, or where significant, no systematic effect in one direction or the other. Numerous empirical studies have been conducted in many countries and areas around the world to evaluate the impact of exchange rate volatility on international trade. Again, the implications of the results of those studies confirm that, although exchange rate volatility has an impact on trade, the effect can be either positive or negative depending on: (i) the endowment of each country; (ii) whether empirical studies use aggregate data, sectoral data or bilateral data; and (iii) the econometric techniques applied. The empirical literature using aggregate data tends to find weak evidence in favor of a negative impact of exchange rate uncertainty on the trade flows of a country to the rest of the world. Using the Engel-Granger method, Doroodian (1999) approximated volatility with both Autoregressive Integrated Moving Average (ARIMA) and Generalized Autoregressive Conditional Heteroskedasticity (GARCH) techniques to study the exports of India, Malaysia, and South Korea from the second quarter of 1973 to the third quarter of 1996. The results reveal significantly negative effects of exchange rate volatility on exports. Meanwhile, employing the Johansen approach of co-integration and using Autoregressive Conditional Heteroskedasticity (ARCH) method to calculate volatility, Arize and Malindretos (1998) found mixed results for two Pacific-Basin countries: volatility is shown to depress New Zealand exports, while its impact is positive in the case of Australia.

Another batch of empirical studies indicate that the relationship between a single country's trade volume and exchange rate volatility is statistically significantly negative in the long run, especially

in developing countries, while others consider that there is the positive relationship in the short run or long run. The basis for empirical model development is mostly based on simple demand functions of exports/import. Relative prices, income, and volatility are often employed as determinants. There are two major problems facing applied econometrics in these studies. Firstly, there has not yet been a standard exchange rate volatility proxy (Bahmani-Oskooee and Hegerty 2007). Some measure of variance has dominated this field, but the precise calculation of this measure differs from study to study. Later estimates have involved using the standard deviation of a rate of change or the level of a variable. Kenen and Rodrik (1986) draw attention to the moving standard deviation of the monthly change in the exchange rate, which has the advantage of being stationary. Utilizing newer time-series methods, Engle and Granger (1987) developed Autoregressive Conditional Heteroskedasticity (ARCH) as a measure of volatility in time-series errors, which is a widespread measure of exchange rate volatility in the literature. A broader perspective is adopted by (Pattichis, 2003) who develops Generalized Autoregressive Conditional Heteroskedasticity (GARCH), which incorporates moving-average processes. These authors' estimates also have the desirable property of stationarity. Some measures are more popular than others, however, not one stands out as the standard volatility proxy (Bahmani-Oskooee and Hegerty 2007). The second problem is the type of method used in estimating the empirical model. While the Ordinary Least Squares (OLS) was commonly used in the early papers, newer and more sophisticated techniques, including time-series and panel data methods, in recent studies have facilitated investigation of the sensitivity of exports to a measure of exchange rate volatility. The main goal of modern time-series analysis is to take into consideration integrating properties of the variables so that spurious results can be avoided. Some popular methods of time-series analysis in recent years are the Engle-Granger method, the Johansen method, and the bounds testing approach.

Wang and Barett (2007) estimated the impact of the conditional mean and conditional variance of real exchange rates on Taiwan's exports by estimating innovative rational expectations based multivariate GARCH-M model using sector- and destination-specific monthly data. They found that agricultural trade flows are negatively affected by high frequency exchange rate volatility that does not seem to impact other sectors significantly. Agriculture appears far more responsive to both expected exchange rates and to expected volatility in the exchange rate and less responsive to importer incomes, than do other sectors in Taiwan's economy. The same results were obtained by Cho et al. (2002) employing gravity models for ten developed countries. They found that real exchange rate uncertainty has had a negative effect on agricultural trade over the period between 1974 and 1995. Moreover, the negative impact of uncertainty on agricultural trade has been more significant compared to other sectors.

4.1 Measures for Exchange Rate Volatility

The approaches to measuring exchange rate volatility have been transformed with the passage of time to present new econometric techniques. However, there is no consensus in the literature on a

single measure for volatility. The most common measures of variance are used for it, but this varies from study to study. The volatility can be measured by taking the standard deviation or rate of change within period one, a moving standard deviation of the real or nominal exchange rate (Bahmani-Oskooee and Hegerty 2007). There is a mixed trend of using exchange rate measures, and neither rate dominates the other in the literature. Previous studies have used both the real and nominal rate as a measure of the exchange rate. The real exchange rate measures the actual price of imported and exported goods. The real exchange rate integrates the price levels of the exporting and importing countries; it also measures the volatility in the price level.

Therefore, the volatility of the nominal exchange rate is usually desired at first (Bahmani-Oskooee and Hegerty 2007). Akhtar and Hilton (1984) conducted a pioneer study to examine the exchange rate volatility. They measured the exchange rate volatility by using the standard deviation of daily observations for the period of three months. Further, Aghion et al. (2009) also computed exchange rate volatility as the annual standard deviation of the growth rate of the effective real exchange rate. Moreover, Grossmann et al. (2014) also used the annual standard deviation of daily US spot exchange rates to compute exchange rate volatility.

Kenen and Rodrik (1984) introduced moving standard deviation to measure month-wise variations in exchange rate. This method has the benefit of being stationary. This method was prominently used before co-integration analysis was invented. Bleaney (1992) also utilized the same method by using the level instead of measuring the change in exchange rate. Engle and Granger (1987) introduced the new time series method, "Autoregressive Conditional Heteroskedasticity (ARCH)", to measure volatility. In literature, it is more commonly used to measure exchange rate volatility. This method calculates the variance of the disturbance term for each period as a part of errors in prior periods. This model can be extended by adding more lags; the further extension is commonly known as the GARCH model, which includes the moving average method. Moreover, Aftab et al. (2017) also measured exchange rate volatility by using the GARCH process.

4.2 Model Specification

Exchange rate volatility is measured by applying the symmetric GARCH model and asymmetric threshold-GARCH model following the process described by Hull and Basu (2016) and Asteriou and Hall (2006). The simplest forms of the GARCH model and TGARCH model are GARCH (1,1) and TGARCH (1,1), which can be shown as follows:

$$R_t = \beta_0 + \beta_1 R_{t-1} \quad (1)$$

$$\sigma_t^2 = \omega + \alpha\mu_{n-1}^2 + \beta\sigma_{n-1}^2 \quad (2)$$

$$\sigma_t^2 = \omega + \alpha\mu_{n-1}^2 + \beta\sigma_{n-1}^2\, d_{n-1} + \gamma\sigma_{n-1}^2 \quad (3)$$

where ω is constant. α, β and γ are coefficients. μ_{n-1}^2 is the mean square of the previous time period. σ_{n-1}^2 is the variance of the previous time period. *dn* takes the value of 1 for $\mu_t < 0$, and 0 otherwise. According to this paper, Equation (1) is the mean equation, which represents the relationship between returns with its lag returns, while Equations (2) and (3) are the variance equations which explain the volatility. To investigate the effect of exchange rate volatility on international trade, equations (4) below is estimated, incorporating pre-generated exchange rate volatility proxies. In line with a prior study (Bleaney and Greenaway 2001).

$$Trade_{it} = \beta_0 + \beta_1 EXVOL_{it} + \beta_2 ECOFR_{it} + \beta_3 INFL_{it} + \beta_4 INTR_{it} + \beta_5 IND_{it} + \beta_6 RES_{it} + \epsilon_{it} \quad (4)$$

In Equations (4), for country i and time period t, $TRADE_{it}$ represents international, $EXVOL_{it}$ is exchange rate volatility, $ECOFR_{it}$ is economic freedom, $INFL_{it}$ is inflation rate, $INTR_{it}$ is interest rate, IND_{it} is industrial growth, RES_{it} is reserve and ϵ_{it} denotes to error term.

5. Sampling and Data Collection

Annual time series data (1990-2018) were sourced from various databases such as the Statistical Bulletin of Central Banks, World Development Indicators (WDI) from the World Bank dataset and International Financial Statistics (IFS) developed by the International Monetary Fund (IMF). This study uses a sample of 15 MENA countries: Algeria, Bahrain, Djibouti, Egypt, Iraq, Iran, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Tunisia and the United Arab Emirates. While, Libya, Syria, West Bank and Gaza and Yemen are excluded from the study due to data unavailability.

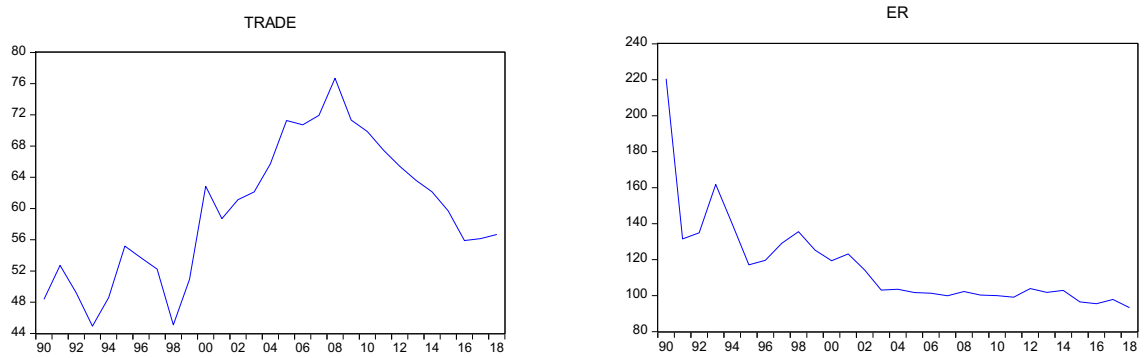
International trade is the dependent variable, measured by total trade as a ratio of GDP. The explanatory variables are as follows: fluctuations in exchange rates measured by applying GARCH (1,1) and TGARCH (1,1) models on data of the real effective exchange rate. Political financial factors can play an important role in trade, the economic freedom index is a weighted index that can measure the economic freedom of a country comprehensively by calculating degrees of trade restriction, government regulations, economic policy, property rights, and other indicators. Thus, the economic freedom index is used in this paper as a political–financial indicator to measure the degree of financial market development and economic openness. Other important macroeconomic variables are included as control variables, such as inflation measured by consumer price index (CPI), real interest rate, reserves and industrial growth measured by value-added growth. The description of variables and sources of data are shown in Table (1).

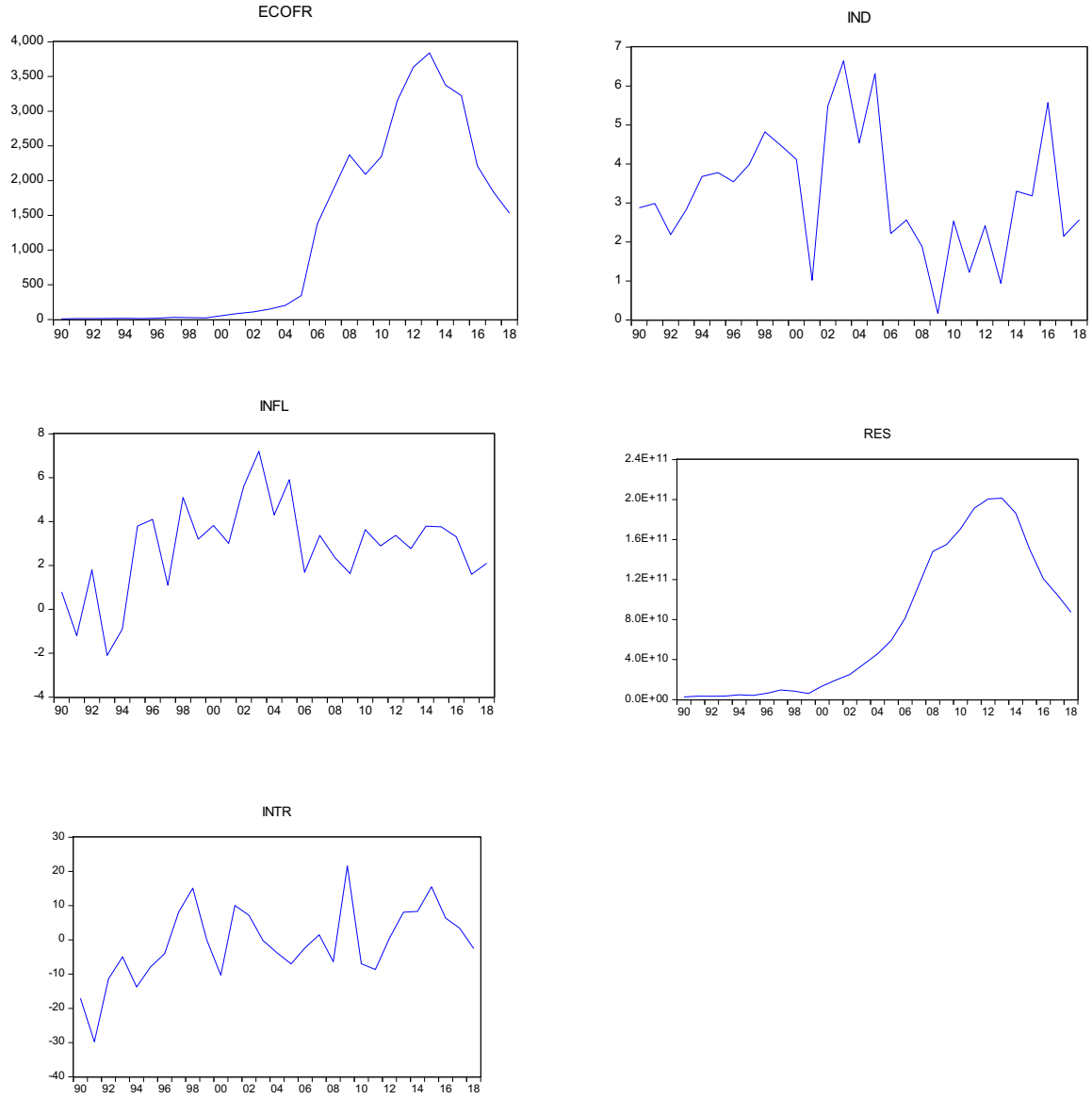
Table (1): Description of Variables and Sources of Data

Variables	Description	Data Source
TRADE	International trade measured by total trade (% of GDP)	"World Bank Development Indicators, http://databank.worldbank.org"
EXVOL	The volatility of real effective exchange rate (%), measured by GARCH (1,1) & TGARCH (1,1)	"Bruegel Datasets: Real effective exchange rates for 178 countries: A new database", http://bruegel.org/publications/ datasets/ real-effectiveexchangerates
ECOFR	Economic freedom index	U.S. Heritage Foundation, http://www.heritage.org/index/
INFL	Inflation rate measured by consumer price index	IMF IFS Statistics, http://data.imf.org
INTR	Interest rate measured by the real interest rate	"World Bank Development Indicators, http://databank.worldbank.org"
IND	Industrial growth measured by value-added growth	"World Bank Development Indicators, http://databank.worldbank.org"
RES	Official reserve	"World Bank Development Indicators, http://databank.worldbank.org"

Data trends for selected variables from 1990 to 2018 are explained in figure (3) below. Analyzing the trade growth pattern─ a slump in trade growth or convergence toward moderate longer-term growth rates and comparing it with the pre global financial crisis period - reveal some interesting changes in trade growth patterns. Given that exchange rate volatility contributes to an increase in imports and decreased exports, countries experience local currency depreciation. An initial examination of exchange rate movements over time suggests that exchange rate variations across countries rapidly increased post-global financial crisis.

Figure (3): Data Trends (1990-2018)





Source: Authors' preparation

6. Results and Interpretation of Findings

6.1 Unit Root Test

Implementation of the regression model is preceded by a stationary analysis of the aforementioned time periods by means of stationary tests or the so-called "unit-root tests" developed by Augmented Dickey–Fuller. This stationary characteristic indicates that a time series has a relatively constant evolution on the average impacts that is not permanent, and fluctuation remains constant. To determine the stationarity of the series, a unit root test is conducted. The absence of a unit root is premised on the assumption that the series exhibits the same order of integration. In general terms, if the series need to be differenced "n" times in order to achieve I(0), i.e. to be integrated to order zero, then the series is said to be integrated of order "n" and can be expressed

as $X_{t\sim}$ I(n). The null hypothesis of the existence of a unit root is H_0:α=0. Failure to reject the null hypothesis leads to conducting the test on further differences of the series. Further differencing is conducted until stationarity is reached and the null hypothesis is rejected. Lags are tested in order to determine the most appropriate number that has statistical relevance for our model; at 5% level of significance Akaike information criteria is used to determine the length of lags. Results of the unit root test are illustrated in Table (2).

Table (2): Results of Unit Root Test

Variable	Level				First Difference			
	Intercept		*Intercept and Trend*		*Intercept*		*Intercept and Trend*	
	Prob.*	***T-Statistics***	***Prob.****	***T-Statistics***	***Prob.****	***T-Statistics***	***Prob.****	***T-Statistics***
TRADE	0.4713	-2.971853	0.9122	-3.580623	0.0005*	-2.976263	0.0024*	-3.587527
EXVOL	0.6329	-1.261421	0.1022	-3.242082	0.0009*	-3.745469	0.0448*	-3.641270
INFL	0.5207	-2.971853	0.6650	-3.580623	0.0002*	-5.392448	0.0009*	-5.403225
INTR	0.0137*	-2.971853	0.0228*	-3.953571	0.0000*	-7.190693	0.0000*	-7.274761
IND	0.0107	-3.659743	0.0352*	-3.750388	0.0000*	-8.384662	0.0000*	-8.239793
RES	0.2322	-2.138279	0.0352*	-3.801457	0.04392*	-2.245913	0.04296*	-2.425841
ECOFR	0.5562	-1.422841	0.6878	-1.7776691	0.0420*	-2.871084	0.0184*	-2.879148

*Result is significant at 5% level

Source: Authors' estimation (statistical work is performed using E-views software version 9).

Drawing from the information provided by the previous table, by employing Augmented Dickey-Fuller (ADF), unit root test is performed. The result of Table (2) shows that almost all of the series were non-stationary at their levels, whether with intercept or with intercept and time trends. The ADF test indicates that INTR is stationary at its levels with intercept while the rest remain non-stationary. Hence, all the series were differenced at first differencing to attain a trend stationary level. The above result, therefore suggests that the series was integrated to order 1, represented as I(1). The implication of the presence of a unit root is the probability of having a series that could be persistently influenced by external shocks and disturbances on the variables which could also result to a spurious result if unchecked.

6.2 Johansen Cointegration Test

Cointegration test indicates the presence of long-run equilibrium relationships among the variables of the system, and thus, the feasibility of a long- and short-run analysis. Overall, the results suggest a stable linear relationship between the dependent variables, namely the international trade and their respective explanatory variables as defined earlier in the long-run.

Table (3): Results of Johansen Cointegration Test

Sample (adjusted): 1992 2018
Included observations: 27 after adjustments
Trend assumption: Linear deterministic trend
Series: TRADE ERVOL ECOFR INFL IND INTR RES
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.935904	206.9023	125.6154	0.0000
At most 1 *	0.832029	132.7234	95.75366	0.0000
At most 2 *	0.707396	84.55634	69.81889	0.0021
At most 3 *	0.594869	51.37510	47.85613	0.0225
At most 4	0.416446	26.97938	29.79707	0.1021
At most 5	0.246283	12.43668	15.49471	0.1372
At most 6 *	0.162956	4.802731	3.841466	0.0284

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

Source: Author's estimation (statistical work is performed using E-views software version 9)

6.3 *Vector Error Correction Model (VECM)*

Here, the estimation of the VECM takes place, this involves adjustments to both short-run changes in the variables and the deviations from long run equilibrium. In order to understand the results of the VECM, Impulse Response Functions (IRF) is estimated.

Table (4): Results of Vector Error Correction Model (VECM*)*

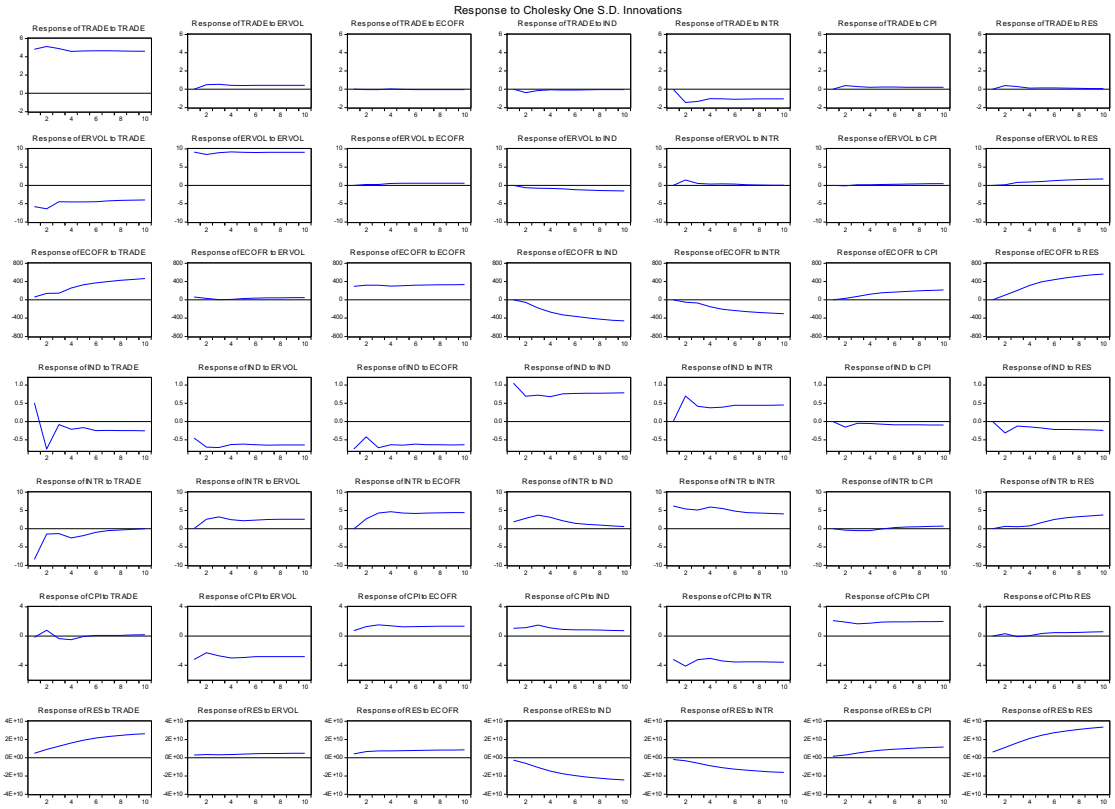
Vector Error Correction Estimates
Sample (adjusted): 1993 2018
Included observations: 26 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	
TRADE(-1)	1.000000	
ERVOL(-1)	-0.620375 (0.77388) [-0.80164]	
C	9.422432	
Error Correction:	**D(TRADE)**	**D(ERVOL)**
CointEq1	-0.124767 (0.12353) [-1.01000]	0.081545 (0.21095) [0.38655]
D(TRADE(-1))	0.074652 (0.25228) [0.29590]	-0.234722 (0.43083) [-0.54482]

D(TRADE(-2))	0.058315	-0.175916
	(0.20302)	(0.34670)
	[0.28724]	[-0.50741]
D(ERVOL(-1))	-0.066114	-0.155270
	(0.08905)	(0.15206)
	[-0.74248]	[-1.02109]
D(ERVOL(-2))	0.073960	-0.421357
	(0.03807)	(0.06502)
	[1.94250]	[-6.48040]
C	1.908845	2.381151
	(4.03032)	(6.88257)
	[0.47362]	[0.34597]
ECOFR	-7.60E-05	0.000373
	(0.00279)	(0.00476)
	[-0.02727]	[0.07835]
CPI	-0.239897	-0.321511
	(0.12417)	(0.21204)
	[-1.93206]	[-1.51628]
IND	0.103679	-0.958445
	(0.56337)	(0.96207)
	[0.18403]	[-0.99623]
INTR	-0.329257	0.135324
	(0.08691)	(0.14841)
	[-3.78854]	[0.91181]
RES	5.48E-12	-1.52E-11
	(6.6E-11)	(1.1E-10)
	[0.08294]	[-0.13476]
R-squared	0.693092	0.816579
Adj. R-squared	0.488487	0.694299
Sum sq. resids	142.4833	415.5152
S.E. equation	3.082027	5.263175
F-statistic	3.387464	6.677922
Log likelihood	-59.00707	-72.92090
Akaike AIC	5.385159	6.455453
Schwarz SC	5.917431	6.987725
Mean dependent	0.287954	-1.601298
S.D. dependent	4.309314	9.519174
Determinant resid covariance (dof adj.)		213.4220
Determinant resid covariance		71.03541
Log likelihood		-129.2061
Akaike information criterion		11.78509
Schwarz criterion		12.94641

Source: Author's estimation (statistical work is performed using E-views software version 9)

Figure (4): Impulse Response Function (IRF)



Source: Author's estimation (statistical work is performed using E-views software version 9)

6.4 Exchange Rate Volatility Estimation

Table (5): Heteroskedasticity Test: ARCH for Exchange Rate Volatility

F-statistic	63.33764	Prob. F(1,26)	0.0000
Obs*R-squared	19.85114	Prob. Chi-Square(1)	0.0000

Source: Author's estimation (statistical work is performed using E-views software version 9).

According to the results of table 5, exchange rate indicates a presence of significant ARCH effects over the sample period, which captures volatility clustering.

Table (6): Estimation of Parameters of GARCH/TGARCH Model

Dependent Variable: TRADE
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample: 1990 2018
Included observations: 29
Convergence not achieved after 500 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
GARCH = C(6) + C(7)*RESID(-1)^2 + C(8)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
ERVOL	-0.291627	0.035393	-8.239640	0.0000**
ECOFR	0.020606	0.006904	2.984613	0.0028**
INFL	0.009709	0.001216	7.985518	0.0000**
IND	3.121113	1.285931	2.427124	0.0152**
INTR	-0.058756	0.098273	-0.597884	0.5499
RES	5.52E-10	1.20E-10	4.618867	0.0000**
Variance Equation				
C	36.69950	31.36451	1.170096	0.2420
RESID(-1)^2	-0.172162	0.175904	-0.978730	0.3277
GARCH(-1)	0.622406	0.446011	1.395494	0.1629

R-squared	-0.139929	Mean dependent var	59.66699
Adjusted R-squared	-0.329917	S.D. dependent var	8.801952
S.E. of regression	10.15059	Akaike info criterion	7.561375
Sum squared resid	2472.827	Schwarz criterion	7.938560
Log likelihood	-101.6399	Hannan-Quinn criter.	7.679505
Durbin-Watson stat	1.417027		

Significance Levels *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: Author's estimation (statistical work is performed using E-views software version 9).

Table (7): Estimation of Parameters of EGARCH Model

Dependent Variable: TRADE
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Sample: 1990 2018
Included observations: 29
Convergence not achieved after 500 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(6) + C(7)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(8)
*RESID(-1)/@SQRT(GARCH(-1)) + C(9)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
ERVOL	-0.292874	0.016020	-18.28207	0.0000**
ECOFR	0.019939	0.004513	4.418292	0.0000**
INFL	4.017838	1.419821	2.829820	0.0047**
IND	3.311586	0.623985	5.307152	0.0000**
INTR	-0.078894	0.030472	-2.589043	0.0096**
RES	5.35E-10	8.67E-11	6.170208	0.0000**
Variance Equation				
C(6)	4.553736	1.158969	3.929127	0.0001

C(7)	-1.916115	0.803926	-2.383446	0.0172
C(8)	0.411485	0.395884	1.039410	0.2986
C(9)	0.256958	0.179998	1.427560	0.1534
R-squared	-0.178086	Mean dependent var		59.66699
Adjusted R-squared	-0.374434	S.D. dependent var		8.801952
S.E. of regression	10.31908	Akaike info criterion		7.371313
Sum squared resid	2555.601	Schwarz criterion		7.795646
Log likelihood	-97.88403	Hannan-Quinn criter.		7.504208
Durbin-Watson stat	1.402172			

Significance Levels *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: Author's estimation (statistical work is performed using E-views software version 9).

While, Tables 6 and 7 present the TGARCH and EGARCH estimation results respectively, both TGARCH and EGARCH models show that exchange rate volatility has a significant negative impact on international trade. Interest rate failed to be significant at any of the conventional levels, even though it carried the expected sign. The control variables, namely, the inflation rate, industrial growth, and official reserve are observed to be positively correlated with trade. Rising inflation makes local goods more expensive and less attractive to customers at home, who increasingly turn to cheaper imports. These higher prices can also reduce exports because of competition in international trade. While economic freedom and interest rate are conformity to show significant negative effect on international trade.

Conclusion

Economic literature does not give a clear direction as to what the relationship is between exchange rate volatility and international trade. There is also no consensus in the literature about measuring the exchange rate volatility, nor does it identify an appropriate methodology to determine its relationship with trade flows. One of the most important empirical contributions of this paper is to apply both symmetric TGARCH (1,1) and asymmetric threshold EGARCH (1,1) models to measure the exchange rate volatility for the panel dataset of 15 MENA countries for the period 1990–2018. It is found that, the coefficients of exchange rate volatility measured with TGARCH/EGARCH showed significant negative effects in both cases. This indicates that high exchange rate volatility can adversely affect international trade flows in sample countries. Moreover, empirical results also reveal that economic freedom - as a proxy of financial market development and economic openness - has a significant impact on international trade, this shows a positive direction in the international trade models. It is also found that inflation has a significant positive effect on international trade as an explanatory variable along with measures of exchange rate volatility. As

expected, the statistical significance of both industrial growth and reserves were indications to foster international trade. This indicates that effective import substitution and industrialization would significantly reduce pressure on the external sector and will increase economic activities and hence, spur economic growth. Finally, interest rate showed a negative but statistically insignificant effect, underscoring that it is ineffective in explaining trade inflows. Conclusively, the findings revealed that exchange rate volatility depressed trade flows in the long-run. Thus, it is suggested that policymakers should formulate economic policies with a goal of achieving a minimum level of exchange rate volatility in MENA countries. The minimum level of exchange rate volatility could be beneficial to foster international trade inflows, as a result, the overall economies of these countries could be increased. In line with the above view, future studies can be conducted by analyzing the relationship between trade with exchange rate volatility along with other macroeconomic, social, and political factors in developed and developing countries, which might lead to more useful policy implications.

References:

Abrahams, K. (1980). Actual and Potential Trade Flows with Flexible Exchange Rates. Federal Reserve Bank of Kansas City Working Paper; Kansas City: Federal Reserve Bank of Kansas City, pp. 800–1.

Aftab, M., Syed, K. B. and Katper, N. A. (2017). Exchange-rate volatility and Malaysian-Thai bilateral industry trade flows. Journal of Economic Studies, (44), pp. 99–114.

Ahmed, S., Appendido, M. and Ruta, M. (2015a). Global value chains and the exchange rate elasticity of exports. International Monetary Fund Working Paper. 15 (552). International Monetary Fund. Washington, D.C.

Ahmed, S., Appendido, M., & Ruta, M. (2015b). Depreciation without exports? Global value chains and the exchange rate elasticity of exports. World Bank Policy Research Working Paper. 7390, World Bank, Washington, D.C.

Akhtar, M. A. and Hilton, R. S. (1984). Exchange Rate Uncertainty and International Trade: Some Conceptual Issues and New Estimates for Germany and the United States. Washington, DC: Federal Reserve Bank.

Appuhamilage, A. and Senanayake, K. (2010). Exchange rate movements' effect on Sri Lanka- China trade. Journal of Chinese Economy and Foreign Trade Studies, 3(3), pp. 254–267.

Aristeriou, D., Masatci, K. and Pilbeam, K. (2016). Exchange rate volatility and international trade: International evidence. Economic Modelling, (58), pp. 133–140.

Aristotelous, K. (2001). Exchange-rate volatility, exchange-rate regime, and trade volume: Evidence from the UK-US export function (1989–1999). Economic Letter, (72), pp. 87–89.

Arize, A., Osang, T. and Slottje, J.D. (2000). Exchange Rate Volatility and Foreign Trade: Evidence from Thirteen LDCs. Journal of Business and Economic Statistics, 18(1), pp. 10-17.

Arize, C. and Malindretos, J. 1998. The long-run and short-run effects of exchange-rate volatility on exports: The case of Australia and New Zealand. Journal of Economics and Finance, (22), pp. 43–56.

Asteriou, D. and Hall, S. (2006). Applied Econometrics: A Modern Approach Using Eviews and Microfit. New York: Palgrave McMillan.

Babecky, J, Bulíˇr, A. and Šmídková, K. (2009). EU Member States: Is FDI a Mixed Blessing? In Five Years of an Enlarged EU. Berlin/Heidelberg: Springer.

Babecky, J., Bulíˇr, A. and Šmídková, K. (2010). Sustainable Real Exchange Rates in The New EU Member States: Is FDI a Mixed Blessing? In Five Years of an Enlarged EU. European Economy Economic Papers; Berlin/Heidelberg: Springer, vol. (368), p. 77.

Bacchetta, P. and van Wincoop, E. (2000). Does exchange-rate stability increase trade and welfare? The American Economic Review, 90(5).

Baek, J. (2012). Exchange rate sensitivity of Korea-US bilateral trade: Evidence from industrial trade data. Journal of Korea Trade, (16), pp. 1–21.

Bahmani-Oskooee, M. and Hegerty, S. (2007). Exchange rate volatility and trade flows: A review article. Journal of Economic Studies, (34), pp. 211–55.

Bahmani-Oskooee, M. and Hegerty, S. W. (2007). Exchange rate volatility and trade flows: A review article. Journal of Economic Studies, (34), pp. 211–55.

Bahmani-Oskooee, M., and Hegerty, S. (2007). Exchange rate volatility and trade flows: A review article. Journal of Economic Studies, (34), pp. 211–55.

Baldwin, E. and Martin, P. (1999). Two Waves of Globalisation: Superficial Similarities, Fundamental Differences. NBERWorking Paper; Cambridge: National Bureau of Economic Research.

Baron, P. (1976b). Fluctuating exchange rates and the pricing of exports. Economic Inquiry, (14), pp. 425–38.

Baron,P. (1976a). Flexible exchange rates, forward markets, and the level of trade. The American Economic Review, (66), pp. 253–66.

Beckman, J., Belke, A. and Kühl, M. (2010). The Dollar-Euro Exchange-Rate and Macroeconomic Fundamentals: A Time-Varying Coefficient Approach. Review of World Economics, (147), pp. 11–40.

Bleaney, M. (1992). Comparisons of real exchange rate volatility across exchange rate systems. Oxford Bulletin of Economics and Statistics, (54), pp. 557–65.

Bleaney, M. and Greenaway, D. (2001). The impact of terms of trade and real exchange rate volatility on investment and growth in sub-Saharan Africa. Journal of Development Economics, (65), pp. 491–500.

Bourguinat, H. (2007). Finance Internationale. Paris: Presses Universitaires de France.

Calderon, C. (2004). Trade Openess and Real Exchange Rate Volatility. Panel Date Evidence. Central Bank of Chile

Calderon, C. (2004). Trade Openness and Real Exchange Rate Volatility. Panel Date Evidence. Central Bank of Chile Working Paper; Santiago: Banco Central de Chile.

Calvo, G.A., Leiderman, L. and Reinhart, C.M. (1996). Inflows of capital to developing countries in the 1990s. The Journal of Economic Perspectives, 10(2), pp.123-139.

Campa, J. M. and Goldberg, L. S. (2005). Exchange rate pass-through into import prices: A macro or micro phenomenon? NBER Working Paper No. 8934. National Bureau of Economic Research, Cambridge, MA.

Cho, G., Sheldon, I and McCoriston, S. (2002). Exchange Rate Uncertainty and Agricultural Trade. American Journal of Agricultural Economics, 84(4), pp. 931- 942.

Choudhry, T. (2008). Exchange Rate Volatility and United Kingdom Trade: Evidence from Canada, Japan and New Zealand. Empirical economics, (35), pp. 607-619.

Clark, B. (1973). Uncertainty, exchange risk, and the level of international trade. Economic Inquiry, (11). pp. 302–13.

Combes, J., Kinda, T. and Plane, P. (2012). Capital flows, exchange rate flexibility, and the real exchange rate. Journal of Macroeconomics, 34(4), pp. 1034-1043.

Combes, J., Kinda, T. and Plane, P. (2012). Capital flows, exchange rate flexibility, and the real exchange rate. Journal of Macroeconomics, (34), pp.1034–43.

Cote, A. (1994). Exchange Rate Volatility and Trade – A Survey. Bank of Canada, Working Paper.94-95.

De Grauwe, P. and Skudelny, F. (1996). The impact of EMU on trade flows. Weltwirtschaftliches Archiv—Review of World Economics, (136), pp. 381–402.

De Vita, G. and Kyaw, K.S. (2008). Determinants of capital flows to developing countries: A structural VAR analysis. Journal of Economic Studies, 35(4), pp. 304-322.

Dell'Ariccia, G. (1999). Exchange rate fluctuations and trade flows: Evidence from the European Union. IMF Staff Papers, 46(3), pp. 315–334.

Doroodian, K. (1999). Does exchange rate volatility deter international trade in developing countries? Journal of Asian Economics, (10), pp. 465–74.

Duarte, M. and Stockman, A. (2005). Rational Speculation and Exchange Rates. Journal of Monetary Economics, (52), pp. 3–29.

Engle, R. and Granger, C. (1987). Co-integration and error correction: Representation, estimation, and testing. Econometrica, (55), pp. 251–76.

Engle, R. F. and Granger, W. J. (1987). Co-integration and error correction: Representation, estimation, and testing. Econometrica: Journal of the Econometric Society, (55), pp. 251–76.

Ethier, W. (1973). International trade and the forward exchange market. American Economic Review, (63), pp. 494–503.

Ethier, W. (1973). International trade and the forward exchange market. The American Economic Review, (63), pp. 494–503.

Franke, G. (1991). Exchange rate volatility and international trading strategy. Journal of International Money and Finance, (10), pp. 292–307.

Frankel, A. and Rose, K. (1996). Currency Crashes in Emerging Markets: An Empirical Treatment. Journal of International Economics, (41), pp. 351–66.

Frommel, M., MacDonald, R. and Menkhoff, L. (2005). Markov Switching Regimes in a Monetary Exchange Rate Model. Economic Modelling, (22), pp. 485–502.

Gala, P. (2008). Real exchange rate levels and economic development: Theoretical analysis and econometric evidence. Cambridge Journal of Economics, 32(2), pp. 1243–1272.

Goldstein, M. and Mussa, M. (1993). The Integration of World Capital Markets. Paper presented at the Economic Policy Symposium, Jackson Hole, WY, USA, August 19–21; pp. 245–330.

Grossmann, A., Love, I. and Orlov, A. G. (2014). The dynamics of exchange rate volatility: A panel VAR approach. Journal of International Financial Markets, Institutions and Money, (33), pp. 1–27.

Hau, H. (2000). Real Exchange Rate Volatility and Economic Openness: Theory and evidences. Journal of Money Credit and Banking, (34), pp. 611–30.

Héricourt, J., and Poncet, S. (2015). Exchange Rate Volatility, Financial Constraints, and Trade: Empirical Evidence from Chinese Firms. The World Bank Economic Review, (29), pp.550–78.

Hooper, P. and Kohlhagen, W. (1978). The effect of exchange rate uncertainty on the prices and volume

Hooy, C.-W., Law, S.-H., & Chan, T.-H. (2015). The impact of the Renminbi real exchange rate on ASEAN

disaggregated exports to China. Journal of Economic Modelling, (4), pp. 253–259.

Huchet-Bourdon, M. and Korinek, J. (2011). To what extent do exchange rates and their volatility affect trade? OECD Trade Policy Papers. 119. Organization for Economic Co-operation and Development, Paris.

Hull, J. C. and and Basu, S. (2016). Options, Futures, and Other Derivatives. Dehli: Pearson Education.

Ibarra C. A. (2004). Capital flows, exchange rate regime, and macroeconomic performance in Mexico. Investigación económica, pp.15-46.

Inci, C. and Lu, B. (2004). Exchange rates and interest rates: Can term structure models explain currency movements? Journal of Economic Dynamics & Control, (28), pp. 1595–624.

International Monetary Fund. (2004). Exchange rate volatility and trade flows—Some new evidence. Washington, DC: IMF.

International Monetary Fund. (2015a). World economic outlook: Adjusting to lower commodity prices. Washington, DC: IMF.

Jongwanich, J. and Kohpaiboon, A. (2013). Capital flows and real exchange rates in emerging Asian countries. Journal of Asian Economics, Vol. (24), pp. 38-146.

Kearns, J. and Patel, N. (2016). Does the financial channel of exchange rate offset the trade channel? Bank of International Settlements Quarterly Review. Bank for International Settlements, Basel, Switzerland.

Kenen, B., and Rodrik, D. (1986). Measuring and analyzing the effects of short-term volatility in real exchange rates. The Review of Economics and Statistics, (68), pp. 311–15.

Kenen, P. B., and Rodrik, D. (1986). Measuring and analyzing the effects of short-term volatility in real exchange rates. The Review of Economics and Statistics, (68), pp. 311–15.

Kohlhagen, W. (1978). The Behavior of Foreign Exchange Markets: A Critical Survey of the Empirical Literature. New York: New York University, Graduate School of Business Administration, Salomon Brothers Center for the Study of Financial Institution.

Koren, M., & Szeidl, A. (2003). Exchange Rate Uncertainty and Export Prices, mimeo. Harvard University.

Krugman, P. (1989). The case for stabilizing exchange rates. Oxford Review of Economic Policy, Oxford University Press. 5(3), pp. 61–72.

Marquez, J. and Schindler, J. (2006). Exchange-rate effects on China's trade: An interim report. Federal Reserve Bank of San Francisco Working Paper Series, Working Paper No. 2006-41.

Meese, A. and Rogoff, K. (1983). Empirical Exchange-Rate Models of the Seventies—Do They Fit out of Sample. Journal of International Economics, (14), pp. 3–24.

Mukherjee, D. and Pozo, S. (2011). Exchange-rate volatility and trade: A semiparametric approach. Journal of Applied Economics, 43(13), pp. 1617–1627.

Mundell, A. (1996). A theory of Optimal Currency Areas. American Economic Review, (51), pp. 657–65.

Nicita, A. (2013). Exchange Rates, International Trade and Trade Policies Policy Issues In International Trade And Commodities, Study Series No. 56 UNCTAD, Geneva.

Obiora, K.I. and Igue, N.N. (2006). Exchange Rate Volatility and U.S. Nigeria Trade Flows: An Econometric Appraisal of the Evidence. Paper Presented at the 11th Annual Conference of the African Economic Society, 5th – 7th July. Dakar, Senegal.

Obstfeld, M. (1998). The Global Capital Market: Benefactor or Menace? Journal of Economic Perspectives, (12), pp. 9–30.

Obstfeld, M. and Rogoff, K. (2000). New Directions for Stochastic Open Economy Models. Journal of International Economics, (50), pp. 117–53.

Obstfeld, M., Rogoff, K. and Wren-lewis, S. (1996). Foundations of International Macroeconomics. Cambridge: MIT Press.

Odili, O. (2014). Exchange Rate and Balance of Payment: An Autoregressive Distributed Lag (ARDL) Econometric Investigation on Nigeria. IOSR Journal of Economics and Finance, vol.4, Issue (6), pp. 21-30.

of international trade. Journal of International Economics, (8), pp. 483–511.

Ollivaud, P., Rusticelli, E. and Schwellnus, C. (2015). The changing role of the exchange rate for macroeconomic adjustment. OECD Economics Department Working Paper 1190, Organization for Economic Co-operation and Development, Paris.

Pattichis, C. (2003). Conditional exchange rate volatility, unit roots, and international trade. The International Trade Journal, (17) pp. 1–17.

Rangarajan, C. (2000). Capital flows: Another look. Economic and Political Weekly, pp. 4421-4427.

Razi, A., Shafiq, A., Ali, S.A. and Khan, H. (2012). Determinants of exchange rate and its impact on Pakistani economy. Global Journal of Management and Business Research, Vol. 12 (16).

Rose, A. (2000). One market, one money: Estimating the effect of common currencies on trade. Economic Policy, (30), pp. 7–45.

Thorbecke, W. (2006). The effect of exchange rate changes on trade in East Asia. Research Institute of Economy, Trade & Industry (RIETI) Discussion Paper Series. 05-E −009. RIETI, Tokyo.

Thorbecke, W. and Kato, A. (2011). The effect of exchange rate changes on Japanese consumption exports. Asian Development Bank Institute (ADBI) Working Paper Series. ADBI Working Paper No. 298. ADBI, Tokyo.

Thursby, G. and Thursby, C. (1978). Bilateral trade flows, the Linder hypothesis and exchange risk. The Review of Economics and Statistics, (69), pp. 488–95.

UNCTAD (United Nations Conference on Trade and Development) (2013). Exchange rates, international trade and trade policies. Policy Issues in International Trade and Commodities Studies Study Series No. (56), Geneva.

Wang, L. and Barett, C. (2007). Estimating the Effects of Exchange Rate Volatility on Export Volumes. Journal of Agricultural and Resource Economics, 32(2), pp. 225- 255.

Working Paper; Santiago: Banco Central de Chile.

World Bank. (1997). The Road to Financial Integration: Private Capital Flows to Developing Countries, Washington, DC.

World Bank. (2019a). Global Economic Prospects: Darkening Skies. January. Washington, DC: World Bank.

World Bank. (2019b). Gulf Economic Monitor. Building the Foundations for Economic Sustainability. May. World Bank, Washington, DC.

World Bank. (2019c). The Middle East and North Africa: From Transition to Transformation. Washington, DC: World Bank.

World Trade Organization. (2011). World trade report. Geneva: Author.

Youssef, H. and Zaki, C. (2019). From Currency Depreciation to Trade Reform: How to Take Egyptian Exports to New Levels? Policy Research Working Paper 8809, World Bank, Washington, DC.