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The Role of Exchange Rate Policy in Trade Balance Adjustment: Investigating the Industry-Level Bilateral Trade Between Egypt and Italy

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**THE ROLE OF EXCHANGE RATE POLICY IN TRADE BALANCE ADJUSTMENT:
INVESTIGATING THE INDUSTRY-LEVEL BILATERAL TRADE BETWEEN EGYPT AND ITALY**

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ABSTRACT

Egypt has adopted various exchange rate policy arrangements over the past 30 years. More often than not, the transitions to new exchange rate regimes were triggered by foreign currency shortages resulting from external shocks that warranted using foreign reserves and relying on foreign borrowing as remedial measures. Further, the Egyptian economy's dependence on exogenous foreign currency sources exacerbated the vulnerability of the EGP exchange rate to the destabilizing external shocks. Accordingly, the foreign exchange rate policy targeted the attraction of foreign capital inflows and workers' remittances to maintain substantial foreign reserves required to continue supporting an overvalued EGP. With less attention given to enhance the competiveness of the non-oil merchandise exports, Egypt's vulnerability to external shocks worsened. Although narrowing the trade deficit (TD) was not primarily targeted by the exchange rate policy over the period 1980-2019, its implications on Egypt's underperforming TD is worth critical examination because of the TD persistence over the past 15 years despite being considered a more sustainable source of foreign currency. With the new reform wave centered on stabilizing the economy, an exchange rate policy geared towards achieving a sustainable external position by promoting non-oil merchandise exports is needed. Accordingly, the study in hand attempted an empirical test for the impact of exchange rate policy on Egypt's trade balance (TB). To address the issue of "aggregation bias," the study was conducted using quarterly disaggregated trade data over the period 2007Q1-2019Q4 to capture the recent foreign exchange rate evolution in Egypt. The study applied a bounds test based on an Autoregressive Distributed Lags (ARDL) in its linear and non-linear form to empirically examine the long-run co-integrating relation between the variables and an error correction model (ECM) to estimate the short run dynamics of the adjustment process. The study compared the symmetrical against the asymmetrical responses of the selected 10 traded commodities based on the Harmonized System (HS) Chapters aiming to quest the occurrence of the J-shaped pattern. Evidently, the empirical test asserted the existence of a long-run relationship in 40% of the industries estimated by linear ARDL. Further, the non-linear ARDL process for 2 of these 4 industries validated the significant long-run relationship, and an asymmetrical relationship was detected for 2 Chapters. Moreover, the findings of the study did not detect a statistically significant short run relationship between real exchange rate and industry level TBs except for 2 industries within the non-linear ARDL process. For the "J-curve effect" quest, the study did not support the observance of the J-shaped pattern in any of the responses of the 10 selected industries. The findings suggest that the RER movements did not yield an immediate trade deficit correction in the case of Egypt bilateral trade with Italy, yet they exhibited long run corrective properties in certain industries.

Keywords: Foreign exchange rate; Trade balance; ARDL; NARDL

JEL Classification: F31, F32, F40

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
ARDL	Autoregressive Distributed Lags
BOP	Balance of Payment
CBE	Central Bank of Egypt
CPI	Consumer Price Index
DOTS	Direction of Trade Statistics
EGP	Egyptian Pound
EG	Engle–Granger
ER	Exchange Rate
ERR	Exchange Rate Regime
EU	European Union
EUR	Euro
FDI	Foreign Direct Investment
FPI	Foreign Portfolio Investment
G7	Group of Seven
GBP	Great British Pound
GDP	Gross Domestic Product
HHI	Herfindahl-Hirschman Index
HS	Harmonized System
IMF	International Monetary Fund
LEDC	Less Economically Developed Countries
L-ARDL	Linear Autoregressive Distributed Lags
MPED	Ministry of Planning and Economic Development
NL-ARDL	Non-linear Autoregressive Distributed Lags
NER	Nominal Exchange Rate
PPP	Purchasing Power Parity
RER	Real Exchange rate
RGDP	Real Gross Domestic Product
ROW	Rest of the World
SC	Schwartz Criteria
TB	Trade Balance
TD	Trade Deficit
UK	United Kingdom
USA	United States of America
USD	United States Dollar
VAR	Vector Autoregression
VAT	Value-Added Taxes
WCO	World Customs Organization
WTO	World Trade Organization

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Chapter 1

Introduction

The exchange rate policy in Egypt is one of the instruments that could be utilized to achieve economic stabilization and sustainable external balance. Egypt has experimented with different foreign exchange rate polices over the past 30 years ranging from rigid to flexible regimes. Generally, the Central Bank of Egypt (CBE) has managed the Egyptian Pound (EGP) Exchange Rate for prolonged periods in Egypt's recent history to achieve different policy objectives. Since the 70s up until 1991, Egypt operated a Multiple Exchange Rate regime (MER), which was abandoned for a unified fixed regime to stabilize domestic price level. Later, the fixed regime was abandoned for an intermediate one in 2001, then a freely floated regime in 2003, to attract foreign cash inflows and worker's remittances required to maintain foreign reserves in response to the occurrence of destabilizing external shocks. Despite achieving the targeted policy objectives, such measures resulted in real effective exchange rate appreciation that hampered the global competitiveness of Egypt's non-oil merchandise exports and encouraged imports; the matter that contributed to a persistent trade deficit over the past 15 years (2004 – 2019) undermining Egypt's external position[1]. On the back of falling foreign currency inflows attributed to plummeting tourism revenues, which started 2010 due to the financial crisis and amplified in 2011 due to the political unrests, coupled with falling foreign direct and portfolio investments fueled by the political uncertainties, CBE attempted to prop the pegged EGP by using foreign reserves[2]. Accordingly, foreign reserves plummeted to the low of USD 14.9 billion in 2013 from the

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[1] Mohieldin and Kouchouk (2003)
[2] Noureldin (2018)

high of USD 35 billion in 2010 contributing to foreign currency shortages.[3]

In the wake of the prevailing foreign currency shortages, the CBE announced the floatation of the Egyptian Pound (EGP) in November 3, 2016 in an attempt to eliminate the parallel market[4]. Towards that end, the CBE 2016 floatation decision aimed to resolve the foreign currency shortages by achieve multiple objectives including channeling currency trading towards the official market, encouraging repatriation of Egyptians' remittances from abroad, attracting foreign portfolio investment (FPI) and foreign direct investment (FDI), reversing dollarization, enhancing tourism revenues and export competitiveness. More importantly, the IMF mandated the EGP floatation as a condition to extend a $12 billion bailout to re-build Egypt's dwindling foreign reserves that were being used to prop up the EGP. Indeed, the EGP floatation succeeded in eliminating the parallel market and building foreign reserves, yet these benefits come with significant costs. In the aftermath of the EGP floatation, Egypt's economy experienced unfavorable short and long run implications. In the short-run, cost-push inflation soared as a result of implementing reform measures like the gradual reduction of energy subsidies, conversion to a Value-Added Tax (VAT) scheme and floatation of the EGP; yet inflationary pressure subsided and retreated to normal rates in the following period relieving the economy of the inflationary issue. Other repercussions lasted for quite a longer time, such as further inequitable distribution of income and a slowly responsive merchandise trade balance.

Although narrowing the trade deficit (TD) was not primarily targeted by the floatation decision, its implications on Egypt's weakly performing TD is worth critical examination because of its persistence over the last 15 years despite being considered a more sustainable

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[3] Egypt External Position Quarterly Report Volume No. 58 FY 2016/2017 Retrieved from: https://www.cbe.org.eg/en/EconomicResearch/Publications/Pages/ExternalPosition.aspx?p=2 [accessed on December 14, 2020]

[4] Circular dated 3 November 2016 regarding exchange rate free float.pdf Retrieved from https://www.cbe.org.eg/ar/Pages/HighlightsPages/Circular-dated-3-November-2016-regarding-exchange-rates-free-float.aspx [accessed December 14 2020]

source of foreign currency[5]. With the new reform wave centered on stabilizing the economy, an exchange rate policy geared towards achieving a sustainable external position by promoting non-oil merchandise exports to shrink the persistent TD is needed.

Accordingly, the study in hand attempted an empirical test for the impact of exchange rate policy on the trade balance. In specific, the study investigated the dynamic short and long run relationships between the trade account, bilateral real exchange rate, Egypt's real Gross Domestic Product (Y_d) and Italy's real Gross Domestic Income (Y_f) to analyze Egypt's bilateral trade with Italy at the industry-level. To address the issue of "aggregation bias," the study was conducted using quarterly disaggregated trade data for 10 Harmonized System Chapters over the period 2007Q1-2019Q4 to capture the impact of the recent foreign exchange rate developments in Egypt.

Understanding the relationship between a country's trade balance and its key determinants, one of which is exchange rate movements[6], is crucial for sound trade policy formulation. Remarkably, this relationship between the TB and Exchange Rate (ER) variations is crucial, especially for emerging markets and Less Economically Developed Countries (LEDC) that opened their borders for overseas trade in compliance with World Trade Organization's (WTO) regulations. Such economies rely on export revenues to fund their import payments, service foreign currency-denominated debts and finance export-led growth plans. Moreover, in pursuit of export promotion, emerging markets and LEDC tend to engage in currency manipulation to promote global competitiveness[7]. Ultimately, exchange rate uncertainties may impede these countries economic growth prospects; hence, justifying

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[5] Balance of Payment Time Series Central Bank of Egypt Website Retrieved from: https://www.cbe.org.eg/_layouts/15/WopiFrame.aspx?sourcedoc={F32D82E4-41F4-44AF-8DB7-3E0B24C76D99}&file=BOP-Annual.xlsx&action=default [accessed on December 14, 2020]

[6] Himarios (1985) confirmed that in 9 out of 10 cases, the cumulative exchange rate coefficient is significant at 1% and 5% levels and that the real rather than nominal exchange rate is what matters for trade balance determination.

[7] Bahmani-Oskooee and Kutan, 2009

the endeavors to analyze the relationship between ER and TB for such emerging economies and LEDC like Egypt[8] to inform policy-making.

Whether the flexible exchange rate regime brings along external stability is quite controversial. Such controversy is deeply rooted in the equivocal nature of the relation between exchange rate regimes and the trade flows of a country embedded in the economics theories. One school advocates the thought that a liberalized ER regime is believed to speed up the TB adjustment as asserted by Milton Friedman (1953), whereas a fixed currency extends the adjustment period. Essentially, this view builds on the corrective mechanism of flexible exchange rates that enables the automatic adjustment of trade imbalances by setting in motion expenditure-switching consumer behavior. In theory, this corrective feature of ER policy is embedded in the Marshall-Lerner (ML) condition, which postulates that ER depreciation would eventually rebalance TD provided the summation of the price elasticities of exports' and imports' demand exceeds unity[9] as noted by Bahmani-Oskooee (1985). In specific, the occurrence of TD would automatically weaken the currency, which in turn work to promote export competitiveness and discourage imports; thereby, helps rebalance the trade account and vice versa. Conversely, a fixed exchange rate regime would disrupt this corrective feature of the currency, which prolongs the duration of the TB adjustment process. However, there are situations where the TB adjustment post currency depreciation was prolonged; the matter that shifted the researchers focus to studying the short-run dynamics of the TB adjustment process[10].

Despite embracing currency devaluations, some countries experience short-term unfavorable TB outcomes before the correction is eventually realized in the long-term. This

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[8] Egypt is classified as an emerging and developing country in the International Monetary Fund's World Economic Outlook, October 2019 issue.

[9] This is called the elasticities approach. It is juxtaposed to the absorption approach, which attributes the improvement in the trade balance to changes in the terms of trade and domestic production following exchange rate depreciation. In contrast, the Monetarist approach advocates the view that improvement in trade balance is triggered by changes in relative prices between traded and non-traded goods.

[10] Bahmani-Oskooee and Ratha (2004)

phenomenon, dubbed "the J-Curve" effect, was attributed to several factors. Initially, Magee (1973) explained that the post-devaluation time path of TB is subject to pre-existing binding contracts with rigid volumes. Ultimately, devaluation[11] and depreciation[12] would reduce export values and increase import payments with little impact on volumes as consumers and producers respond with a lag to changes in relative prices as revealed by Junz and Rhomberg (1973), Magee (1973) and Meade (1988); the matter that justify the TB short run declining path post currency devaluation and depreciation. However, over time, matured contracts are renewed based on the newly depreciated currency; the matter that incentivizes decision makers to adjust their contracted volumes in favor of the TB adjustment. Likewise, Junz and Rhomberg (1973) revealed that post-depreciation TB adjustment is subject to at least 5 lags; namely, recognition, decision, delivery-time, inventory replacement and production lags that last for at least 5 years before the ER variations reflect on the respective economies share in global trade. Eventually, investigating the existence of the "J-curve effect" in the response of a country's TB to exchange rate movements equip policy makers with insights regarding the time path and dynamics of the adjustment process allowing them to make better decisions regarding the most relevant policy tools, implementation timing and anticipated drawbacks.

In line of the above view, various studies were undertaken to observe the dynamic path of the TB in response to ER movements; i.e., the "J-curve effect". Although abundant, the literature on the relationship between ER movements and TB adjustment is inconclusive. On one hand, various empirical studies confirmed the short-run deterioration of TB post depreciation followed by eventual improvement, hence the existence of a J-letter time-path response of the TB to currency depreciation. In line with the above view, empirical

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[11] a deliberate downward adjustment of the value of a currency in terms of other currencies by a monetary authority under fixed exchange rate arrangements.
[12] a downward adjustment of the value of a currency in terms of other currencies by means of market forces of supply and demand in the foreign exchange market under flexible exchange rate arrangements.

investigations undertaken by Himarios (1985) confirmed that real devaluations[13] improve the TBs of 9 out of 10 examined countries[14]. Similarly, Bahmani-Oskooee (1985) observed the "J-curve phenomenon" for 3 out of the 4 countries[15] with varying duration. Later, Bahmani-Oskooee and Alse (1994) reported the presence of the J-curve for 4 of 41 countries examined and confirmed the positive long-run relationship between the ER and TB for 3 countries. Further, Gupta-Kapoor and Ramakrishnan (1999) observed the existence of J-curve for Japan and confirmed the long run relationship between TB and ER. In addition, Bahmani-Oskooee and Malixi (1992) reported the existence of J-curve in 4 of the 13 LEDC. Also, Marwah and Klein (1996) examined the response of the TB to the ER in the USA and Canada with G7 major trading partners and noted that both countries' TB improved due to ER depreciation.

Likewise, Bahmani-Oskooee and Kanitpong (2001) found evidence of a J-curve effect and asserted the long run relationship between real devaluations and TB for Thailand with 2 of her largest 5 trading partners studied using bilateral trade data. In addition, Lal and Lowinger (2002) reported the occurrence of the "J-curve effect" for 7 East Asian countries. Similarly, Hacker and Hatemi-J (2003) confirmed the J-curve existence for 5 North European countries. Adding on, Arora et al. (2003) found evidence of a J-curve in India and confirmed the existence of a long run relationship between real ER movements and TB. Likewise, Yol and Baharumshah (2007) applied Johansen and panel cointegration tests and showed that real exchange rate depreciation improves the TB in 6 of 10 African countries. The same findings were asserted by Fetene & Soyoung's (2017) investigation that deployed an ARDL approach to cointegration testing and concluded that real exchange rate depreciation significantly improves trade balance in 4 out of 6 East African countries.

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[13] A deliberate downward adjustment of a currency exchange rate against another currency or basket of currencies by a monetary authority adjusted for inflation

[14] Costa Rica, Ecuador, Finland, France, Iceland, Israel, Philippines, Spain, Sri Lanka, and United Kingdom (UK)

[15] Greece, India and Korea and Thailand

In Egypt and using the ARDL approach, Abd-El-Kader's (2013) study established the short and long run relationship between real exchange rate and TB with 20 major trading partners. Similarly, Ibrahim (2016) found a significant relationship between trade deficit adjustment and real effective exchange rate. Likewise, Nabil (2018) conducted a study focusing on the effect of bilateral trade between Egypt and China, which, similar to Abdel Kader (2013) concluded the long-run positive relationship between real bilateral ER and TB with China. Applying different econometric approaches to different samples, these studies systematically confirmed the findings regarding the correlation between the ER movements and the pattern of TB adjustment process. Consequently, conversion to a more flexible exchange rate regime as a savior trade policy becomes on top of the remedial packages peddled to countries struggling with trade account imbalances, and Egypt was no exception. Yet, economists and policy makers do not unanimously adopt this view.

Contrary to the above view, various empirical studies invalidate the J-curve theory and dismissed the notion that ER policy tool could be manipulated to adjust TB in the short-run. Pioneered by Magee (1973) who argued theoretically that even though devaluation improves the trade balance in the long run, the short-run response could vary. Furthermore, Bahmani-Oskooee (1989) corrected for the way he entered the real exchange rate variable to re-estimate the TB model for a previously studied sample and revealed an "inverse J curve" rather than the commonly known "J-curve". Similarly, using bilateral trade data for the USA, Rose and Yellen (1989) found no evidence of a J-curve effect for the US and its selected trading partners, except for Germany and Italy, and rejected the effect of ER on TB for the USA. Likewise, Flemingham (1988) reported the absence of J-Curve effect for Australia. Also, Rose (1990) studied the relationship between real exchange rate and trade balance for a number of developing countries and found that TB is irresponsive to exchange rate depreciation dismissing the view of the corrective mechanism of liberalized exchange rate for

TB adjustment in the case of developing countries. Adding on, Zhang (1996) investigates the response of China's trade balance to the value of Renminbi and concluded the nonexistence of J-curve effect for China. Also, Bahmani-Oskooee and Brooks (1999) and Bahmani-Oskooee and Ratha (2004) use bilateral trade data for the USA and reported the absence of the J-curve in the short-run, yet he confirmed the long run effect of exchange rate on TB. Besides, Bahmani-Oskooee and Goswami (2003) studied the J-Curve for Japan and her trading partners and found evidence of the J-Curve in only 2 of the 9 countries studied and asserted the absence of a specific short-run pattern. Adding on, Wilson (2001) obtained similar results for Singapore, Malaysia, Korea and Thailand with USA and Japan. Recently, Duasa (2007) used ARDL Bound testing to study the relationship between TB and exchange rate in Malaysia and found no evidence for a relationship between real exchange rate and TB.

In Egypt, Bahmani-Oskooee and Hosny (2013) estimated Egypt's industry-level trade flows with EU for 59 industries and found that devaluation improved Egypt's trade balances of 39 commodities. Conversely, Ezzat (2018) confirmed the absence of the J-shaped pattern in Egypt's bilateral trade with 8 main trading partners[16] including Italy and rejected the existence of positive long-run relationship of EGP depreciation on real TB with the 8 studied countries.

Conclusively, as noted in Bahmani-Oskooee and Ratha (2004), the short-run dynamics of the TB following ER depreciation exhibited varying patterns subject to specific country characteristics. However, they praised the outcomes of bilateral trade data models in detecting a positive long run relationship between a depreciating ER and TB adjustment compared to aggregate-level data. Furthermore, they asserted the superiority of commodity-level models in explaining the responsiveness of traded commodities to ER, despite the impediment of varying exported and imported items by a specific country. However, this

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[16] China, France, Germany, India, Italy, Japan, Saudi Arabia and United States of America (USA)

issue could be resolved by deploying trade flows data at commodity level to reduce the 'aggregation bias problem'.

Primarily, as highlighted by Bahmani-Oskooee and Ratha (2004) there are two key strands of literature relevant to the investigation in hand; namely, (a) the aggregate-level studies; (b) disaggregate-level studies at the country or industry level. First, the studies conducted on the aggregate level[17] analyze the impact of ER movements on trade flows between a country and the world. However, such studies were criticized for "aggregation bias" as aggregate data may dilute the impact of individual country characteristics leading to irrelevant outcomes and ultimately uninformed policies. Second, bilateral trade studies[18] were undertaken later on to investigate the bilateral trade between a country and its major trading partners, which despite being a disaggregation at country level, still share the same concern of "aggregation bias" since different industries respond differently to the magnitude and direction of ER movements. Third, industry-level studies[19] are conducted based on industry or sectorial level data aiming to shed light on the unique patterns pursued by different industries/sectors in response to ER variations. In this direction, studies by Breuer and Clements (2003) regarding the exchange rate sensitivity of 58 US exports and 50 imports of specific goods with Japan yielded assertive outcomes in support of the impact of currency depreciation on trade flows as exchange rate carries a significant coefficient in 40 exports and 24 imports.

Noteworthy, the empirical studies questing the J-curve phenomenon in Egypt's TB are not numerous and mostly deploy aggregate trade data. Apparently, the case of Egypt was

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[17] Magee (1973), Junz and Rhomberg (1973), Miles (1979), Himarios (1985, 1989), Bahmani-Oskooee (1985, 1989, 1992, 1995), Felmingham (1988), Noland (1989), Rose (1990), Bahmani-Oskooee and Malixi (1992), Bahmani-Oskooee and Alse (1994), Zhang (1996), Gupta-Kapoor and Ramakrishnan (1999), Lal and Lowinger (2002), Hacker and Hatemi-J (2003), Yol and Baharumshah (2007), Bahmani-Oskooee and Kutan (2009), Fetene & Soyoung's (2017)

[18] Rose and Yellen (1989), Marwah and Klein (1996), Bahmani-Oskooee and Brooks (1999), Oskooee and Kanitpong (2001), Baharumshah (2001), Onafowora (2003), Bahmani-Oskooee and Goswami (2003), Bahmani-Oskooee and Ratha (2004), Bahmani-Oskooee and Harvey (2006), Bahmani-Oskooee and Wang (2006), Abd-El-Kader (2013), Ezzat (2018), Nabil (2018)

[19] Meade (1988), Carter and Pick (1989), Breuer and Clements (2003), Baek (2006), Bahmani-Oskooee and Wang (2007, 2008), Bahmani-Oskooee and Mitra (2008, 2009), Bahmani-Oskooee and Hegerty (2008), Bahmani-Oskooee and Satawatananon (2010), Zaki et. al (2018), Aboulyazid et al. (2019)

tackled in several aggregate-level trade studies like Bahmani-Oskooee and Malixi (1992), Himarios (1989); bilateral trade studies like Abd-El-Kader (2013), Ezzat (2018), Nabil (2018); and commodity-level studies like Bahmani-Oskooee and Hosny (2013) with EU, Zaki et al. (2017), Aboulyazid et al. (2019) with the Arab countries. However, to the best of our knowledge, only few studies have attempted the application of micro or industry-level data. Specifically, Bahmani-Oskooee and Hosny (2013) estimated Egypt's industry-level trade flows' responsiveness to nominal exchange rate changes with EU, which does not capture the inflationary effect of ER depreciation and is subject to "aggregation bias" posed by employing aggregate trade data with the EU bloc rather than bilateral trade data of individual EU countries. Similarly, Zaki et al. (2017) studied the impact of ER developments on firm-level exports, which despite the sophisticated analysis undertaken is limited with respect to trade analysis because it focused only on exports and excluded Egypt's non-substitutable imports.

That said, the proposed topic was approached in several studies that applied a cross-country analysis[20], which entails controlling for variables that could be of relevance to the case of Egypt. For example, there are circumstances pertaining to the Egyptian economy that may promote or impede the TB adjustment if they were factored in the analysis like the persistence of the deficit. In addition, various industries respond varyingly to ER movements, as depreciation might benefit one sector and harm the other. Moreover, there are limited empirical references on the effect of ER movements on TB adjustment speed in Africa generally and on Egypt in particular. The existing studies mostly generally pertain to developing countries, or MENA region rather than focusing on analyzing Egypt's case for future policy review.

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[20] Miles (1979), Bahmani-Oskooee and Malixi (1992), Himarios (1989), Abd-El-Kader (2013)

Furthermore, various researches[21] were conducted to study the distinctive responses of trade flows to positive versus negative ER movements, which is another untapped research area for the case of Egypt. Evidently, Bahmani-Oskooee & Kanitpong (2017) found evidence of short run and long run asymmetric effects of ER changes on TB of 7 Asian economies and asserted that outcomes are country-specific. Similar results were empirically revealed for advanced as well as transitioning economies. Noticeably, the studies about Egypt mostly tackled the response of TB adjustment to currency depreciation, which is limited with respect to accounting for the varying TB response in case of currency appreciation and its relevance to the Egyptian TB adjustment facilitation. Therefore, the purpose of this study is to shed light on Egypt's case, which represents a contribution to the existing literature on the symmetric and asymmetric relationship between exchange rate developments and Egypt's TB adjustment process by deploying bilateral trade data with Italy at the industry level to address the shortcomings of aggregation posed by previous studies about Egypt, which is to the best of our knowledge an untapped and understudied area.

To this date, there is no unanimity over the expected response of a country's TB to ER movements, hence the existence of the J-curve phenomenon, which is common in the Economics discipline and renders the topic subject to extensive research. However, one normally resorts to empirical studies for conclusive outcomes in such dilemmas; which in this case seems to face similar discordance like theoretical studies. The inconclusive nature of the results reveals that there is no direct response to the question of whether the exchange rate regime matters for facilitating the TB adjustment or not. Based on the above studies, one can attribute the discrepancies between different outcomes to the time period variation, difference in methodology, as well as the size and homogeneity of the studied sample. For instance, the relationship may be rejected when cross section panel approach is used due to the dilution of

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[21] Bahmani-Oskooee and Fariditavana (2015), Nusair (2016), Bahmani-Oskooee & Kanitpong (2017)

the impact of individual country characteristics. Yet, pegged regimes might work best for countries that heavily rely on importing inputs that comprise a large proportion of its export production, like Egypt; the matter that prioritizes ER regime fixation over floatation or currency appreciations over depreciations. Eventually, this confirms that the best approach to tackle the proposed quest is by means of a single-country approach.

As it turns out, the outcomes of the studies testing for the impact of ER movements on TB adjustment are almost never unanimous. Generally, this implies that irrespective of the adopted ERR, i.e., free or managed, TB adjustment could be achieved under both arrangements. To confirm, conducting a simple benchmarking exercise to compare the extent of TB adjustment in Egypt, given its relatively rigid exchange rate regime, displayed by percentage changes in the official exchange rate (OER) in Figure 1 below, against that of China, it was revealed that despite the ERR commonality, Egypt's TB/GDP outlined in red in figure 1.1 below is more stable around its average balance of -11.5% expressed as a percentage of real GDP than China, whose TB displayed considerable fluctuations around its mean balance of 3.5% surplus. This indicates that the rigidity of ERR did not contribute to a stable TB in China and suggests that TB stability could be independent of the ERR adopted dismissing the view that a certain regime is favored to the other in addressing TB instabilities:

Figure 1.1: *China versus Egypt's Trade Balance Adjustment*
Source: *Constructed by the author using World Development Indicator (WDI) for GDP and World Trade Organization for merchandise exports and imports (WTO) Data*

Likewise, Japan displayed a relatively more stable TB dynamics as a percentage of real GDP than South Africa, even though both countries operate under flexible exchange rate arrangements. As depicted in Figure 1.2 below, the South Africa's TB/GDP curve outlined in red fluctuates more around its mean balance of -4.39% expressed as a percentage of real GDP compared to that of Japan with a 0.5% average surplus as a percentage of real GDP. Similar to the rigid ERR deduction above, this result also dismisses the view that a flexible ERR could facilitate TB stability as it created a conducive environment for TB stability in Japan, yet failed to achieve this objective in South Africa. Furthermore, comparing the performance of both regimes in achieving TB surplus in China and Japan, China's rigid ERR corresponds to a consistent TB surplus over the examined period despite its relatively frequent departures from the average surplus compared to Japan, whose flexible ERR corresponds to periods of mild surpluses over 2000-2010 followed by periods of mild deficits over 2011-2015. This observation indicates that the flexibility of ERR does not necessarily result in TB surplus.
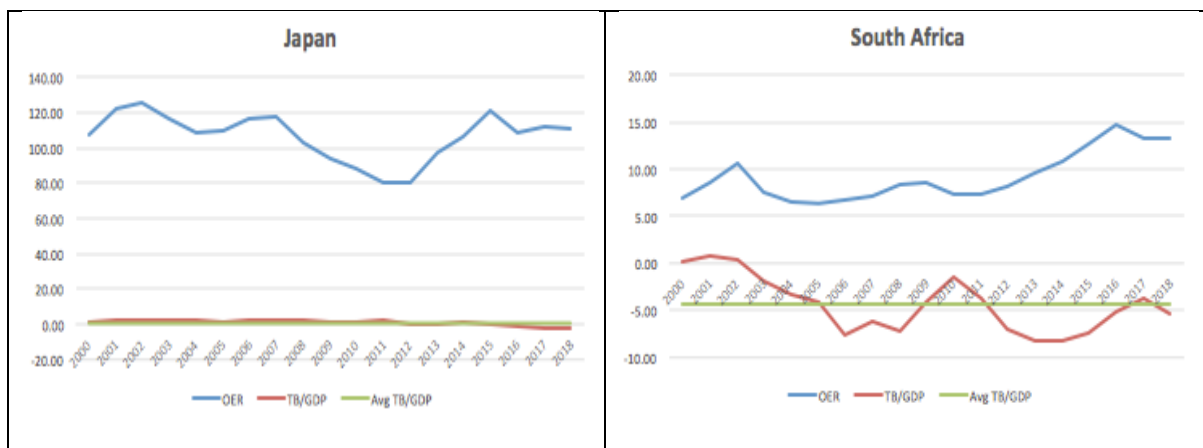
Figure 1.2: *Japan versus South Africa's Trade Balance Adjustment*
Source: *Constructed by the author using World Development Indicator (WDI) for GDP and World Trade Organization for merchandise exports and imports (WTO) Data*

Evidently, the outcomes of the above simplistic juxtaposition question the unanimity of peddling flexible exchange rate polices as a one-size-fits-all solution to trade account imbalances since different economies exhibit distinctive TB dynamics irrespective of the

commonality of the ERR adopted; which warrants the need for customized stabilization policies to counter the unique dilemmas faced by different economies.

Egypt is an interesting country to study knowing its prominent position in the African region. Considered one of the influential and diverse economic powers in the area, Egypt's economic strength is believed to reflect on the region's economic accomplishments. Geographically, Egypt shares economic characteristics with numerous economies in the region, which renders its economic circumstances learning lessons for several surrounding nations that experience similar economic shocks. Additionally, the Egyptian economy has recently undergone various economic policy alterations in terms of trade and macroeconomic measures, which renders it a rich material for academic research that generate policy outcomes applicable to various regional economies with similar characteristics.

For the purpose of analyzing bilateral trade flows for Egypt, a major trading partner was selected based on annual shares in Egypt's total trade. Italy accounts for at least 5.6% in Egyptian annual trade flows, rendering it a representative choice for Egypt's trade pattern. Thusly, analyzing the relationship between ER movements and Egypt's TB with Italy could provide useful insights about the overall Egyptian TB response without sacrificing the benefit of detailed disaggregation.

In line with the recent approaches to study the impact of ER movements on TB dynamics, the research pursued further disaggregation of the trade data at industry level. The industries were selected based on the 2-digit commodity classification of the Harmonized System (HS). The study in hand focused on the top 10 HS chapters that account for 74.6% share of total trade of Egypt with Italy and 43.9% of total trade of Egypt with the world. Finally, the research deploys quarterly data from 2007Q1 till 2019Q4 to factor in the effect of ER policy alteration from 2012 till 2019 on a quarterly basis.

In trade theory, TB for a given economy is defined as the difference between its export revenues and import payments. Accordingly, to build the model, the TB equation was derived based on the theoretical framework as follows:

$$TB = P_x. X - EP_m.M \qquad (1)$$

where TB, P_x, P_M, X, M and E represent balance of trade, export prices, import prices, exports quantity, imports quantity, and the real bilateral exchange rate (RER) of domestic currency respectively. Since exports quantity depends on foreign real income, Y_f, and import quantity depends on domestic real income, Y_d, based on the theoretical framework, TB can be expressed as a function of Y_f, Y_d, and RER as follows:

$$TB = X (Y_f, RER) - M (Y_d, RER) \qquad (2)$$

where TB, X, M, RER, Y_d, and Y_f represent balance of trade, export quantity, import quantity, the RER, which is the units of domestic currency against one unit of a foreign currency, Egypt's domestic real income and the Italy's real income respectively.

In order to investigate the trade balance short run and long run dynamics at the industry level, the TB equation for Egypt is constructed for each of the individual examined chapters following the common practice in the previous literature explained above. As in Rose and Yellen (1989), Bahmani-Oskooee and Brooks (1999) and Halicioglu (2008), Egyptian TB for each selected industry is expressed as a function of RER, real foreign income of Italy and real domestic income in Egypt. According to the theoretical framework, the RER is expected to have significant positive coefficients in the long run since RER depreciation of the EGP is expected to improve TB in the long run as grounded in the ML condition theory. However, as confirmed by Bahmani-Oskooee (1989), the "J-curve effect"

implies that RER's coefficient is expected to carry a significant negative sign followed by positive ones to reflect the "J-curve phenomenon".

As for the asymmetric model, the ER variable is split into two components to account for appreciations and depreciation. To confirm the asymmetry, their corresponding coefficients are expected to carry different signs and vary in magnitude as noted by Bahmani-Oskooee and Kanitpong (2017) and Bahmani-Oskooee and Arize (2019) for African countries.

In addition, it is embedded in the economic theory that there is an inverse relationship between TB and Y_d as higher levels of domestic real income raises demand for imports worsening TB, which implies that Y_d coefficients are expected to carry a negative sign. However, based on the findings of Narayan and Narayan (2005) and Petrovic and Gligori (2010), the sign of Y_d is indefinite in general conditions as it may vary based on whether the economy is supply-driven or adopt inward-oriented growth strategies. Finally, there is a positive relationship between TB and Y_f as higher levels of foreign real income raises demand for a country's exports improving TB, which implies that Y_f coefficient is expected to carry a positive sign. However, it is widely perceived that prior expectations for the signs of the coefficients of domestic and real income variables are indefinite as both can carry negative or positive signs depending on whether demand driven or supply driven objectives are dominating the trade relations between Egypt and Italy during the period under investigation.

On investigating the dynamic relationship between the industry-level TB and RER for Egypt with Italy, there exist many approaches to testing their co-integration in the literature. Namely, in terms of univariate models, Engle–Granger (EG) (1987) approach and Autoregressive Distributed Lags (ARDL) approach developed by Pesaran and Shin (1995)

are deployed to test for co-integration. In terms of multivariate models, a Vector Autoregression (VAR) model based on Johansen (1988), Johansen and Juselius (1990) and Johansen's (1996) are used to undertake studies with multi variables. Each one of the aforementioned approaches come with advantages and shortcomings. While Engle–Granger (1987) approach is praised for the ability to test variables that are integrated of order higher than I(1), it comes with a restrictive property that all variables tested must be of the same order of integration, which is circumvented in the ARDL model. In addition, Engle-Granger model is subject to endogeneity problems, which is overcome in an ARDL approach. Despite its renowned superiority over existing co-integration approaches for its applicability to variables with mixed orders of integration, I(0), I(1) or fractionally integrated, the ARDL model still comes with the limitations of inapplicability to I(2) variables.

Moreover, both EG and ARDL approaches are commended for their parsimonious feature which places them above the Johansen (1998) and Johansen and Juselius (1990) Vector Autoregression (VAR) test that requires multitude of observations and renders the test outcomes highly sensitive to the sample size; whereas the EG and ARDL approaches circumvent the large number of specifications requirement. In addition, the ARDL-based bound test approach integrates the short run dynamics into the long run model estimation enabling both pathways to be estimated simultaneously and confirming its fit for the "J-curve effect" modeling. Furthermore, the Non-linear Autoregressive Distributed Lags (NL-ARDL), which is a variation of the ARDL, is deployed to examine the asymmetric relationship between economic variables. Technically, this will be implemented by decomposing the ER variable into two components; one accounts for currency depreciations and the other accounts for currency appreciations. Ultimately, for the model estimation, the study in hand implemented the bound test based on ARDL and NL-ARDL co-integration approaches to compare the varying response of TB to currency appreciation and depreciation.

In the context of Egypt, understanding of the role of exchange rates in TB adjustment is urged by the IMF call upon Egypt's monetary authority to liberalize its exchange rate and depreciate its currency to achieve various policy objectives, on top of which is the stabilization of its foreign currency market, which was rattling with significant currency shortages due to a dire political situation that warded-off tourists, direct and financial investors. Aiming to re-build its depleted foreign reserves, the CBE executed the EGP floatation. However, aligning with the recent stabilization wave that primarily targets achieving sustainable inclusive growth, an exchange rate policy geared towards a sustainable external balance grounded on non-oil merchandise exports is required to address the persistent TD issue fueled by an overvalued currency due to prolonged management as noted in the work of Mohieldin and Kouchouk (2003) and Noureldin (2018). Essentially, the floatation and subsequent depreciation impact on TB dynamics presented a potential remedy for a gaping trade imbalance; hence, warranting an investigation to observe its impact in the case of Egypt.

In light of the above claims, the effectiveness of this measure becomes questionable. *Ultimately, drawing on the aforementioned studies, the thesis aims to empirically examine the short-run dynamics as well as the long-run relationship between Egyptian Pound (EGP) exchange rate movements and the trade balances of 10 HS Chapters to observe the J-curve phenomenon at the industry level for Egypt's trade with Italy. In this quest, the research ponders the questions of (a) whether the industry-level TBs converge to their respective means with EGP movements? and (b) whether the industry-level TB adjustment process responds varyingly to EGP appreciation versus depreciation?* aiming to distinguish between industries that are positively impacted by ER depreciation and those that warrant ER appreciation to boom for policymaking as well as investment decision-making purposes and to contribute to the academic discussion on the matter.

In this context, the hypotheses set forth for examination are that *(a) exchange rate arrangement facilitates the TB adjustment process in the short as well as long run and (b) TB response to ER movement varies with the direction of the ER change.*

Towards this end, the research in hand is organized as follows: Chapter 2 reviews the relevant literature pertaining to the relationship between ER changes and TB dynamics as outlined in the conceptual and empirical literature. Chapter 3 overviews the exchange rate developments in Egypt over the past 40 years to set the background knowledge, then introduces the methodology with respect to the selection criterion applied for the trading partner and the industries under examination, the model specification and data sources. Chapter 4 presents the econometric model and summarizes the findings. Finally, Chapter 5 presents the concluding remarks and policy implications.

Chapter 2

Literature Review

2.1. Conceptual Framework

The relationship between the trade balance and the exchange rate fluctuations has been extensively studied aiming to confirm or refute the remedial properties of exchange rate policies to persistent trade deficits. Although numerous researches were conducted, the outcomes are unanimously inconclusive. Conceptually, the response of the trade balance to exchange rate movements is rationalized by three approaches; namely: the elatsticities approach, the absorption approach and the monetary approach briefed below:

i. ***The Elasticities Approach:*** This approach entails that ER changes impact TB through changing the relative prices between domestic and foreign products, which eventually alters the volumes of exports and imports; hence the trade balance adjustment. Intuitively, this rationale stems from the renowned Marshall-Lerner (ML) condition, which asserts that currency devaluation and depreciation adjusts TB in the long run provided the price elasticities of exports and imports demand sum up to at least unity. To clarify, a currency depreciation and devaluation effectuates an "expenditure-switching mechanism" through which spending is channeled towards domestic rather than foreign output due to the change in relative prices of domestic and foreign goods[22]. This is attributed to the fact that depreciation and devaluation influence TB in 2 ways: first, it reduces the relative prices of domestic output enhancing its global competitiveness; second, it increases the prices of foreign output relative to domestically produced output; thereby, promoting exports and discouraging imports. Consequently, currency depreciation is expected to correct TD due to its positive impact on trade flows, yet the degree of improvement depends on

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[22] El-Ramly and Abdel-Hameed (2008)

the global demand on the country's exports as well as its capacity to supply more to fulfill this demand. Ultimately, ER manipulation; in particular, currency devaluations become popular policy recommendations for economies struggling with yawning TD.

ii. **The Absorption Approach:** This approach entails that ER changes impact TB through altering relative terms of trade as well as domestic production; hence, channeling consumers' spending from foreign towards domestic goods triggering the TB adjustment. That said, ER depreciation and devaluation improves TB if the resulting increase in domestic economic activity exceeds the size of foreign economic activity. As a result of currency depreciation or devaluation, there would be changes in employment of domestic resources. If the foreign as well as domestic demand on local produced output increased as a result of increased domestic economic activity relative to foreign activity, then TB improves. In addition, depreciation and devaluation result in terms of trade deterioration, which poses an income effect due to reduced real national income and a substitution effect due to switching consumption away from foreign products to domestic products. If income effect dominates the substitution effect, TB deteriorates as a result of currency depreciation; otherwise, TB improves as noted in Baek et al. (2009).

iii. **The Monetary Approach:** this approach entails that ER changes impact the TB through altering the real value of cash balances and /or changing the relative price of tradable and non-tradable products of an economy stimulating the change in consumption patterns from foreign towards domestic goods; hence improving TB. As noted by Baharumshah (2001), currency devaluation or depreciation increases the price of imports. This results in decreasing real money supply, and in turn aggregate demand; hence, improving TB. Alternatively, if the decrease in real money is offset by an increase in nominal money supply following currency devaluation or

depreciation, which in turn increases spending and results in TB deterioration. Eventually, the net effect on TB depends on which factor dominates.

In theory, all three approaches elaborated on above, support the improvement of TB in the long run as a result of ER depreciation or devaluation. To clarify, the elasticities approach suggests that TB improvement will be triggered as price elasticity of exports and imports demand increases in the long-run. Similarly, the absorption approach postulates that the employment and substitution effect of the deteriorating terms of trade dominates in the long-run. Lastly, the monetary approach assumes that decreasing real money would not be offset by increasing nominal money; hence, decreasing spending and improving TB in the long-run. By the same token, the short run TB deterioration can also be explained in light of the three above approaches. Based on the elasticities approach, TB deteriorates due to the short run irresponsiveness of exports and imports demand to currency depreciation. Likewise, the dominance of the income effect and slower domestic economic activity are key contributor to the TB short-run deterioration as explained by the absorption approach. Finally, the monetary approach advances that increases nominal money post currency devaluation or depreciation increases expectation of future income and results in increased spending in the short-run fueling TB deterioration.

Focusing on the elasticities approach rooted in the ML, numerous empirical studies revealed that satisfying the ML condition did not qualify some countries for immediate TB adjustment in response to real ER changes. To clarify, although TB is expected to improve in response to real currency depreciation, there have been cases where the trade balance continued to deteriorate[23]. Ultimately, this phenomenon has shifted the researchers attention to tracing the short-run dynamic time-path of the post-depreciation/devaluation TB adjustment process. Resultantly, researchers reported various patterns for the TB time-path

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[23] Bahmani-Oskooee (1985)

and concluded that it is country specific.

While some studies revealed that the pattern of the TB time-path adjustment resembles a J-letter; hence dubbed the phenomenon "the J-Curve effect", others witnessed S, W[24], N and their inverses[25] paths. Building on studies that concluded the occurrence of a J-Curve time-path in TB responses to ER devaluation/depreciation, TB worsens initially following ER devaluation/depreciation before it improves in the long run as emphasized by the ML condition. In specific, Rose and Yellen (1989) stated that the TB is expected to deteriorate following a depreciation if export and import volumes adjust slowly to movements in relative prices in the short run, but import prices respond quickly to exchange rate changes. They enlisted 3 assumptions underlying the existence of a J-curve: (a) a short-run inelastic response of import volume to import prices, (b) a short-run elastic response of import prices to exchange rate and (c) a sluggish response of export value to the exchange rate. This claim is in line with the work of Magee (1973) that elaborated on the underlying factors contributing to the J-shaped response of the TB post devaluation/depreciation.

Initially elaborating on the short-run effects of the ER devaluation/depreciation, Magee (1973) explained three fundamental phases underpinning the witnessed J-shaped TB short-run dynamics; namely, (a) the currency contracts period, (b) the pass through period, and (c) the quantity adjustment period explained below:

  i. ***The Currency-Contracts Period*** refers to the time period following a currency devaluation/depreciation (evaluation/appreciation) when contracts entered prior to the currency change become due. According to Magee (1973), the trade balance deteriorates in the currency contract period following devaluation/depreciation if there is a larger share of import contracts relative to export contracts denominated in

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[24] Bahmani-Oskooee (1989)
[25] Bahmani-Oskooee (1985)

foreign currencies and asserted that the contract currency is set based on the ER expectations of traders.

ii. **The Pass-Through Period** refers to the time period when world prices quoted in new contracts entered after the currency change incorporate the new ER; thus, reflecting increased domestic currency price index of imports and decreased domestic currency price index of export after devaluation/depreciation without changing volumes of imports and exports respectively. As Magee (1973) noted, the irresponsiveness of import and export quantities in the short-run despite the changes in relative prices triggered by the currency depreciation/devaluation justifies the TB deterioration and export revenues fall short of import payments. The rigidity of export and import quantities in the pass-through period is attributed either to the perfectly inelastic supply as the exporters cannot alter their overseas sales due to supply bottlenecks or to the perfectly inelastic demand as the importers require time to substitute their current purchases. Essentially, the higher the degree of demand elasticity of domestic exports and imports, the more likely is the TB improvement during the pass through period. Furthermore, demand elasticities of exports and imports increase as time passes, satisfying the ML condition and correcting the TB as revealed by Felmingham (1988). Conclusively, Magee (1973) suggests that the rigidity of export and import volumes shortly post currency devaluation/depreciation causes the price effects to outweigh the volume effects justifying the observation of the J-shaped time-path of the TB response to currency depreciation/devaluation.

iii. **The Quantity Adjustment Period** refers to the time period when contracted quantities slowly adjust to relative price variations. Initially, due to the dominance of price effects over volume effects, devaluation tend to lower the dollar value of exports and increase the dollar value of imports; which enhance export volumes and discourage

imports volumes in the long run as price elasticities increases rendering the adjustment of the trade balance.

Supplementing the findings of Magee (1973), Junz and Rhomberg (1973) used annual data for the period 1953–1969 for 13 industrial countries (Austria, Belgium-Luxemburg, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, the UK, and the USA) to compute (i) the average price-elasticities of market shares in manufactured exports and (ii) the average price-elasticities of manufactured exports aiming to estimate the time dimensions and variances of responses of export flows to changes in relative prices. In brief, they found 5 lags of up to 5 years in the response of countries' shares of global trade to ER variations. In specific, they identified a recognition lag, a decision lag, a delivery lag, a replacement lag and production lag. A brief outline of the underpinning lags:

i. *The Recognition Lag* refers to the time is takes for purchasers to recognize the altered exchange rate due to information asymmetries.

ii. *The Decision Lag* refers to the time required to place and finalize new orders.

iii. *The Delivery Lag* refers to the time required to deliver imports and make payments that incorporates the new ER.

iv. *The Replacement Lag* refers to the time required to restock used up inventories.

v. *The Production Lag* refers to the time required by producers to perceive the opportunity as profitable to produce.

Owing to the outlined lags, they argued that the impact of relative price changes brought along by ER alterations on trade balances is subject to lags and recommend measuring the adjustment duration in years rather than in quarters.

Finally, Bahmani-Oskooee and Ratha (2004) summarized the assumptions underpinning the "J-curve effect" to be (a) that import prices increase faster than export

prices immediately following currency devaluation/depreciation and (b) the lagged retreat in import volumes accompanied by a lagged increase in export volumes contributing to the formation of the J-shaped time path of TB.

To explain the relationship between exchange rate and TB in the context of Egypt, its corresponding mechanism, application and implication are concisely portrayed in chart 1 below:
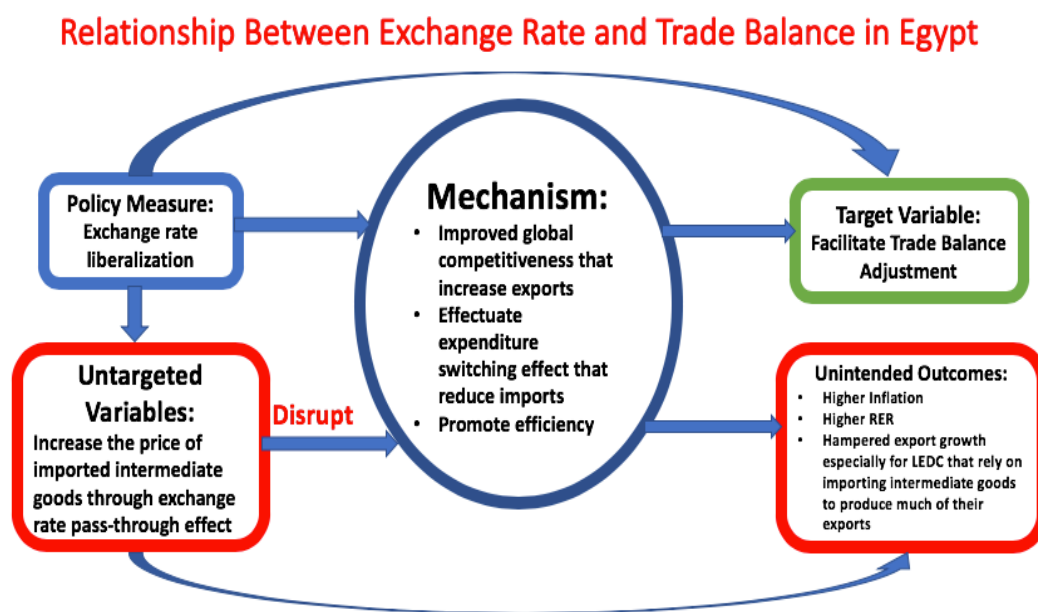
Figure 2.1: *Conceptual framework that links exchange rate policy to trade account adjustment*
Source: *Constructed by the author based on sources referenced in the conceptual framework above*

Chart 1 above illustrates the primary conceptual relationship between currency floatation and TB adjustment as embedded in the economic theory. Conceptually, an exchange rate policy that aims at floating the currency can be deployed to achieve the target of automatic TB adjustment, displayed in the green box to the top right, through the transmission mechanism, displayed in the blue oval in the middle, of improved global competitiveness and expenditure switching effects explained above. However, untargeted variables like the price of imports are also impacted through "the exchange rate pass-through effect", which disrupt the above transmission mechanism and trigger the occurrence of unintended outcomes like higher inflation and appreciated real exchange rates that hamper

export growth especially for LEDC that rely on importing intermediate products; hence, worsening the TB. However, as time goes by, both producers and consumers adjust their volumes to the new relative prices; and thus imports decline while exports rise adjusting the trade balance ultimately. The initial worsening followed by improvement in the trade balance generates a J-shaped time path.

2.2. Empirical Studies

The relationship between exchange rate and TB dynamics has been extensively tackled in empirical literature, yet research in this domain rendered inconclusive outcomes. Bahmani-Oskooee and Ratha (2004) and Bahmani-Oskooee and Hegerty (2009) comprehensively reviewed the relevant literature. Basically, there are two strands of literature on the empirical studies of the relationship between TB adjustment and exchange rate. One pertains to the aggregate level, where the short and long run effects of currency changes on TB are investigated between a country and the rest of the world; whereas the other strand pertains to attempting the study on disaggregated trade data at a country level; i.e., between a country and specific major trading partners which was initiated by Rose and Yellen (1989), and at industry level; i.e., between a country and another applying industry specific trade data pioneered by Meade (1989). In addition to the above, a recent strand of the trade literature was introduced by Bahmani-Oskooee and Fariditavana (2015), who found short-run asymmetric TB response in response to exchange rate changes in 8 out of the 13 African countries studied, and confirmed that TB adjustments react differently to currency depreciations versus appreciations. In this chapter, a detailed chronological review of the relevant trade literature is provided. The literature is classified based on the type of trade data examined in the analysis as aggregate-level and disaggregate-level studies.

2.2.1. Empirical Studies at the Aggregate Level

Aiming to investigate the reasons behind the irresponsiveness of US TB to the USD devaluation in 1971, Magee (1973) used monthly data for exchange rate, domestic and foreign real incomes over the period 1969 - 1973 to theoretically analyze the impact of exchange rate changes and level of domestic and foreign economic activity on US trade based on the elasticities approach. His study highlights the implications of adjustment lags caused by currency contracts, pass-through and quantity adjustments and concluded that the short run J-shaped path is not inevitable as TB could logically take any different pattern. In addition, he asserted the favorable long run impact of ER on TB.

Aiming to provide empirical evidence for the impact of exchange rate on the response of trade flows, Junz and Rhomberg (1973) applied an Ordinary Least Squared regression to annual data of manufactured exports market shares, volumes and relative export prices for the period 1953-1969 to estimate the time dimension of responses of exports of manufactured goods among 13 industrial countries[26] to changes in relative prices. They identified lags of up to 5 years in the response of market shares of countries' world trade to relative price variations due to ER changes attributed to the time required to recognize the devaluation, decide to change real variables, deliver orders, replace inventories, and produce. They also found that 50% of the effects were observed in the first 3 years while 90% were observed in 5 years time.

Juxtaposed with the findings of the previously enlisted studies, Miles (1979) findings did not support the occurrence of a J-shaped pattern in the response of TB post devaluation. He used annual data of trade balances, balance of payment (BOP), income growth differentials, high-powered money to output ratio, government spending to output ratio and ER from 14[27] countries over the period 1956–1972 to incorporate aspects of monetary and

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[26]Austria, Belgium, Luxemburg, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, UK, and USA

[27] Costa Rica, Denmark, Ecuador, Finland, France, Guyana, Iceland, Ireland, Israel, New Zealand, Philippines, Spain, Sri Lanka, and UK

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fiscal policies as well as growth rates into his analysis of the impact of ER changes on both TB and BOP. He applied the seemingly unrelated regression techniques and concluded that devaluations do not improve the trade balance but they do improve the balance of payments through the capital account. Similar results were revealed by Sundararajan and Bhole (1988) who used data over 1960 –1985 and found that devaluation improves the balance of payments of India.

In support of the J-curve phenomenon and retaining Miles (1979) absorption approach framework, modeling technique, and sample, Himarios (1985) used OLS regression on annual data for 10[28] of the 14 countries previously studied by Miles to estimate the real trade balance in relation to the same variables defined by Miles except for the money supply and nominal exchange rate, as both were replaced by M1 and real exchange rate respectively. However, he shows that devaluations improved the trade balance in the traditionally predicted direction. Essentially, he attributed the divergence between his findings and those of Miles to many aspects among which are reliance on nominal rather than real ER to determine trade flows, overlooking ER lagged values and neglecting the sensitivity of the results to measurement units.

While Magee (1973) provided a theoretical explanation for the J-curve concept, Bahmani-Oskooee (1985) introduced the empirical testing method by specifying a trade balance model and imposing a lag structure on the exchange rate as one of the determinants of the trade balance. He used quarterly data for 4 developing countries[29] over 1973-1980 to examine the statistical relationship between devaluation and their trade balances; hence proves or disproves the J-curve effect in their TB time-path. Building on Krueger's (1983) multiplier-based model to estimate the effect of exchange rate variations on trade balance, he defined the trade balance as the indexed values of excess exports over imports, imposed a lag

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[28] Costa Rica, Ecuador, Finland, France, Iceland, Israel, Philippines, Spain, Sri Lanka, UK
[29] Greece, India, Korea, and Thailand

structure on the exchange rate variable where the long run effects of devaluations are factored in, defined the real exchange rate as units of foreign currency per unit of domestic currency, and added domestic and world income as well as domestic and world high powered money. The results supported the existence of a J-curve path for all countries except Thailand, which exhibited an inverse J-curve. Following the common practice, Bahmani-Oskooee (1989) later on re-defined the exchange rate variable in the article enlisted above as the units of domestic currency per unit of foreign currency deflated by the domestic price level and repeated his 1985 study enlisted above deploying the same trade data scope and frequency. Juxtaposed with the previous findings, the results of the corrected study indicated the observance of an "inverse J-curve" for all the studied countries as their TB improved in the short run and then deteriorated in the long run. However, in accordance with the previous findings, only in the case of Thailand had the long-run impact of devaluation on trade balance been favorable.

Duasa (2007) examined the short- and long-run relationships between trade balance, real exchange rate, income and money supply in Malaysia using annual data from 1974 till 200. The study applied an autoregressive distributed lag (ARDL) approach to co-integration and error correction models (ECMs) to determine whether there is evidence of a relationship between trade balance and exchange rate, under the short- and long-run based on the elasticity approach. In addition, the model used in the study incorporated income and money supply variables to relate to the absorption and monetarist approaches. Furthermore, the study applied a Variance Decompositions (VDC) method to account for the Impulse Response Function (IRF) to examine the effects of shocks to the TB triggered by changes in REER, GDP and money supply over time. Essentially, the study found no evidence of a long-run relationship between trade balance and real exchange rate; hence, refuting the validity of the ML condition in the long run for Malaysia.

Later, Bahmani-Oskooee and Kutan (2009) used monthly aggregate data for 11[30] East European emerging economies for the period 1990M1-2005M6 to test for the existence of J curve hypothesis. Towards that end, they applied the bounds testing approach to co-integration to test for the long run dynamics of TB and error correction modeling to capture short run dynamics of TB as a response to changes in their commonly used determinants of ER, domestic and international incomes. Eventually, their study concluded the observation of J-curve effect in only 3 of the 11 countries while the improvement vanished for the remaining countries in the long run, hence, dismissing the potential of relying on ER policy instrument to reform trade in these countries.

Likewise, Halicioglu (2008) used quarterly data from 1980Q1 till 2005Q4 to empirically test for the existence of a J-curve. She employed bounds testing co-integration approach and ECM to estimate the short-run and long run dynamic relationship between TB and real effective exchange rate in Turkey. In addition, she applied Granger causality analysis between trade balance, real effective exchange rates, foreign income and domestic income to examine their co-integrating relationship. Similar to Bahmani-Oskooee and Kutan (2009), the study concluded that the J-curve pattern was detected only in the short-run, but the long run co-integration results were inconclusive.

Hunegnawa and Kim (2017) empirically investigated the relationship between real exchange rate and trade balance in 10[31] East African countries using an ARDL based bounds testing approach to co-integration and ECM on annual data over m 1970 to 2013. The study expressed TB as the ratio of exports to imports as pioneered by Bahmani-Oskooee and Brooks (1999) and related it to its key determinants REER, domestic and international incomes as followed in the common practice. The study concluded that real exchange rate

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[30] Bulgaria, Croatia, Cyprus, Czech Republic, Hungary, Poland, Romania, Russia, Slovakia, Turkey and Ukraine

[31] Burundi, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Tanzania, and Uganda

depreciation improves trade balance in the long run for 7 of the 10 countries, yet the results were significant only for 4 countries. Additionally, their study refuted the existence of J-curve relationship as evidenced by the absence of significant short-run deterioration of the trade balance following depreciation for 7 of the 10 countries; while the REER improves trade balance in the short run for only 3 countries.

Noteworthy, studies carried out at the aggregate level conveyed mixed results, but more often then not fail to support the standard J curve. Moreover, while for some countries, more than one article can reveal the same J curve effect such as for Greece, Japan, for other countries the findings of different studies did not align, as is the case for Egypt, India and the US. Thus, it can be said that time periods analyzed and the techniques used in the examination of J curve effect matters and could lead to different inferences.

2.2.2. Empirical Studies at disaggregate level

Noticeably, the results of the studies enlisted above are inconclusive and country specific suggesting that aggregate level studies that deploy economic indicators for a country vis-à-vis the world might suffer from "aggregation bias" and conceal underlying individual country's TB response to ER variations. This was clarified by Bahmani-Oskooee and Brooks (1999) findings regarding the positive impact of ER variations on TB of a country with another, whereas a negative impact on its TB could be encountered with other countries as dictated by the unique nature of trade between them. Therefore, neglecting the unique characteristics of the trade relation between two countries could invalidate the tests' outcomes. Building on the unique dynamics of the TB of one country with another, bilateral trade empirical studies, which pertain to a country's trade balance with another major trading partner(s), were undertaken to factor in country specific features.

In addition to the above bilateral studies, a recent trend pursue further disaggregation by industry level, where the trade between two or more trading partners is analyzed with

respect to certain industries or commodities. Generally, the further the disaggregation of the study's inputs, the lesser the "aggregation bias" effect of its outcomes; hence, rendering more relevant, reliable and justifiable conclusions.

With this motivation, the studies reviewed in this subsection of the empirical literature review belong to the second strand of literature classified under disaggregate level bilateral trade studies. Then, the following subsection reviewed the industry level studies.

2.2.2.1. Bilateral trade studies

Criticizing the above aggregate level studies for coupling aggregate trade variables of one country with the rest of the world (ROW) and REER, Rose and Yellen (1989) recommended using trade flows at the bilateral level and the real bilateral exchange rate to find more relevant outcomes for the existence of J-curve effect. To that end, Rose and Yellen (1989) pioneered the bilateral trade empirical studying field. Not only did their work contribute to more reliable, relevant and country-specific research outcomes, but also it enhanced the accuracy of the outcomes by ridding researchers of the need to enter a proxy for the ROW income that is considered ad hoc at best and misleading at worst by Bahmani-Oskooee and Brooks (1999) who commended the approach of Rose and Yellen (1989) as well as Marwah and Klein (1996) for using disaggregated data in testing the J-curve existence. Finally, Rose and Yellen's (1989) work is praised for introducing an alternative way to systematically test for the J-curve within co-integration and error-correction modeling techniques by specifying that J-curve can be detected by short-run deterioration combined with long-run improvement in the trade balance due to currency depreciation which replaced the previous methods originated by Bahmani (1985) that focused on the short run adjustment path of the TB.

Owing to the above thoughts, Rose and Yellen (1989) compared the bilateral J curve

effect for the USA with her Group of Seven (G-7) trading partners[32] to the aggregate level J-curve effect using quarterly data from 1960Q1 till 1985Q4. To estimate the TB model, they expressed it in real terms as net merchandise exports of US to a certain G-7 country and then estimated the co-integrating relationship using the Engle and Granger (1987) and Stock and Watson (1986) approaches and OLS as well as Instrumental Variables (IV) estimation techniques with respect to real bilateral exchange rate, domestic and foreign real incomes. Resultantly, the study found no support for a bilateral or aggregate J-curve relationship between USA and its G7 trading partners, yet they found a weak evidence of J-curve in the aggregate level estimation and attributed the discrepancy to the different estimation techniques. To elaborate, unlike, IV estimation outcomes, OLS estimation method yielded a weak relationship between real bilateral TB and ER with aggregate level data. However, the outcome of such estimation is deemed spurious as the use of level non-stationary variables to conduct of the regression analysis invalidates the outcomes of the test. Conclusively, they found no statistically reliable support for the J-curve in the US – G7 bilateral trade relationship. Bahmani-Oskooee and Brooks (1999) criticized the study for the way real TB expression is defined rendered it sensitive to measurement units, the subjectivity of the lag length selection method for the VAR and the reliance on simple autoregressive rather than the superior error correction modeling for the short analysis due to the lack of co-integration. On the other hand, Rose and Yellen (1989) work is praised for defining the J-curve as the combination of a negative short run derivative with a positive long run derivative, which was later on frequently incorporated in many empirical studies to re-examine the J-curve hypothesis.

Marwah and Klein (1996) pursued a similar approach by employing bilateral trade data to compare US and Canada's trade flows with their major G7 trading partners without

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[32] Canada, France, Germany, Italy, Japan, and UK

Italy. They compared the estimates of the TB adjustment in response to changes in global relative price and bilateral price for both countries using both IV and OLS estimation techniques and quarterly data over the period 1977Q1 – 1992Q2. The study revealed that ER depreciation worsened TB in the short run, but improved it in the long run for both Canada and the US. Yet, Bahmani-Oskooee and Brooks (1999) discredit the findings of Marwah and Klein (1996) on grounds of using non-stationary level data that could yield spurious regression.

Later, Bahmani-Oskooee and Brooks (1999) criticized the aggregate level studies conducted to examine the relationship between trade flows and effective exchange rate on grounds of the smoothing out of the effective ER fluctuations due to the concurrent currency appreciation against one currency and depreciation against another that weaken the link between effective ER and trade flows; hence, rendering insignificant link between the studied variables. As previously mentioned, they also condemned Rose and Yellen (1989) and Marwah and Klein (1996) for the shortcomings mentioned above. Building on Rose and Yellen (1989) TB model but correcting for the TB definition, they constructed a model to estimate the short-run and the long-run relationship between the real bilateral trade balance and the real bilateral exchange rate between the US and her G7 trading partners using quarterly data over 1973Q1 and 1996Q2 and an ARDL error-correction modeling and co-integration techniques. Unlike Rose and Yellen (1989), they expressed TB as the ratio of US imports to exports from and to the same trading partner respectively rather than the difference between exports and imports because this expression is unit free, allows for both nominal and real TB data and could be interpreted as the rate of change if logged at the first difference. In line with Rose and Yellen (1989), their findings refuted the existence of a J-curve pattern in the short run; however, they reported different outcomes for the long run relationship as they proved a long run positive impact of real depreciation on US TB which was previously

rejected by Rose and Yellen (1989). The different outcomes were attributed to the error-correction modeling technique deployed in this study in comparison to a simple autoregressive formulation by Rose and Yellen (1989).

Employing a bounds testing co-integration technique, Bahmani-Oskooee and Harvey (2006) used quarterly bilateral trade data over the 1973Q1–2003Q3 period to investigate the impact of real depreciation of the Malaysian ringgit on its in-payments from and out-payments to its 14[33] trading partners. They construct two separate equations to express the exports' and imports' values in terms of the real bilateral exchange rate, the foreign and domestic income. They use the nominal values of export and import rather than the real values due to the unavailability of import and export price indexes on bilateral basis. Eventually, their study concluded that real depreciation has short run effects on exports and imports, yet in the long run it could only increase exports form 5 trading partners. Overall, the study supports the notion that that real depreciation of ringgit could improve the trade balance between Malaysia and five of her trading partners, which are contrasted to the findings of Duasa (2007) that refuted the short-and long-run impact of depreciation on aggregate TB in Malaysia, indicating that the relationship was masked by the use of aggregate data in Duasa (2007).

Following Rose and Yellen (1989) TB model and the bounds testing and error correction modeling approaches, Bahmani-Oskooee and Wang (2006) used quarterly data over the 1983Q1–2002Q1 period to estimate a trade balance model between China and 13[34] major trading partners. They conducted their study by utilizing disaggregated data at a bilateral level to assess the short-run and the long-run effects of real depreciation of RMB. In addition, to account for the feedback effects among the examined variables, they applied a

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[33] Australia, China, France, Germany, Hong Kong, India, Indonesia, Japan, Korea, the Philippines, Singapore, Thailand, the UK and the USA.

[34] Australia, Belgium, Canada, France, Germany, Hong Kong, Italy, Japan, Netherlands, Singapore, Thailand, UK and USA

Johansen's (1988) VAR co-integrating test and impulse response function (IRF). Essentially, the bounds testing approach concluded the real depreciation of exchange rate has a favorable impact on Chinese bilateral TB in the long run with 4 partners, on top of which is the USA; yet, it did not support the J-curve hypothesis that was only observed in 2 out of the 13 countries. Adding on, the study confirmed the co-integrating relationship between ER and Chinese bilateral trade flows to USA, indicating the viability of the real devaluation of the Chinese renminbi (RMB) as an instrument to improve long run bilateral trade with USA. Compared to the bounds test's findings, the results reported by the Johansen based VAR and IRF were in line with those reported by the bounds testing in short run. In addition, they asserted long run favorable impact of real depreciation on bilateral TB with more countries than the previously mentioned 4 cases.

Applying similar empirical test, Bahmani-Oskooee and Ratha (2007) investigate the short and long run effects of the real depreciation of Swedish krona in her trade with her 17 trading partners bilaterally over 1980Q1-2005Q4 period. They found that the bilateral real exchange rate is significant on the bilateral trade balance in trade with 14 out of 17 countries, while in Swedish trade with Austria, Denmark, Italy, Netherlands and the UK the response has the shape of a J letter. However in the long run, the trade balances only with 6 of the countries have a significant relationship with the real exchange rate changes. In particular, the negative short run effects last into adverse long run effects in the cases of Germany, Italy, Switzerland, UK and US.

Seeing that some countries' TB could respond positively to depreciation with one country, but respond negatively with another, researchers attempted further disaggregation by commodity level for more reliable inferences.

2.2.2.2. Sectorial Level Studies

Attempting to shed light on the distinctive properties of the response of individual industries

or commodities trade balances to exchange rate changes for more insightful and country specific outcomes, researchers went for further disaggregation by industry or commodity level. This subsection will focus on reviewing the studies that tackled the dynamics of industry, commodity or sectorial level TB following currency movements in chronological order.

Starting with the original work of Meade (1988) who combined aggregate and sectorial level trade analysis aiming to segregate the response of individual market to exchange rate movements from that of the aggregate TB using quarterly data for the USA over the period 1968–1984. Towards that end, Meade (1988) attempted 3 simulations. In specific, she ran a first simulation where she isolated the effect of exchange rate and assumed no feedback effects to income and prices after exchange rate changes. Then, in her second simulation she incorporated the feedback responses to the dollar's depreciation. Finally, in her third simulation she investigated the effects of a persistent 10% annual deprecation in the dollar's exchange rate. Resultantly, the study did not support the existence of a J-Curve effect in the US aggregate TB response to USD depreciation. Furthermore, she investigated the sectorial J-Curves by focusing on three sectors: non-oil industrial supplies, capital goods excluding automobiles, and consumer goods. Essentially, the findings for this investigation revealed the inconsistencies between the sector specific responses to changes in relative prices (devaluation). In specific, the deterioration in the trade balance for non-oil industrial supplies is short spanned with improvement observed quicker than in consumer goods, which was unresponsive to exchange rate changes. Also, the adjustment path of capital goods did not deteriorate altogether. Clearly, the study neither supported the existence of a J-curve nor a delayed J-curve. Finally, she concluded that the magnitude and timing of the aggregate TB response depends on the magnitude of the ER changes against each competitor, the sector pertaining to the commodities traded and speed of adjustment to exchange rate changes.

Empirically, Baek (2007) examined the dynamic effect of the bilateral exchange rate on bilateral trade of 5[35] forest products between the Canada and the USA by employing industry level quarterly data over the period 1989-2005. In specific, he questioned the impact of ER depreciation on the TB for US forest products with Canada. Similar to the common practice, he adopted the ARDL co-integration technique and the TB model of Rose and Yellen (1989) to estimate the short relationship and could not detect the J-curve pattern in US bilateral forest products TB with Canada, yet he asserted that real depreciation improved the trade balances of softwood lumber, panel/plywood, hardwood lumber and other wood products in the long run.

Similarly, Bahmani-Oskooee and Wang (2008) investigated the response of 88 US commodities TBs with China to real bilateral exchange rate changes using annual data over the 1978-2002 period. Following the common practice, they deployed the bounds testing approach to investigate the short-run and the long-run effects of change in the real Yuan/USD rate on the trade balance of each industry. Eventually, following the traditional definition of the J-curve, which stipulates the observance of initial negative coefficient followed by a positive one for the exchange rate variable, they were able to detect the J-curve in only 3 out of 88 industries indicating a very weak support for the J-curve phenomenon in line with the findings of Rose and Yellen (1989). However, adopting the error-correction modeling and co-integration analysis coupled with the new definition of the J-curve by Rose and Yellen (1989, p. 67), as a negative short-run effect combined with a positive long-run effect, they were able to confirm the favorable long-run effects that real depreciation of the dollar has on the trade balance of at least 34 of the 88 industries. Combining these positive long-run effects with the short-run effects, and incorporating Rose and Yellen's (1989) new definition of the J-curve, they were able to empirically detect the J-curve path in 22 of the 88 industries. These

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[35] Softwood lumber, Hardwood lumber, Panel/Plywood product, Logs and chips, and other wood products.

findings, when bilateral trade data are disaggregated at the commodity level, contradict Rose and Yellen's (1989) findings who used data at the aggregate bilateral level as well as those studies that used aggregate trade data between China and ROW.

Later, Bahmani-Oskooee and Kovyryalova (2008) focused on 177 commodities traded between the United States (US) and the United Kingdom (UK) and applied bounds testing ARDL based co-integration and error-correction techniques to investigate the short-run and long-run effects of exchange rate volatility on US commodity imports and exports from the UK, using two separate equations to estimate exports and imports in terms of a real income, real bilateral exchange rate and exchange rate variability component. They used annual data over the period of 1971–2003. Their comprehensive study concluded real depreciation of the USD increases exports of 75 commodities to the UK and reduced imports of 32 commodities from the UK. These findings contradict Rose and Yellen (1989) who used co-integration analysis and aggregate trade data between the US and the UK and found no long-run relationship between the real bilateral exchange rate and the bilateral trade balance. In essence, Bahmani-Oskooee and Kovyryalova (2008) attributed the divergence between both studies to the fact that the disaggregation of bilateral trade data by commodity provides additional useful insight into the relation between trade flows and the exchange rate.

Seeking to reduce the aggregation bias effect on the outcomes of the research undertaken to investigate the impact of depreciations on TB in India, Bahmani-Oskooee and Mitra (2009) disaggregated the bilateral trade data between India and the US at the industry level for 38 industries to identify the industries that respond favorably to real depreciation. Using annual data over the period 1962-2006, they deployed bounds testing approach and error-correction modeling to examine the short and long run dynamic relationship between depreciation and TB. Eventually, they reported a significant short run response for 22 out of 38 industries, but were able to detect the J-curve in 8 industries indication the long run

favorable effect of real depreciation on bilateral TB with the US in these 8 industries. Clearly, these findings contradict Bahmani-Oskooee (1989) that revealed an inverse J-curve response and Bahmani-Oskooee and Malixi (1992) that concluded the absence of a short and long run TB responses to currency depreciation in India using aggregate trade data. Also, these findings contradict Arora et al. (2003) who empirically observed the J-curve in bilateral trade relation between India and Australia, Germany, Italy and Japan, but reject the long run effect of currency depreciation on bilateral trade with the US. They attributed the different findings of their study to the further disaggregation of trade data employed.

Later, Bahmani-Oskooee and Zhang (2013) investigated the existence of the J-curve between China and the UK for 47 sectors. Using trade data from 1978 to 2010, they employed bounds testing co-integration approach and error correction modeling techniques to capture the short and long run dynamics of the response of TBs to real ER variations at the industry level. Eventually, they showed that the currency devaluation has favorable short-run effects in 38 out of the 47 industries. Nevertheless, the short-run impacts last into the long run in seven cases.

Contrasting the findings of the studies enlisted above, Tutueanu (2015) examined the dynamic effect of the changes of Romanian exchange rate on bilateral trade of Romanian forest products with the ROW. Tutueanu (2015) questioned whether the TB for Romanian forest products benefited from a decline in the value of Romanian Leu (RON). To answer the question, she adopted an ARDL-based bounds testing approach to co-integration to estimate the annual bilateral trade data of Romanian forest products from 1991 to 2013 with various countries in the world. Conclusively, she reported no evidence of the J-curve phenomenon for the trade in Romanian forest products. The long-run analysis showed the exchange rate to be insignificant in influencing the trade balance of Romanian forest products. However, one can identify several shortcomings in the work of Tutueanu (2015) that might render the outcomes

of the research invalid. First, there is a mismatch in the selection of exchange rate variable and the trading partners real income, as the study employed a bilateral exchange rate coupled with world real income. This approach conflicts with the common practice recommend by Bahmani-Oskooee and Bolhasani (2008) and adopted by researchers to employ bilateral ER in disaggregate level bilateral studies and REER in aggregate level studies. Eventually, one could invalidate the outcomes of Tutueanu (2015) work on grounds of inconsistent handling of the data.

To compare the outcomes of aggregate level and bilateral trade level studies, Bahmani-Oskooee and Cheema (2009) investigated the long run and short run effects of exchange rate changes on the trade balance between Pakistan and her 13 trade partners using both aggregated as well as disaggregated level Quarterly data over 1980Q1-2003Q4. The results based on aggregate data between Pakistan and ROW revealed no significant effects of currency depreciation. However, when bilateral trade flows were used, there was evidence of significant short-run and long run effects, at least in six cases. Considering Pakistan's trade balance with one of its major partners, the US, there was no significant effect either in the short run or in the long run.

Questioning the insignificant outcomes of the study and attributing the insignificant relation between the bilateral real exchange rate and the bilateral Pakistani-US TB to aggregation bias, Bahmani-Oskooee et al (2016) disaggregated the Pakistani–US trade flows by commodity and assess the impact of real depreciation of the rupee against the dollar on the bilateral trade balance of 45 industries that account for approximately 45% of the trade between the two countries to exchange rate changes to identify industries that could benefit from real depreciation. They used annual data over the period 1972–2013 and deployed the same empirical approach used in their previous study, which is bounds-testing approach to co-integration and error-correction modeling to estimate the response of trade balance of 45

two-digit industries to exchange rate changes. Contrasting their previous findings, they found evidence of the J-curve effect in 17 out of 45 industries. The short-run effects lasted to long-run favorable effects in 15 industries including the largest industry that accounts for more than 10% of the trade between the two countries. Therefore, the divergence between the research outcomes of both studies can be attributed to the level of disaggregation of the data employed in the study. Clearly, given the same geographical, time and empirical approach settings, both studies rendered different outcomes due to the type of trade data employed; indicating that the further the disaggregation, the more relevant, reliable and country specific outcomes the study yields.

2.3. Studies About the Asymmetric TB Adjustments:

The asymmetric response of trade flows to exchange rate variations has attracted the attention of researchers. Recently, Bahmani-Oskooee and Fariditavana (2015) criticized all of the above-mentioned studies that investigated the effects of currency depreciation on the trade balance on grounds of their assumption that the adjustment of all variables in a given model is in linear fashion. In this respect, they questioned the potential insights that could be unmasked if the linearity assumption was relaxed. To that end, they re-examined the J-curve hypothesis after factoring in the nonlinearity assumption in the adjustment of the exchange rate variable following Bahmani-Oskooee and Fariditavana (2015) by decomposing the movements of the exchange rate variable into its negative (depreciation) and positive (appreciation) partial sum to test whether exchange rate changes have symmetric or asymmetric effects on the trade balance of Canada, China, Japan, and the USA. Using quarterly data over the period 1971Q1-2013Q3, they compared the outcomes of linear versus non-linear ARDL models to test the short run and long run effects of currency depreciation on the trade balance and revealed that more evidence is found in support of the J-curve effects when non-linearity is introduced. However, they acknowledged the aggregation bias

affecting their study as a result of using aggregate trade flows of each country with the ROW and recommended using bilateral and commodity level trade flows for future research.

Attributing Rose and Yellen's (1989) failure to detect the J-curve effect in bilateral level studies to the assumption set forth that the effects of exchange rate changes on TB are symmetric, Bahmani-Oskooee and Fariditavana (2015) assumed introduced non-linearity and decomposed the depreciations from appreciations to separately test their effects on the trade balance. They used quarterly bilateral data over the period 1971Q1-2013Q3 between the U.S. and her G7 trading partners that were previously examined by Rose and Yellen (1989)[36]. They argued that traders could have different expectations and different response to currency depreciations compared to appreciations. If so, the trade balance could respond in an asymmetric manner to changes in the exchange rate. They found that the results from linear ARDL model supported the J-curve in 3 out of the 6 countries examined; however, the results from nonlinear ARDL model supported the J-curve in 5 of the 6 countries. In general, they not only found evidence of asymmetric effects of exchange rate changes on the trade balance but also evidence of a significant short-run and long-run link between currency depreciation or appreciation and the trade balance. Overall, more evidence was found from the nonlinear models as compared to the linear models.

Building upon the asymmetry analysis of Bahmani-Oskooee and Fariditavana (2016), Bahmani-Oskooee and Harvey (2018) compared the outcomes of a linear and nonlinear ARDL models using bilateral data of the US with 13 developing countries of her trading partners[37]. They used quarterly trade data over the period 1993Q1-2015Q4 to empirically test for the short as well as long run dynamics of the TB response to ER movements while separating appreciation from depreciation following the J-curve definition introduced by Bahmani-Oskooee and Fariditavana (2016). The findings of the linear model supported the J-

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[36] Canada, France, Germany, Italy, Japan, and the U.K
[37] Argentina, Chile, Ecuador, Indonesia, Israel, India, Korea, Malaysia, Mexico, the Philippines, Singapore, South Africa, and Thailand.

curve effect with 6 out of 13 partners. However, the nonlinear approach to asymmetry analysis was successful in supporting the J-curve in the US trade with 10 partners. Additionally, while we find support for the short-run asymmetric effects of exchange rate changes in almost all cases, the short-run effects translate into the long-run significant asymmetric effects in half of the cases. Clearly, the linear model's findings comply with Rose and Yellen's definition of the J-curve in 6 partners with the US; however, the non-linear model's findings supported Bahmani-Oskooee and Fariditavana's definition of the J-curve in 10 partners with the US indicating that TB responded differently to depreciation and appreciation in the US. Like other multi-country studies, our findings are country specific.

Bahmani-Oskooee and Arize (2019) assessed the asymmetric effects of exchange rate changes on the trade balance of 13 African countries[38]. They were the first to apply the non-linear ARDL co-integration and error-correction modeling to African countries using quarterly data over different periods. They estimated a linear and a non-linear ARDL model for comparative purpose. In short, they found evidence of significant short-run asymmetric effects in 10 out of 13 countries and evidence of short-run adjustment asymmetry in 8 countries, where the time period it took the TB to respond varied in the case of depreciation versus appreciation. Finally, their study revealed long-run significant asymmetric effects that supported the newest definition of the J-curve phenomenon introduced by Bahmani-Oskooee and Fariditavana (2015) in 6 countries. However, they acknowledged that their findings are subject to aggregation bias due to the utilization of aggregate rather than bilateral trade or industry level trade data and suggested that more asymmetry evidence could be revealed upon utilizing more disaggregated data.

Focusing on the bilateral level trade analysis for a single country, Bahmani et al.

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[38] Algeria, Cameroon, Ethiopia, Ghana, Kenya, Mauritius, Morocco, Nigeria, South Africa, Tanzania, Tunisia, Uganda and Zambia

(2017) estimated the bilateral trade balance models of Tunisia with 6 largest partners[39]. They used monthly data over the period January 2000–September 2016 to estimate the bilateral linear and nonlinear trade balance models of Tunisia by applying a linear ARDL and nonlinear ARDL approaches respectively. They also applied an error-correction modeling to capture the short run dynamics. The results revealed that both the linear models and nonlinear models supported the J-curve effect in the bilateral trade balance models of Tunisia with France, Italy, UK and US, which were later confirmed by the findings of Bahmani-Oskooee and Arize's (2019) aggregate level study on 13 African countries pertaining to Tunisia. In addition, the study revealed that exchange rate changes have short-run asymmetric effects for all countries, yet they have short-run adjustment asymmetric effects and significant long-run asymmetric effects in 3 countries; namely France, Germany and US. This indicates that appreciation and depreciation generates varying dynamics in direction and duration of TB adjustment.

On the bilateral level, Bahmani-Oskooee, Rahman and Kashem (2019) undertook a study to estimate the linear and non-linear ARDL models for Bangladesh bilateral TB with 11 trading partners[40]. They used quarterly data over the period 1985Q1– 2015Q4. The findings of their linear model provided evidence for the J-curve effect with only 1 of 11 partners; whereas, the findings of their non-linear model supported an increased number of 3 partners including their largest partner, the USA. Furthermore, their findings are similar to those of Bahmani-Oskooee and Arize (2019) African countries with regard to the significant short-run asymmetric effects as well as the evidence of short-run adjustment asymmetry in most countries; however, unlike Bahmani-Oskooee and Arize (2019) they were unsuccessful in establishing the long-run asymmetric effects except for a few.

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[39] France, Germany, Italy, Spain, UK and US
[40] United States, India, Canada, Japan, Germany, Singapore, United Kingdom, Korea, France, Canada and Malaysia.

2.4. Studies About Egypt

Although understudied, the relationship between the Egyptian trade balance and the exchange rate movements was tackled in the literature both in cross-country and single-country studies. Furthermore, empirical studies employed Egypt's trade data on an aggregate, bilateral and industry/commodity levels, indicating the diversity of the available literature on Egypt's case. Nonetheless, the limited frequency of the literature leaves room for more research on Egypt's case. In brief, a chronological review of the relevant literature is presented below.

Within the literature pertaining to the relationship between TB and exchange rate movements, Egypt appeared in the work of Rose (1990) that undertook an investigation to examine the empirical impact of the real exchange rate on the trade balance of 30 developing countries including Egypt using annual aggregate level data over the period 1970-1988 as well as quarterly aggregate level data over the period 1977 – 1987 for only 19 developing countries including Egypt. Unlike the methodologies deployed by previous studies that arrived at outcomes based on structural models, he constructed non-structural techniques which directly model the trade balance as a function of the real exchange rate, and both domestic and foreign expenditure following the bilateral model used by Rose and Yellen (1989) on American data. He used two statistics, the first is a Wald test of the joint hypothesis of the impact of the exchange rate on the trade balance in the short and long run and the second test estimated the cumulative effect of exchange rate variable on the TB of each country in the short and long run. In general, the findings of the study could not establish the relationship between real exchange rate and TBs for 28 out of 30 countries. In the context of Egypt, Rose (1990) findings failed to establish the relationship between real exchange rate and TB neither in the short, nor in the long run. However, the positive

coefficient of the cumulative exchange rate variable deployed in the second statistic revealed real depreciation improved the TB in Egypt.

Later, Egypt was one of 13[41] developing countries to which Bahmani-Oskooee and Malixi (1992) applied an empirical investigation to test for the effect of real ER movements on aggregate TBs. Criticizing Miles (1979) and Himarios (1989) for applying bilateral exchange rate to the analysis of aggregate trade balance of developing countries that peg their currencies to major currencies or a basket of major currencies, Bahmani-Oskooee and Malixi (1992) used quarterly data over 1973Q1-1985Q4 for real effective exchange rate to assess the effects of a change in effective exchange rate of developing countries on their trade balances with the rest of the world. To that end, they imposed lag structure on real exchange rate variable to relate trade balances to real domestic and world incomes, real domestic and world high-powered money, as well as domestic and world price levels. Eventually, they concluded that there is evidence of a J-curve effect in the TB response of 4 countries; yet, in line with Magee (1973), they reported TB responses that are N-, M-, I- shaped and their inverses in the short run for some of the studied countries; hence, confirming that the short-run effects may not follow a standard pattern. In specific, they reported an N-shaped pattern for Egypt's short run response, where the TB improved after depreciation, then deteriorated for a while, then improved. Additionally, they concluded that the long-run effects are favorable for most countries except 5. In specific, their findings confirmed the positive long-run impact of depreciation or devaluation on TB of Egypt, which is in line with the findings of Bahmani-Oskooee (1985) and Himarios (1989) who also investigates the J-Curve pattern for Egypt amongst others.

Criticizing Bahmani-Oskooee (1985), Himarios (1989), and Moffett (1989) for using non-stationary data that invalidate the outcomes of the studies, Bahmani-Oskooee and Alse

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[41] Brazil, Dominican Republic, Egypt, Greece, India, Korea, Mexico, Pakistan, Peru, Philippines, Portugal, Thailand, and Turkey

(1994) re-examined the short and long run relationship between the trade balance and the real effective exchange rate for 19 developed and 22 less developed countries including Egypt for the period 1971Q1-1990Q4 by using the Engle and Granger co-integration and error-correction modeling techniques. They define the TB as the ratio of imports over exports and explained that this expression is a) unit free, hence insensitive to measurement units and b) can be represented in real as well as nominal terms. Resultantly, they found evidence of the J-Curve in 4 countries of which 2 are developed and 2 are developing. In specific, the study reported the absence of J-curve effect for Egypt. The findings of this study contradicts Bahmani-Oskooee and Malixi (1992) with respect to the long-run outcomes pertaining to the relationship between the REER and TB for Egypt, but their short run outcomes are aligned.

Later, concentrating on the neglected African continent, Bahmani-Oskooee and Gelan (2012) used quarterly aggregate trade data over the period 1971Q1 till 2007Q4 for some countries and 2008Q4 for others to test for the J-curve hypothesis in 9[42] African countries including Egypt. The study deployed a bounds testing approach to co-integration and error correction modeling to estimate the relationship of the trade balances and its key determinants REER, domestic and international income. Contrasting the findings of Bahmani-Oskooee and Alse (1994), this study asserted the favorable long run impact of real depreciation on the TB of Egypt and 2 other countries, yet both studies agreed on the absence of J-curve effect for Egypt.

On the bilateral level, Abd-El-Kader (2013), used an ARDL-based bounds test to investigate the effects of bilateral real exchange rate RER, GDP and foreign income for trading partners on the bilateral TB for Egypt vis-à-vis 20 of her major trading partners annually between 1989 – 2010.[43] Conclusively, the study asserted the significance of real

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[42] Burundi, Egypt, Kenya, Mauritius, Morocco, Nigeria, Sierra Leone, South Africa, and Tanzania
[43] Algeria, Brazil, Canada, China, Denmark, France, Germany, Greece, India, Italy, Japan, Jordon, Morocco, Sudan, Saudi, Spain, Turkey, Syria, UK and USA

exchange rate changes in explaining long-run dynamics of TB variations in Egypt and suggested that depreciation can improve TB in the long run which is in accordance with the previously enlisted studies that deployed aggregate level data. However, the findings of the study contradicted those of Bahmani-Oskooee and Alse (1994) and Bahmani-Oskooee and Gelan (2012) with regard to the short-run deterioration. Noteworthy, despite the similarity of the co-integration technique deployed by Bahmani-Oskooee and Gelan (2012) and the study in question, Abd-El-Kader's (2013) work asserted the existence of the J-curve effect in the case of Egypt. The different results could be attributed to the level of disaggregation of the data employed in both studies, as bilateral data seems to have unmasked the TB responses concealed by the aggregation.

Attempting to reduce the aggregation bias, Bahmani-Oskooee and Hosny (2013) estimated Egypt's industry-level trade flows with EU for 59 industries. They used quarterly trade data between 1994Q1 – 2007Q4 and applied an ARDL-based co-integration and error correction modeling techniques to compare the responsiveness of trade flows on the industry level to nominal exchange rate changes versus relative prices. They concluded that only 20 of the 59 industries revealed a relatively higher responsiveness to exchange rate compared to relative prices. In addition, they found that devaluation improved Egypt's trade balances of 39 commodities.

Also, Bahmani-Oskooee, Hegerty and Hosny (2014) experimented with 36 separate export and import industry level trade data for Egypt vis-à-vis the USA looking for the link between exchange rate volatility and trade flows. Similar to their study for Egypt's commodity level trade with Europe, they used data spanning from 1994Q1 to 2007Q4 and separately modeled trade flows for 36 industries in terms of income, prices and exchange rate volatility variable. They applied an ARDL methodology and found that half of the traded products responded positively to exchange rate volatility implying the long-run relationship

between these industries and exchange rate movements as well as indicating that variation in the exchange rate could improve TB for these sectors in Egypt-US trade relationship. In specific, their industry-level results shows that chemical imports and exports of industries with large trade shares are more likely to increase than are other products or imports as a result of a fluctuation exchange rate.

Likewise, Ezzat (2018) tested the J-curve hypothesis in Egypt by investigating the dynamics of the bilateral trade balance with its 8key trading partners[44]. He applied an ARDL-based bounds test and error-correction modeling similar to the common practice to examine the impact of real exchange rate changes on the real bilateral trade balance with a focus on testing the J-curve phenomenon. He used panel annual bilateral trade data to estimate both of the long and short run models for the period 1994-2016. Conclusively, the findings of his work revealed that the short-term adjustments do not follow any specific pattern dismissing the existence of a J-curve with the 8 trading partners examined. This is consistent with the main previous findings of Bahmani-Oskooee and Ratha (2004) and Baek et al. (2009) regarding the short-term adjustments of TB because of currency depreciation, but it contradicts those of Abdel-Kader's (2013) given that his work includes all the countries involved in this study. As for the long run, the findings confirm the absence of the J-curve effect in Egypt's bilateral trade with the 8 countries studied as the coefficients of the indicating that depreciation could not improve Egypt's bilateral TB with the 8 main trading partners.

Recently, Nabil (2018) conducted a study focusing on the effect of bilateral trade between Egypt and China. She examined the impact of EGP depreciation against the Yuan on the bilateral trade balance between the two countries using annual bilateral data from 1995 till 2016. She adopted Rose and Yellen's (1989) model and utilized an ARDL-based bounds

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[44] USA, China, Saudi Arabia, Italy, Germany, France, Japan, and India.

testing approach to co-integration and error-correction modeling technique to test the existence of a J-curve in the case of Egypt-China. Similar to the findings of Abdel-Kader (2013), the study confirmed the long-run relationship between real ER and TB indicating the positive long run impact of bilateral real depreciation on bilateral trade with China. However, it could not observe the J-curve pattern with China, which contradicted the findings of Abdel-Kader (2013) whose work asserted the observance of J-curve with China among others.

Recently, Aboulyazid et al. (2019) attempted a bilateral commodity level analysis to study the impact of EGP devaluation on the agricultural TB of Egypt with the Arab countries using annual bilateral data over the period 1995 – 2015. They applied a Johansen co-integration technique to test for the impact of real ER movements on agricultural commodities bilateral TB between Egypt and the Arab countries as well as investigate any evidences for the J-curve. Furthermore, they applied a Granger causality test to investigate the existence of a causal relationship between the same variables and identify its direction. Resultantly, they did not observe the J-curve in the agricultural TB with the Arab countries and asserted that EGP depreciation would not improve the agricultural trade flows with the Arab countries. Additionally, they established that Egypt's GDP and real GDP granger cause the real TB but not the opposite. Clearly, the findings of the study pertaining to the failure to detect the J-curve in agricultural TB between Egypt and Arabs is in line with previous studies like Nabil (2018) who rejected the existence of J-curve in Egypt's bilateral trade with China, yet those findings are in conflict with those of Abdel-Kader (2013) who concluded the existence of the J-curve in Egypt vis-à-vis 20 trading partners, of which 6 are Arab countries. However, it's worth noting that both Abdel-Kader (2013) and Nabil (2018) studied bilateral trade data using a different co-integration technique, unlike Aboulyazid et al. (2019), whose work applied a Johansen co-integration approach, which justifies the different outcomes.

Clearly, the literature pertaining to the dynamics of the TB response to exchange rate

movements is extensively rich, yet the academic arena always welcomes further disaggregated level studies about the matter. This is attributed to the fact that the findings of the existing literature are inconclusive; the matter that qualifies the research topic for further studying, disaggregation and innovative empirical testing approaches. Towards that end, this research aims to contribute to this objective by conducting a disaggregate J-curve analysis on the Egyptian trade balance at both country and industry levels to capture the impact of recent exchange rate policy on the persistent merchandise TD. Thus, the coming chapter will be dedicated to reviewing the exchange rate policy developments in Egypt's recent history and explaining the selection criteria of the trading partner and industries. In addition, the chapter presents the model specifications and data sources.

Chapter 3

Exchange Rate Developments, Methodology, Data and Model Specifications

As gathered from the previous review, the response of the Egyptian TB to the ER changes has been understudied whether on an aggregate, bilateral or industry level rendering this study a welcomed contribution to the infrequently tapped issue. Besides, as indicated in previous research, studies undertaken on a commodity level yield reliable, relevant and country specific outcomes that constitute welcomed contribution by policy makers. Furthermore, the studies concerning the asymmetrical response of TB dynamics to ER variations are seldom for the case of Egypt. That said, the study in hand aims at filling this knowledge gap by examining and comparing the symmetrical and asymmetrical industry level bilateral TB dynamic response to EGP/EUR variations. Given the urge to correct Egypt's persistent TD coupled with the recent reform initiatives to insinuate stability, the Egyptian exchange rate policy is reviewed in this subsection to understand its likely role in this dire external position. This comprehensive research contributes to the strand of literature that focuses on disaggregated data studies to address the "aggregation bias" limitations.

Firstly, the study presents the recent developments in the exchange rate market and overviews descriptively the implications of the floatation on the key targets, such as parallel market trading, dollarization rate, remittances attraction, tourism, foreign portfolio and direct investment over the studied period. Secondly, the selection criteria of partner country and the industries are explained. Thirdly, the trade balance model adopted is presented. Afterwards, the sources and properties of the data are provided.

3.1. Descriptive Analysis of the Exchange Rate Policy Developments

3.1.1 An Overview of the Exchange Rate Policy in Egypt (1980 – 2016)

The exchange rate policy in Egypt is one of the instruments that could be utilized to achieve economic stabilization and sustainable external balance. Thus, an overvalued currency could pose distortive implications on the trade flows encouraging imports and reducing export competitiveness. As noted by Brixiova et al. (2014), current account deficits and increasing inflation over the period of mid 1990 till late 2000 contributed to the overvaluation of the EGP RER. This in turn resulted in the lower competitiveness of Egyptian exports and increased imports; hence, fueling the persistence of trade deficit. Given the urge to correct this persistent TD coupled with the weak performance of Egypt's non-oil exports and the recent reform initiatives to insinuate stability, the Egyptian exchange rate policy is reviewed in this subsection to understand its likely role in this dire external position. In specific, over the period in question the exchange rate policy has developed through six stages, each with distinctive policy objectives and implications as presented below:

1. *From 1980 till 1987:* The foreign exchange rate policy adopted Multiple Exchange Rates (MER) and was geared towards shielding the country against the negative impact of an overvalued EGP and attracting workers' remittances[45]. There were three simultaneous exchange rates. First, a fixed exchange rate handled by the CBE to carry out government transactions. Second, a fixed but weaker exchange rate used by commercial banks to execute transactions pertaining to worker's remittances, tourism and other exports revenues as well as public sector companies. Third, an unofficial free-market exchange rate to attract some of the remittances, tourism revenues and private sector transactions. Accordingly, this arrangement resulted in the overvaluation of the EGP that fueled inflation over the period 1984 - 1990[46] and the

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[45] Mohieldin and Kouchouk (2003)
[46] Brixiova et al. (2014)

increase in the spread between the different exchange rates in the markets above insinuating ER uncertainties[47].

2. *From 1987 till 1991:* In May 1987, the CBE gradually moved to an adjustable peg regime by devaluing the EGP to 2.165/\$1 to match the unofficial market rate and further adjustments to the new fixed rate were planned to reflect the inter-bank exchange rate. The purpose of this new exchange rate era was to gradually resolve the distortions in the exchange rate market resulting from the adopted MER and realign the multiple exchange rates. Eventually, the new policy channeled most of the foreign exchange transactions towards the Central Bank, ended the commercial bank exchange market by 1989 and resulted in EGP depreciation to EGP3/\$1 by end of 1990[48].

3. *From 1991 till 2002:* In compliance with the Economic Reform and Structural Adjustment Program (ERSAP) requirements, MER was abandoned for a unified exchange rate system in which the exchange rate is informed by market forces in May 1991. Specifically, the exchange rate system adopted departed from an adjustable peg to a managed floating[49]. This exchange rate policy primarily targeted economy-wide stabilization, attraction of capital flows that build foreign reserves from \$3.8 billion in 1991 to approximately \$19.6 billion in 1997, which were subject to sterilization measures through the sale of government treasury bills in 1991 to avoid liquidity traps and inflationary issues[50]. Moreover, 1991 marked the year of announcing the nominal exchange rate of EGP/USD as a nominal anchor that is deployed to promote stability and disinflation. Despite achieving its policy objective, this measure contributed to the significant appreciation of the EGP REER, which further undermined Egypt's

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[47] Mohieldin and Kouchouk (2003)
[48] ibid
[49] Massoud and Willet (2014)
[50] Egypt Economic Reform And Structural Adjustment Programme Project Performance Evaluation Report (PPER). African Development Bank Group. 15 May 2000.

competiveness and worsened the TD[51]. Adding on, three shocks hit the Egyptian economy in the late 1990s; namely, falling global oil prices reducing export revenues, Asian financial crisis triggering substantial capital outflows and falling tourism revenues in the aftermath of Luxor terrorist attack. Consequently, falling foreign currency inflows mandated the CBE intervention to stabilize the foreign exchange market by using reserves, which declined to \$13.8 billion in 2001[52]. Aiming to stabilize the foreign exchange market, CBE adopted a *de jure* crawling peg exchange rate system in 2001 and devalued the currency to EGP3.85/\$1.[53] Later in the year, further drop in tourism revenues as a result of the US terrorist attack urged further EGP devaluation to EGP4.14/\$1, then EGP4.5/\$. [54] These devaluations were conducted to resolve the foreign currency shortages that emitted from external shocks and warranted the use of foreign reserves.

4. ***From 2003 till 2012:*** In 2003, reluctant to continue using the foreign reserves to further support the EGP against the lingering effects of US terrorist attacks, the CBE shifted from the *de jure* crawling peg to a flexible exchange rate regime, which further depreciated the currency from EGP 4.6/\$1 to EGP 5.4/\$1, then to EGP6.3/\$1.[55] The key driver of the 2003 EGP floatation was to reconcile the prevalent exchange rate policy conflicting practices of pegging the currency and simultaneously attempting to conserve the foreign reserves required to sustain the peg; thereby, attracting capital inflows by boosting confidence. Moreover, the floatation would enable the CBE to ease the monetary policy to steer the economy.[56] Clearly, 2003 floatation targeted the ER liberalization to relieve the CBE of the need

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[51] Mohieldin and Kouchouk (2003)
[52] ibid
[53] Ezzat (2018)
[54] Massoud and Willett (2014)
[55] Elsherif (2016)
[56] Galal (2003)

to accumulate foreign reserves and tighten the monetary policy; hence, utilizing the policy instrument, i.e., interest rate, to enhance investment and economic growth, which is still in line with the previous exchange rate policy directions pursued in Egypt that centered on the attraction of foreign capital inflow and worker's remittances to obtain foreign currency rather than reinforcing the non-oil merchandise exports competitiveness. In addition, aiming to stabilize the foreign exchange market following the EGP floatation in 2003, CBE launched the Foreign Exchange Interbank market for spot transactions in December 2004 that commit banks to report 2 two-way ER quotations, one for interbank trading and another for clients, upon which the CBE rates[57] are based qualifying Egypt's ER to be classified as a managed float by the IMF[58]. Expectedly, the EGP depreciation coupled with the low elasticity of imports demand accelerated inflation from 3.21% in 2003 to 8.11% in 2004.[59] Consequently, the CBE announced the transition to inflation targeting as a framework for the monetary policy conduct in 2005, which resulted in EGP appreciation to EGP5.8/1$ coupled with increased reserves from $15.4 billion in 2005 to $21.3 billion in 2006 due to controlled inflation and reached $33.6 billion in 2010.[60] In 2011, Egypt's encountered political issues that paralyzed its economic activity, threatened tourists and warded-off foreign investors; all together constitute the key foreign currency sources for the country. Consequently, Egypt was dragged back to the episode of foreign currency shortages that warranted further EGP depreciation. Surprisingly, the exchange rate of EGP/$ slightly depreciated form EGP5.8/$1 in January 2011 to EGP6.1/$1 in November 2012 as the CBE used the foreign reserves to stabilize the

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[57] Retrieved from CBE Website
https://www.cbe.org.eg/_layouts/download.aspx?SourceUrl=%2Fen%2FEconomicResearch%2FPublications%2FSDDSdl%2FExchange%20rate.pdf [Accessed 17 December 2020]
[58] *ibid*
[59] Retrieved from https://www.statista.com/statistics/377354/inflation-rate-in-egypt/ [Accessed December 16 2020]
[60] Elsherif (2016)

exchange rate and shield the import-reliant economy from accelerated inflation[61]. The steady decline in foreign reserves caused the CBE to start auctioning foreign currencies end of 2012 in an attempt to gradually stop depleting the reserves. Resultantly, the EGP exchange rate slightly depreciated to EGP6.7/\$1 by 2013.[62].

5. *From 2013 till 2016:* In 2014, the CBE relied on support from gulf countries to maintain the exchange rate of the tightly managed EGP[63]. Consequently, the stabilized exchange rate of the EGP encouraged demand on foreign currencies, which was expected to result in significant EGP depreciation; yet the borrowed funds enabled the CBE to stabilize the EGP; hence, triggered its slight depreciation by less than 2%. At the same time, high inflation differentials with trading partners caused the EGP REER to experience an 18% appreciation by November 2014.[64] Accordingly, this put the global competitiveness of Egyptian products at a stake. In 2014, CBE increased the auctioned amount of foreign currencies to further support the EGP and stabilize the foreign exchange market.[65] In 2015 and 2016, several measures were implemented to restrict the increased demand on foreign currency, including exchange controls, quantitative limits on non-essential imports, and increasing the deposit cap for imports of intermediate components in exportable products, yet the effectiveness of such measures on controlling parallel market trading were limited as more transactions were carried out in the parallel market to meet the demand of importers.[66] Adding on, by the end of 2015, the Russian airplane crash strapped the Egyptian economy of some tourism cash inflows, which aggravated the conditions in the tourism sector exacerbating the currency shortages. As a result of the

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[61] *ibid*
[62] *ibid*
[63] *ibid*
[64] *ibid*
[65] *ibid*
[66] Restrictions placed on deposits and withdrawals of foreign currencies to limit trading in the parallel market.

dire foreign currency shortages, further EGP depreciation to EGP8.85/$1 was warranted in 2016.[67]

6. *Last quarter of 2016:* In November 2016, the CBE announced the move to a freely floating exchange rate regime to counter the foreign exchange crisis and eliminate the parallel market[68]. Consequently, the EGP depreciated to 13/$1 on the same day, then approximately 18/$1 by the end of 2016. In addition, several reform measures were implemented to support the value of the EGP including raising interest rates to attract foreign financial deposits and reducing energy subsidies to relieve the fiscal deficit by limiting import payments[69]. Along with the adoption of the flexible exchange rate policy, these measures enabled the government to finalize a bailout deal with the IMF worth $12 billion to further support the economic stabilization endeavors and boost foreign borrowing through dollar-denominated bonds to re-build the foreign reserves[70]. In addition, this foreign exchange rate policy had other policy objectives including the attraction of remittances, foreign portfolio and direct investment as well as the reversal of dollarization to re-build the depleted foreign reserves and stabilize the currency market.

As gathered, external shocks were, in almost all the cases above, the major reason for the CBE move to a new ER regime. Apparently, the six phases above overviewing the Egyptian foreign exchange rate policy milestones over the period 1980-2016 highlight the primary overarching policy objectives of attracting foreign portfolio investment and remittances to quickly build plummeting foreign reserves rather than promoting the competitiveness of the non-oil merchandise exports, which is a more sustainable source of foreign currency. Accordingly, this contributed to the overvaluation of the EGP with respect to trading partners

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[67]Ezzat (2018)
[68] Circular dated 3 November 2016 regarding exchange rates free float.pdf Retrieved from https://www.cbe.org.eg/ar/Pages/HighlightsPages/Circular-dated-3-November-2016-regarding-exchange-rates-free-float.aspx [Accessed December 14 2020]
[69] Nourledin (2018)
[70] Ezzat (2018)

and loss of competiveness that undermined the non-oil exports, encouraged imports, increased reliance on exogenous sources of foreign currency like tourism and Suez Canal revenues, remittances and carry-trade. Obviously, these sources are vulnerable to external shocks; hence unstable and should not be counted on as sustainable sources of financing the current account deficit. To elaborate, the repercussions of the currency shortages in Egypt are exacerbated by the over-reliance on these exogenous currency sources to finance the purchase of essential imports of intermediate products. Therefore, to stabilize the foreign exchange market, CBE more often than not intervened by using the foreign reserves, introduced foreign currency auctions and tightened restrictions on currency outflows to support the EGP[71]. Expectedly, merchandise TB was not primarily targeted by the foreign exchange rate policy for most of Egypt's modern history. In the meantime, with the shifting strategies to stabilize and liberalize the economy, more focus should be dedicated to the neglected TB.

3.1.2. The Merits of the EGP Floatation in 2016

Knowing that cracking the parallel foreign exchange market was a key target for the EGP floatation policy rendered the elimination of the parallel market a key success indicator of the policy. To establish the background knowledge, the IMF reported that the EGP was trading at approximately 30% premium in the parallel market over the period preceding the floatation, June 2016 - October 2016 as displayed in figure 3.1 below. [72] As a result, importers and currency traders favored the parallel market to the regulated official banks rate depriving the banking system of foreign currencies that were flooding the black market. The foreign currency shortages paused necessary trading in favor of nonessential trading financed

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[71] Brixiova (2014)
[72] Elnagar, R. 2016. IMF Executive Board Approves US$12 billion Extended Arrangement under the Extended Fund Facility for Egypt. International Monetary `fund Press Release No. 16/501. November 11, 2016 retrieved November 18 2020.

by black market dollars and further destabilized the foreign currency market; the matter that warranted the decision to float the EGP. After the floatation, the EGP official exchange rate depreciated by 48% on average, which increased the dollars traded through the formal banking system after lifting the price regulations. In Figure 3.1 below, displays the relationship between the official and parallel EGP/USD exchange rate prior to and post the floatation.
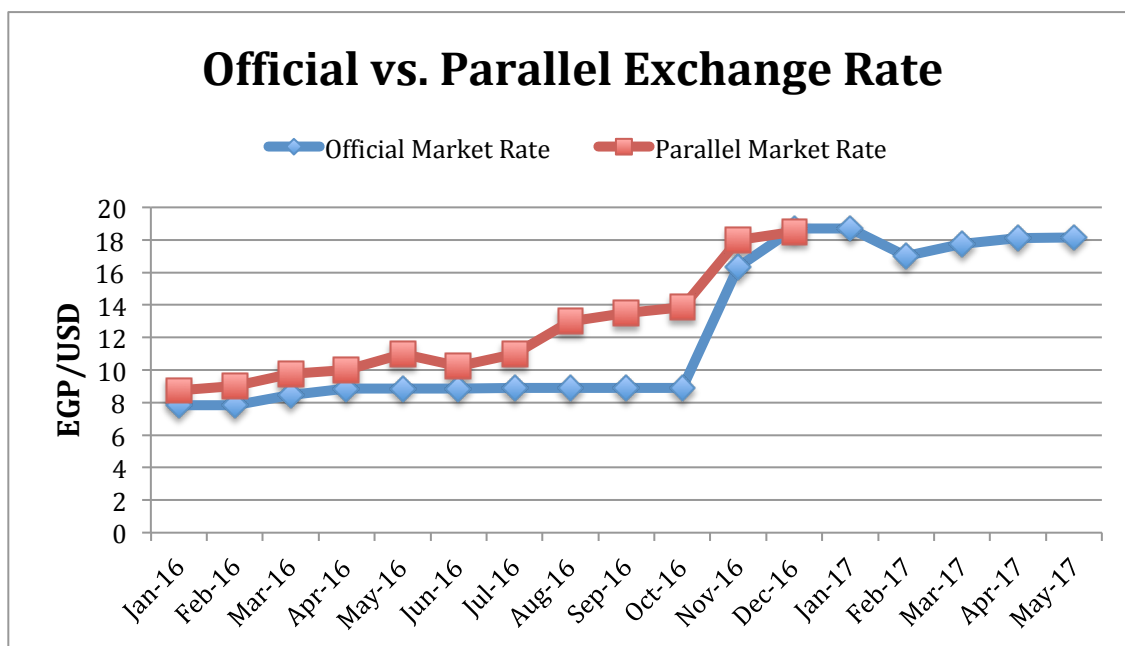
Figure 3.1: The official market EGP/USD exchange rate against parallel market exchange rate.
Source: constructed by the author based on data compiled from CBE, Amcham and media reports.

Figure 3.1 above portrays the progress in narrowing the gap between the official and parallel EGP/USD exchange market rates post currency floatation indicating the success of the ER policy on targeting the elimination of the parallel market. This means that dollars are channeled towards the banking system availing importers the burden of resorting black markets to secure currency required for foreign transactions, encouraging reversal of dollarization and encouraging expatriated remittances to be converted in the official channels.

Another key target of the exchange rate policy implemented by CBE is to reverse dollarization. The dollarization phenomenon in Egypt during fiscal year 2016 is largely attributed to two key factors. First, the fact that Egyptians working abroad were clinging to

their earned dollars in anticipation of EGP devaluation. Therefore, the fall in remittances witnessed over the period 2015Q1-2016Q3 preceding the floatation is an indicator of dollarization. Second, the loss of confidence in the EGP encouraged Egyptians to convert their savings into dollar, which was deemed a safe haven. Focusing on the dollarization phenomenon, Figure 3.2 displays the evolution of the dollarization rate, which is calculated as *Foreign Currency Deposits/ Total Deposits* and expressed in percentage terms and reported by the CBE. Obviously, dollarization rate rose in the period preceding EGP floatation implying that people were rushing to convert their EGP to USD and/or holding on to their dollars to avoid eroding the value of their wealth. Following the EGP floatation that boosted confidence in the EGP, dollarization rate started falling in 2017 and all through 2017/2018 as illustrated in Figure 3.2 below:
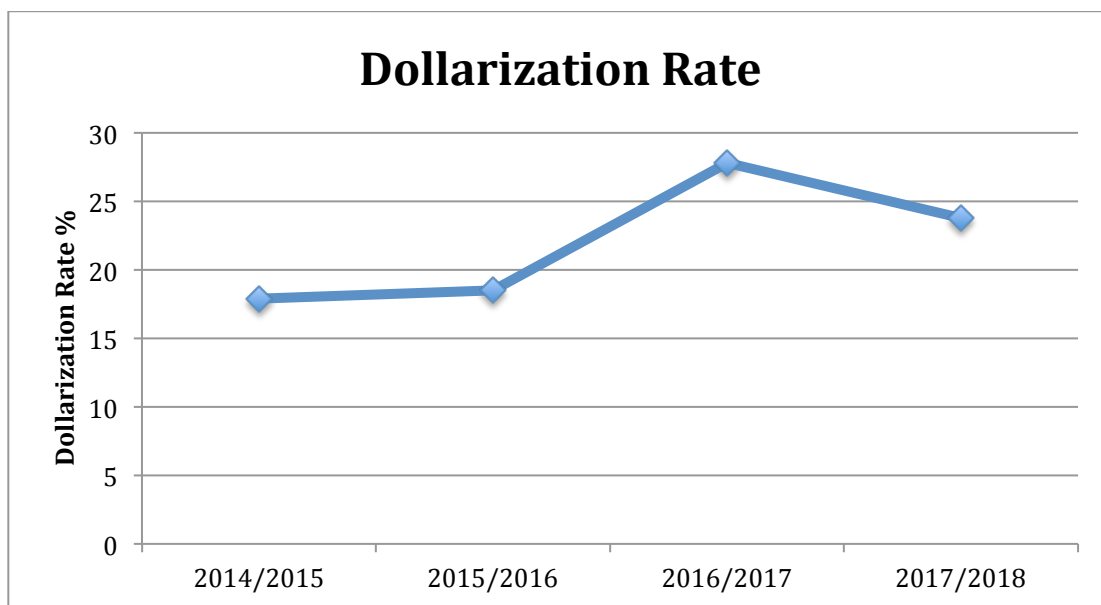
Figure 3.2: The Egyptians' dollarization rate %
Source: constructed by the author based on data compiled from CBE Annual Reports

As hinted above, remittances represents a key source of foreign currency for Egypt together with tourism and Suez Canal revenues[73]. During the period preceding the floatation, Egyptians remitting their overseas earnings refrained from converting their dollars through the official banking system as they sought higher rates in the parallel market; the matter that

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[73] Egypt Country Monitor.IHS Global Inc. 27 February 2017

exacerbated the foreign currency shortages in the official markets. As displayed in Figure 3.3 below, remittances expatriated by Egyptians abroad fall over 2015Q1-2016Q3 as a result of 2 primary factors: the poor economic conditions due to falling oil prices in the gulf countries and converting dollars earned overseas in parallel market. Afterwards, the EGP floatation channeled remittances of Egyptian workers abroad towards the relatively cheaper Egyptian assets and domestic markets. In theory, EGP depreciation is expected to increase inflows of remittances from abroad as revealed by Akcay and Karasoy (2019) in the long run for Egypt. In specific, EGP devaluation is expected to increase remittance inflows and therefore cushion Egypt's external position against crisis.
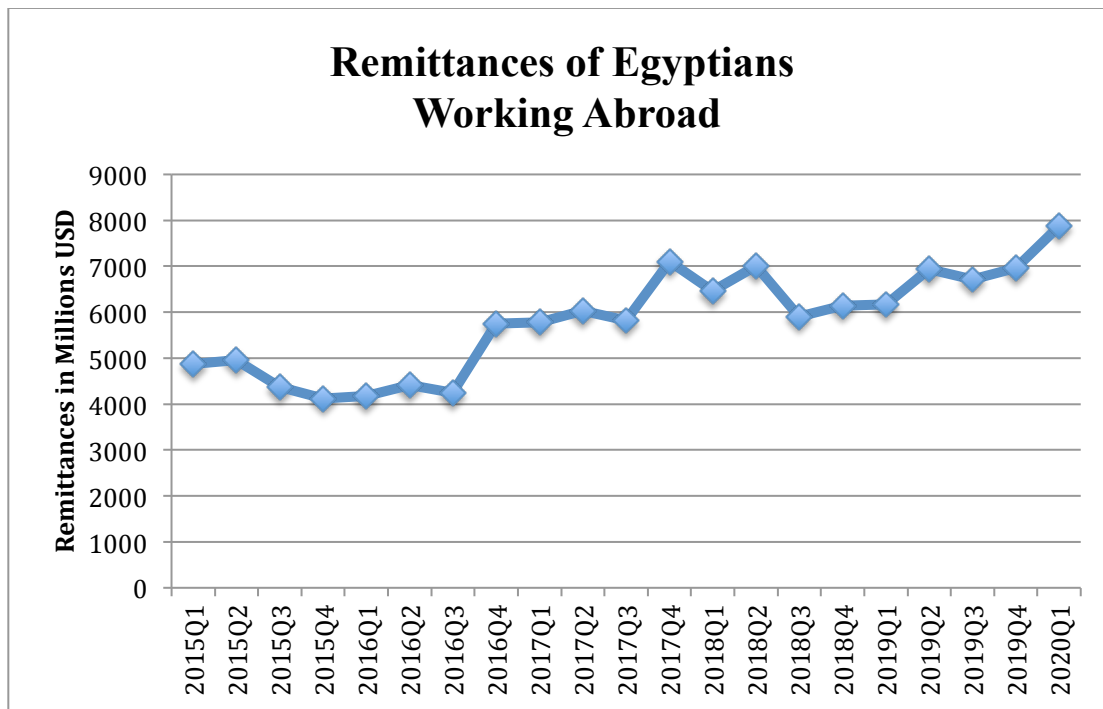
Figure 3.3: The Egyptian remittances in USD
Source: constructed by the author based on data compiled from CBE

Apparently, Figure 3.3 above portraying the remittances of Egyptians working abroad revealed that upon floating the EGP, CBE reported a 35.7% surge in remittances expatriated through the Egyptian banking system from the low of $4.2 billion in 2016Q3 prior to floatation to $5.7 billion in the 2016Q4 following the floatation. Clearly, the floatation boosted confidence in EGP and signaled to USD hoarders that the EGP has hit its minimum

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value against the USD, which encouraged them to de-dollarize. Moreover, remittances continued to rise thereafter despite the deteriorating economic conditions of the Gulf countries that employ most of the Egyptians, which is another reason behind the falling remittances.

In addition to the above, the floatation is expected to potentially boost investors' confidence in the stability of the Egyptian economy by creating an environment conducive for direct and financial investment; hence, stimulating capital inflows in the form of FDI (Foreign Direct Investment) and FPI (Foreign Portfolio Investment). On the FDI side, the EGP floatation is expected to yield a considerable increase in FDI since Egyptian asset acquisition becomes relatively cheaper, hence more potentially rewarding investment opportunities following EGP depreciation. However, the insignificant effect on FDI post EGP floatation displayed in Figure 3.4 below over the period 2016/2017 and 2017/2018 reflects that foreigners are not attracted to invest in long-term projects in Egypt despite efforts to draft investment laws to attract FDI. Noteworthy, the majority of FDI is concentrated in the oil and gas sector, which yields limited employment opportunities and added economic value.
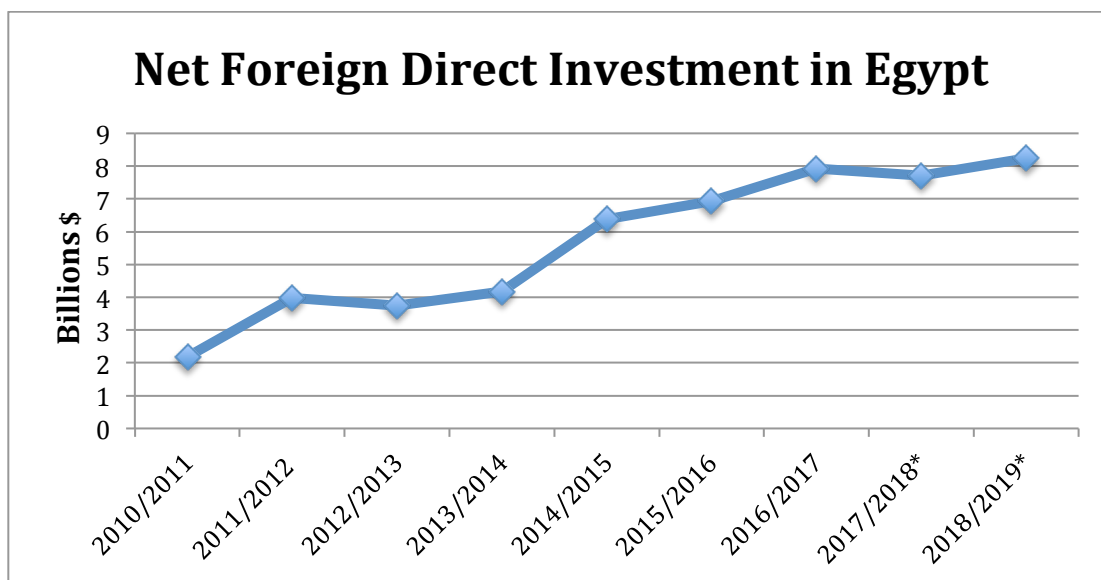
Figure 3.4: Net Foreign Direct Investment in USD
Source: constructed by the author based on data compiled from CBE

As for the FPI, Egypt's have heavily relied on carry trade, where an investor borrows in a low-interest rate currency and use the proceeds to invest in high interest bearing assets denominated in another currency, as a source of foreign currency to finance its trade deficit. The depreciation of the EGP simultaneously occurred with a 300 basis point increase in interest rate to hamper inflationary pressure expected to build up post depreciation. As a result, foreigners perceived EGP deposits as a lucrative investment opportunity; the matter that helped Egypt regains the lost FPI due to the political uncertainty and foreign currency shortages. As clearly charted in Figure 3.5, this spike in Net FPI in 2016/2017 from a deficit of $1 to a surplus of $15.9 billion after the floatation incidence indicates that the EGP floatation realized the objective of raising quick foreign currency through carry trade, as foreigners were lured to deposit their low interest bearing funds into the Egyptian high interest bearing EGP assets. Nonetheless, the volatility of this source of funding poses threats to the Egyptian economy as they lack stability due to their general short-term maturity feature coupled with the tendency to withdraw the investment at first signs of tightening monetary policy rendering this financing source unstable. As shown in figure 3.5 below, the balance dropped significantly as the investment matures and the interest rate plummets to encourage capital investment that spur economic growth.
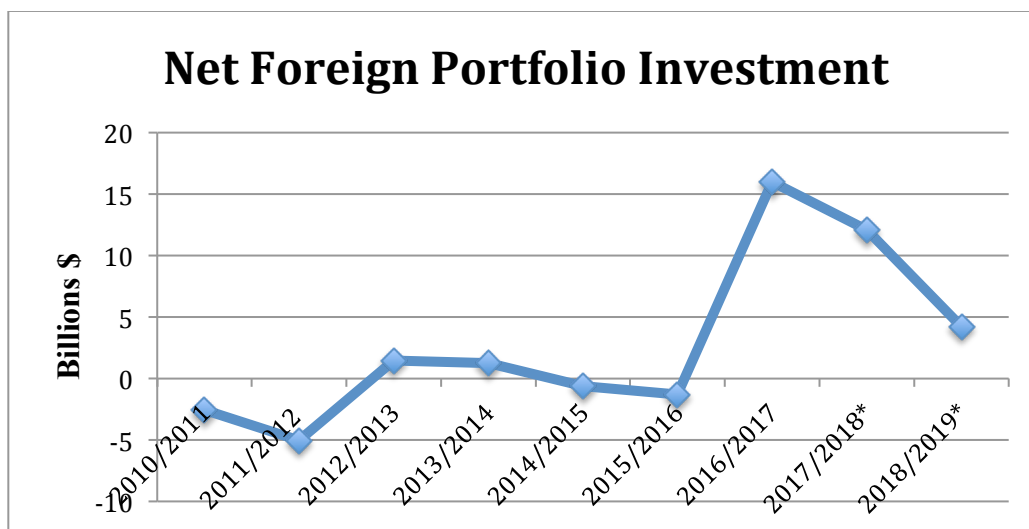

Figure 3.5: Net Foreign Portfolio Investment in USD
Source: constructed by the author based on data compiled from CBE

Indeed, the devaluation of the EGP rendered FPI more affordable and more financially attractive to foreigners, helping Egypt build its dwindling foreign reserves. Egypt finalized the deal with IMF and clutched a $12 billion bail out disbursed over six tranches after fulfilling the ER regime liberalization mandated as one of its main conditions; the matter that contributed to the replenishment of foreign reserves reaching about $39 billion as of November 2020 up form the low of $17.5 billion prior to the floatation.

Further, the service sector is another key target area of the EGP floatation policy since it includes two major components that contribute to the foreign currency sources in Egypt; namely, tourism revenues and Suez Canal fees. In 2011, tourism was hit hardest with Egypt's tarnishing political stance yielding a significant drop in the tourism revenues and corresponding employment in the sector. Knowing that tourism ranked third largest contributor to foreign currency inflows in Egypt in 2014/2015, its post floatation developments become significant to the assessment of the floatation success.[74] Prior to floatation, the tourism revenue started declining in 2010 on the back of economic crisis that hit the developed world and caused less spending on travel. Later, the political conflict and Russian airplane crash in Egypt reinforced the negative effect of the economic crisis on tourism as evident in the trend of the tourism revenues as well as tourist nights that took a nose dive following the political uprising. This trend was reversed by EGP floatation, which yielded a significant depreciation. Eventually, travelling to Egypt become relatively cheaper and attractive to more foreign visitor as evident in the increased number of tourist nights and increased tourism revenues portrayed in Figure 3.6 below.

It's worth noting that people working within the tourism sector are mostly price setters and might benefit from the EGP depreciation only if they lowered their prices quoted

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[74] CBE Annual Report 2014/2015

in local currency to become competitive and appeal to foreign visitors; the matter that squeezes their profit and limits their ability to benefit from the full depreciation. Otherwise, depreciation is expected to increase their revenues in local currency significantly if the dollar quoted prices were not subject to changes.
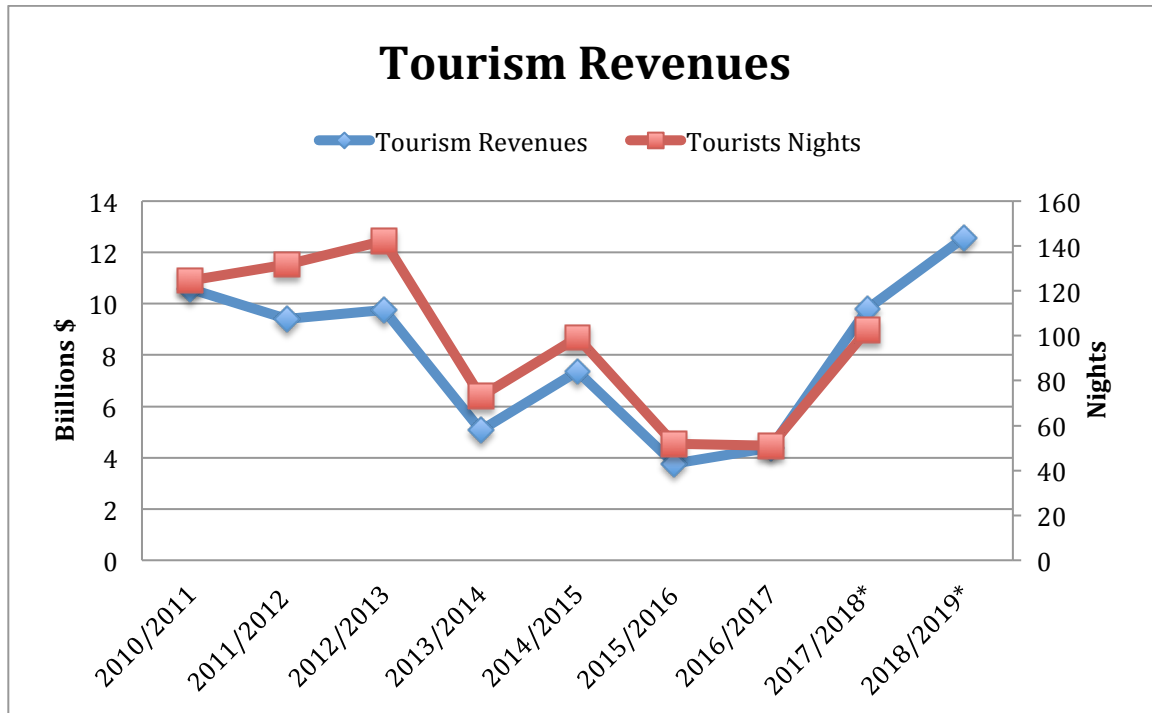
Figure 3.6: Tourism revenues in USD and Tourist Nights
Source: constructed by the author based on data compiled from CBE

Figure 3.7 below compares Egypt's merchandise trade balance to its service balance over the period 2004/2005 – 2017/2018. A closer look at the trend presented by the diagram illustrates a subtle improvement in the merchandise trade balance post the EGP depreciation. Apparently, unlike the service balance that consistently reported a surplus over the past decade, the implications of EGP floatation on the merchandise trade balance that consistently reported a deficit over the same period is more concerning and worth critical examination. Towards that end, an empirical examination of the impact of exchange rate changes over the period 2007- 2019 is conducted to reflect on the possible implications of EGP devaluation on 10 bilaterally traded commodities with a major trading partner.
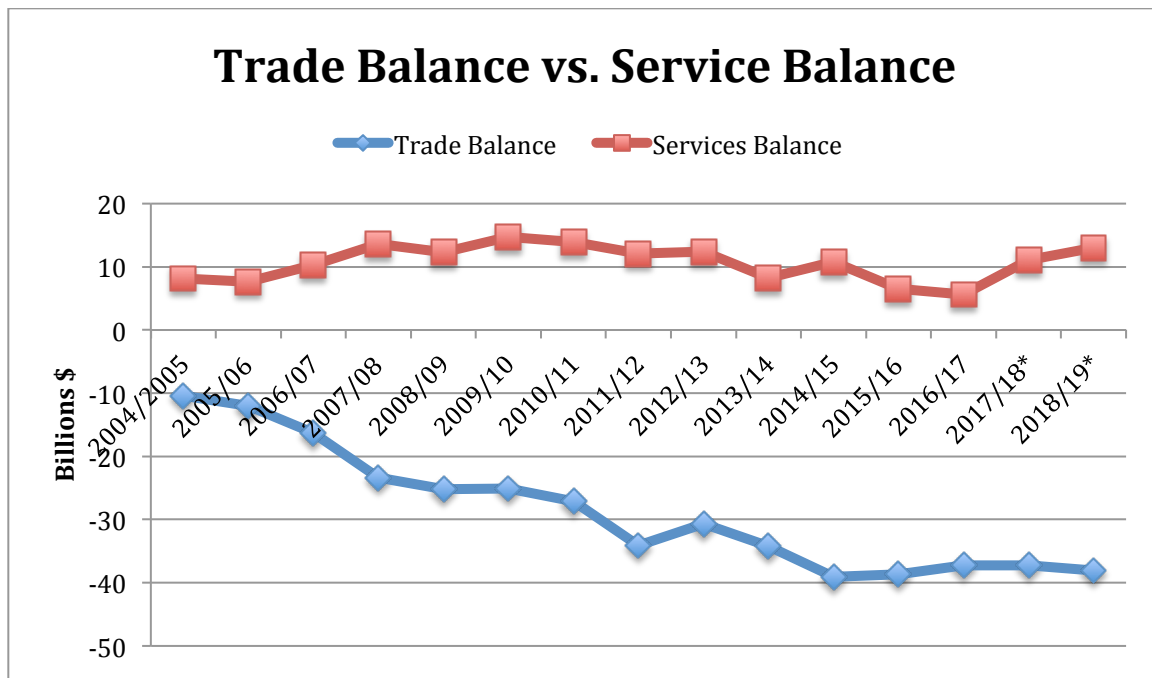
Figure 3.7: Merchandise trade balance versus Service balance in billions USD
Source: constructed by the author based on data compiled from CBE

Noteworthy, the mild impact of EGP depreciation on the TB along with its general poor performance is attributed to the properties of Egypt exports and import basket in terms of product and geographical concentration. To illustrate, Youssef and Zaki (2019) attributed the moderate response of Egyptian exports to EGP depreciation late 2016 to the fact that Egypt exports are highly concentrated in terms of product and destination. In terms of merchandise trade, Egypt's export and import baskets are both dominated by oil exports that accounts for 34%of total export proceeds and oil imports that accounts for 19.8% of total import payments[75]. This indicates that for these products, Egypt operates in markets where all participants are price takers rather than price setters implying that currency depreciation will benefit exporters of fuels, mainly the Egyptian government, as the earnings in local currency equivalent increases since there is no chance of lowering the price of exports quoted in foreign currency in a market where Egypt operates as a price taker like fuels. As a buyer in the fuels market, the EGP depreciation would result in increased import payments quoted in local currency since there are limited chances of negotiating lower foreign currency quoted

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[75] Central Bank of Egypt – Annual Report 2017/2018

prices. On the other hand, for services like tourism where providers of the service are price setters, the EGP depreciation would allow some service providers to squeeze their profit margins by lowering sales price quoted in foreign currency and accept lower prices in pursuit of higher sales, which is an area where currency depreciation boost global market competitiveness unlike the case of price-takers setting. Thus, the overall impact of EGP depreciation on the tradable commodities examined is subject the degree of market power Egypt exploits in each of the 10 markets analyzed.

Furthermore, the low responsiveness of TD to the depreciating EGP was attributed to the product and geographic concentration of Egypt's exports and non-substitutability of imports. In that regard, Youssef and Zaki (2019) constructed Herfindahl-Hirschman Index (HHI) to gauge the degree of geographic concentration for Egyptian export destinations. The HHI revealed that Egypt exports are concentrated and highly exposed because the EU and Arab countries receive close to 70% of Egypt's exports; whereas, trade engagement with Africa remains underdeveloped.

3.2. De-jure versus De-facto Exchange Rate Regime:

Levy-Yeyati and Sturzenegger (2016) defined *de facto* exchange rate as the regime classification of the country's ER arrangement by the IMF, based on market interaction rather than the official statement of the country, in its Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). On the other hand, the *de jure* exchange rate entails the official declaration of the ER arrangement announced the central bank of the country. Basically, Massoud and Willett (2014) identified four ER *de jure* regimes announced by Egypt over the period 1980 and 2013, then the IMF website is consulted for the remaining period until 2016; namely, fixed adjustable peg, managed floating, crawling peg and free floating. This section sheds light on the *de facto* ER arrangements practiced against the *de jure* ER arrangements announced by the CBE over the period 1980 until 2016.

1. The Period From 1980 Until 2000: Prior to 1987, Egypt operated under a fixed exchange rate regime and gradually moved to an adjustable peg in the late 1980s as presented in the above subsection. Egypt managed to maintain the fixed exchange rate due to the abundance of foreign currency sources from oil export revenues, tourism revenues, Suez Canal fees, large remittances and substantial foreign borrowing between 1974 and 1984[76]. Then, the decrease in oil prices in 1982 undermined Egypt's importing capacity, coupled with the continued fiscal expansionary polices between 1982 and 1985 mainly financed by foreign borrowing, led to sliding growth rates in the second half of the 1980s attributed to inability to import intermediate goods and to meet debt-servicing requirements; hence, leading to the external debt crisis of the late 1980s as Egypt's debt-service ratio doubled between 1982 and 1986[77]. Remarkably, the external debt grew to 113% of GDP, yet the overvalued EGP masked the severity of the actual figure that was believed to reach 184% in 1987[78]. Worth noting, this fixed exchange rate policy along with other distorting policies that oriented resources towards the wrong sectors discouraged non-oil exports and exacerbated Egypt's vulnerability to external shocks. Consequently, the Egyptian government resorted to the World Bank with a reform plan against an agreement with the IMF that was reached in May 1987 stipulating the introduction of a free exchange market that unify the exchange rates of the CBE and the Free Bank's Market, devaluation of the EGP, trade liberalization, reduction of subsidies and elimination of other distorting factors to reduce the external as well as budget deficits by giving clearer signals to the economic agents[79]. In specific, the 1987 economic reform program's condition pertaining to the exchange rate policy mandated the Egyptian government to unify the exchange rates and devalue the EGP to maintain the REER

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[76] Arab Republic of Egypt Structural Adjustment Loan 1991-1994: Project Completion Report 1999-2001, African Development Bank, Retrieved online from https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/ADB-BD-IF-99-130-EN-EGYPT-PCR-SAL.PDF [Accessed December 17 2020]
[77] World Bank (1990)
[78] *ibid*
[79] *ibid*

in the free market at competitive level over the period 1989-1992.[80] However, due to disagreement regarding other macroeconomic policies like the size of the budget deficits and nominal interest rates, the 1987 IMF reform program failed; hence, forcing the Egyptian government to seek a debt rescheduling agreement with the Paris Club in May 1987.[81] Despite the granting of the debt rescheduling treatment, the foreign debt financing need was unmanageable, with debt servicing expected to eat up 45% of export proceeds between 1990 and 1992; hence, further concessionary loans or debt relief treatments were needed to re-establish Egypt's debt-servicing capacity.[82] Against the support that Egypt provided in the war against Iraq, Gulf countries and US canceled a large sum of Egypt's foreign debt, which enabled the Egyptian government to obtain further debt relief from the Paris Club members[83]. In pursuant to the IMF 1987 reform, the EGP exchange rate unification was announced in May 1991. However, due to the limited foreign currency supply, destabilizing episodes of EGP depreciation forced the Egyptian government to intervene by supporting the domestic currency qualifying it for the *de facto* "conventional fixed pegged" regime labeled by the IMF in 1998 despite the *de jure* "Managed float" announced by the Egyptian authorities.[84]

   2. The Period From 2001 Until 2002: In January 2001, the CBE announced the adoption of a *de jure* "Crawling Peg" regime, which is perceived as a relatively more rigid arrangement than the de jure "Managed float" announced in the previous period[85]; this could be attributed to the subsequent interventions in the foreign exchange market needed to support the EGP against the harmful impact of late 1990s external shocks explained above. Notably, over this same period, the IMF classification of the *de facto* ER regime remained as "Pre-announced horizontal band that is narrower than or equal to +/-2%".[86] This *de facto*

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[80] *ibid*
[81] *ibid*
[82] *ibid*
[83] Richards (1991)
[84] Massoud & Willett (2014)
[85] *ibid*
[86] ibid

nomination remained till the free-floating regime announced in 2003.

3. The Period From 2003 Until 2016: In January 2003, the CBE announced the adoption of a new *de jure* "Free-floating" regime; yet a year later the IMF re-classified the regime as *de facto* "Managed Floating With no predetermined path for ER" over the period 2004 till 2006 with "Monetary Aggregate Target" framework[87]. Clearly, the economy's overreliance on exogenous sources of foreign exchange coupled with the external shocks referred to in section 3.1 above forced the frequent interventions of the CBE in the foreign exchange market. Massoud and Willett (2014) observed the fluctuations in reserves following the 2003 floatation and compared the variability of the EGP to other currencies (EUR and GBP following the 2003 floatation) with that of the USD to support their belief that the CBE was intervening to fix the ER of the EGP against the USD over the period in question above. Note worthy, the CBE frequent interventions were deemed necessary to avoid long-term ER fluctuations resulting from the volatile capital inflows.[88] To elaborate, Galal (2003) recommended the implementation of market-based exchange rules in the form of "floatation bands" within a Taylor's Rule framework to ensure the success of the 2003 floatation in achieving its targets of attracting foreign capital inflows, making the economy less vulnerable to external shocks and stimulate exports.[89]

By the same token, the foreign exchange market was impacted with the external shock brought along by the financial crisis in 2008; thereby, currency shortages due to sliding tourism revenues and declining Suez Canal fees due to plummeting global trade urged the CBE intervention. Thusly, the IMF re-classified the regime as a *de facto* "Other Conventional Fixed Peg Arrangement" with ER as a nominal anchor in 2008, and then revised it in 2009 as a *de facto* "Managed Floating with no Predetermined Path for ER". Since then, the IMF

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[87] *ibid*
[88] Galal (2003)
[89] An exchange rate policy that corresponds to the monetary authority operating within preset bands and crawling rates around the equilibrium exchange rate.

revisited the *de facto* exchange rate regime every year.

In 2011, the eruption of the revolution in Egypt coupled with the lingering repercussions of global financial crisis led to significant foreign currency shortages due to decreased tourism revenues and substantial capital outflows. However, the EGP slightly depreciated from EGP5.8/$1 in January 2011 to EGP6.1/$1 in November 2012 by means of CBE interventions to supported the value of the EGP by depleting the foreign reserves that reached a record low as documented in section 3.1.1 above. As a result, IMF labeled the ER as *de facto* "Crawl-Like Arrangement". In 2012, the IMF re-classified Egypt's ER regime as a *de facto* "Stabilized Arrangement". Yet, by the end of 2012, in order to control the loss of reserves, the CBE announced the adoption of the new system of auctioning the USD in December 2012. Accordingly, the EGP depreciated against the USD as well as EUR and GBP at matching degrees instead of faring stable against the USD only, indicating that the new auctioning system took Egypt's ER regime a step closer to liberalization and qualified it for the *de facto* "Crawl-Like Arrangement with the ER used as a nominal anchor" label by the IMF in 2013.[90]

Apparently, Egypt liberalized its foreign exchange market to conform to the requirements of economic reform programs in 1987 and 1991. In 2003, the floatation was announced to stabilize the foreign exchange market following the external shocks that led resulted in a drop in foreign reserves warranting the transition to a flexible exchange rate regime in 2003 due to the inability of the CBE to continue supporting the pegged value with the depleting foreign reserves. At the end of this period, the official foreign exchange interbank market[91], established in 2004, eliminated the parallel market and stabilized the nominal exchange rate qualifying Egypt's ER to be classified as a managed float by the IMF.

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[90]*ibid*
[91] Retrieved from CBE Website
https://www.cbe.org.eg/_layouts/download.aspx?SourceUrl=%2Fen%2FEconomicResearch%2FPublications%2FSDDSdl%2FExchange%20rate.pdf [Accessed 17 December 2020]

Noticeably, the external shocks forced the CBE to deviate from the *de jure* flexible regime announced over these periods to a stabilized arrangement to cushion the economy against expected high inflation rates. Massoud and Willett (2014) studied the exchange rate policy after the 2003 floatation announcement until 2013 and concluded that the CBE managed the ER of the EGP with various degree of flexibility against the USD and never freely floated it over this examined period.

Later, the 2011 political turmoil posed similar threats to Egypt's foreign currency market as the declining tourism revenues among other factors plunged foreign reserves rapidly and fueled the formation of a parallel market. In an attempt to rebuild foreign reserves and eliminate the parallel market, the CBE was pressured to move to a more liberal exchange rate regime in November 2016.[92] Similar to the floatation initiative in 2003, CBE attempted to adopt the market – oriented approach that is based on incentivizing market participants to go through the official exchange rate market. This process entails occasional intervention by the CBE to inject foreign currency through open market operations in case of significant deviation form the equilibrium exchange rate[93].

Accordingly, irrespective of the announced exchange rate regime, determining the actual exchange rate regime is subject to the degree of intervention by the central bank in the foreign exchange market; yet as confirmed by Massoud and Willett (2014), CBE intervention was limited to light rather than heavy intervention to stabilize the foreign exchange market except in 2011 as indicated by the substantial loss in foreign reserves between 2011 and 2012. Unable to continue propping the EGP due to the constantly depleting the reserves and aiming to qualify for the required external borrowing, the CBE announced the late 2016 EGP floatation. Since then, the *de jure* exchange rate arrangement officially announced by the CBE is "floating" regime, whereas the *de facto* ER arrangement is classified as

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[92] Zaki, C., Abdallah A., Sami, M., (2019)
[93] Galal, Ahmed, 2003

"stabilized/soft peg" by the IMF with a *de facto* exchange rate anchor to the US dollar[94].

3.3. Scope of the Analysis

3.3.1. Country Selection

To analyze the bilateral Egyptian TB response to bilateral exchange rate variations at the industry level, a leading trading partner of Egypt was identified; namely, Italy. The selection criterion was based on tracking the trading partner with the highest partner share percent over the last 2 decades 2000-2020.

Figure 3.8 depicts the shares of the top 5 trading partners for Egypt over the last 2 decades. Noticeable, Italy has steadily occupied the second largest trading partner preceded only by USA over the period 2000 – 2009 hovering between a maximum of 9% and a minimum of 6% of Egypt's total bilateral trade flows. Furthermore, from 2009 onwards Italy maintained a steady share in total bilateral trade with Egypt with a maximum of 6% and a minimum of 4%; whereas, the US share of total trade took a nose dive falling from a high of 13.5% in 2000 to a low of 6.5% in 2019. Noteworthy, US falling trade share was taken over by China, whose share boosted from being the lowest of 3.8% in 2000 to the highest share partner of 11.8% in 2019. The shares of Egypt's main trading partners presented in Figure 3.8 are accounted for by adding up the total bilateral trade (exports and imports) with the respective countries and express it as a percentage of total bilateral trade of Egypt.

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[94] International Monetary Fund. 2020. Annual Report on Exchange Arrangements and Exchange Restrictions 2019. Washington, DC: IMF Retrieved from: https://www.elibraryareaer.imf.org/Pages/countryreport.html [Accessed December 18 2020]
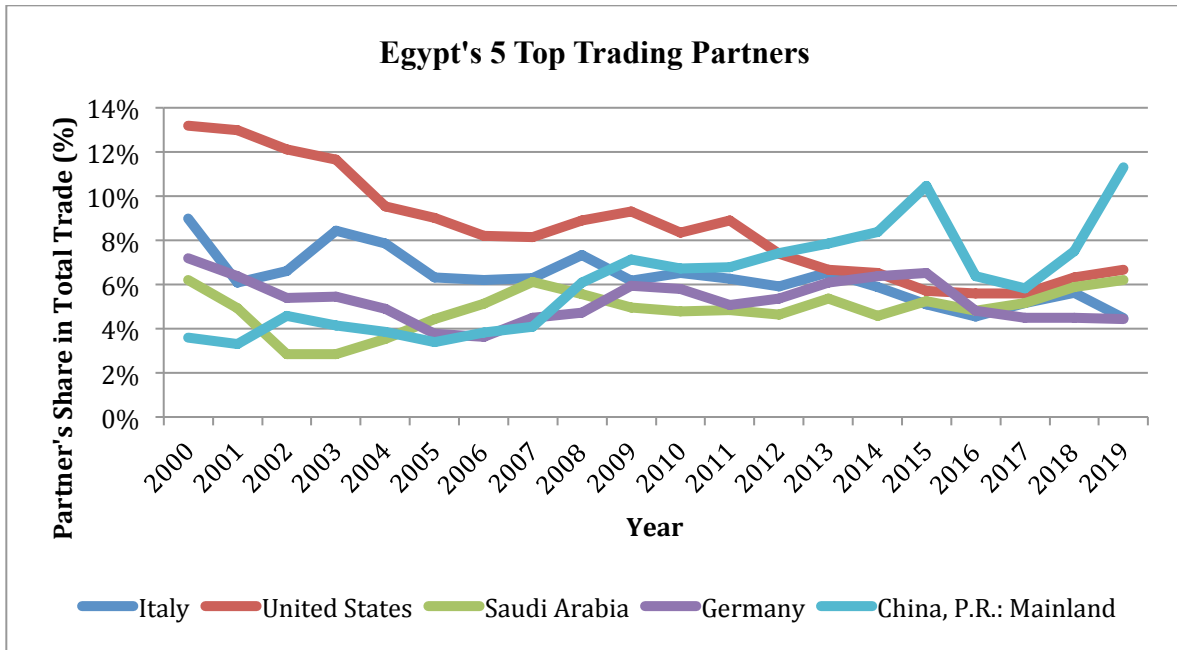
Figure 3.8: Egypt's Top Trading Partner's Share of Total Trade (%)
Source: Calculated by the Author based on trade data gathered from Direction of Trade Statistics (DOTS)

Likewise, as illustrated in Figure 3.9 of Egypt's top export destinations, Italy has been Egypt's largest export destination since year 2000 when no other country topped its share at 16%. It's place was taken over twice between 2000 and 2019, once in 2006-2007 by India and then again in 2016-2017 by United Arab Emirates. Being Egypt's top export destination and key trading partner in terns of total trade qualified Italy to be examined within this study.
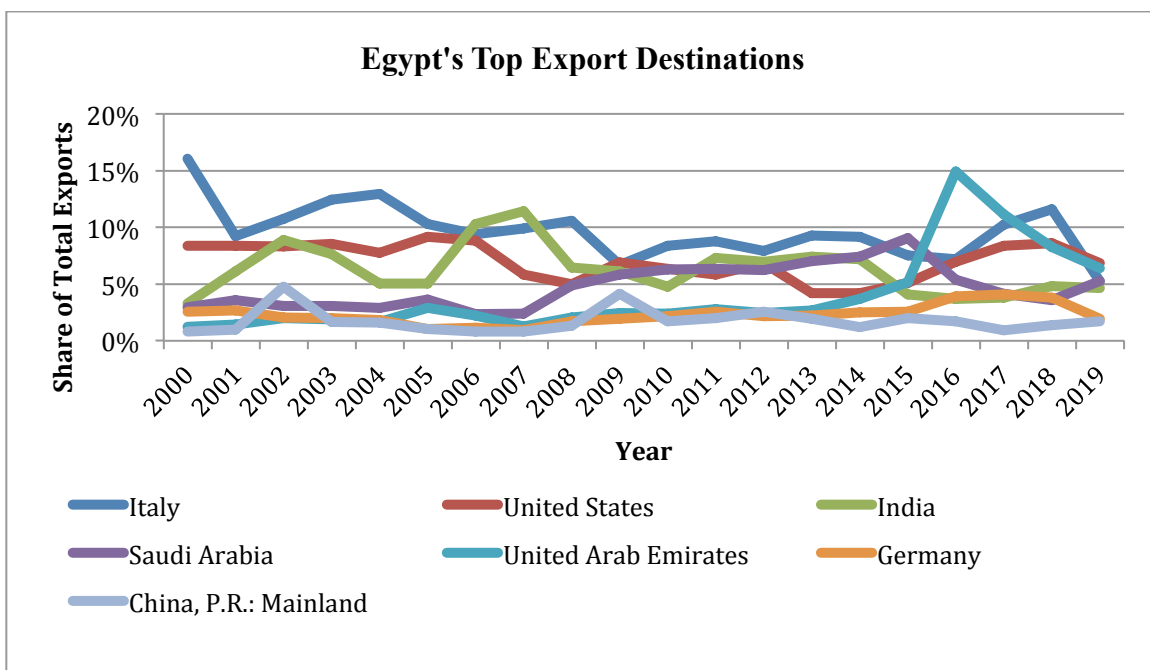
Figure 3.9: Egypt's Top Export Destinations (%)
Source: Calculated by the Author based on trade data gathered from Direction of Trade Statistics (DOTS)

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Furthermore, comparing the dynamics of Egypt's bilateral trade with Italy to that of Egypt's total trade revealed that both patterns pursued similar paths over the past 2 decades. This simple comparison displayed in Figure 3.10 below indicates that Egypt's bilateral TB with Italy is representative of Egypt's total TB, hence analyzing this bilateral relationship could provide insightful outcomes that applies to Egypt's aggregate trade policy. In specific, more often than not, Egypt's bilateral TB with Italy's pattern follows that of Egypt's total TB except for 2009 and 2017; i.e., only 2 years in 2 decades. The divergence between the two TB patterns can be explained by the economic events that affected one of the two countries. However, convergence to the common path occurs instantaneously implying the similarity between both TB's patterns and confirming their powerful representation properties.
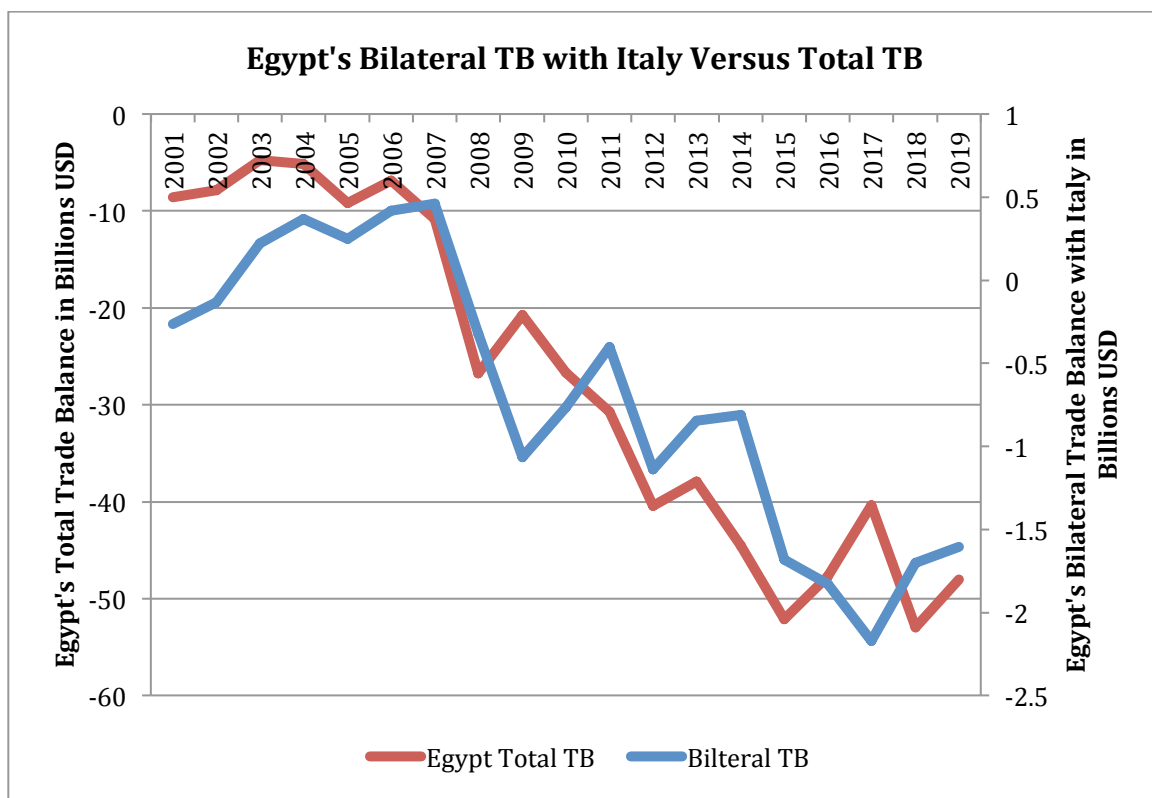
Figure 3.10: Dynamics of Egypt's bilateral TB with Italy compared to Egypt's total TB
Source: Compiled and constructed by the author using trade data from UN COMTRADE Statistics

Building on Youssef and Zaki's (2019) gravity model's findings of 1.74 confirming Egypt's overtrade with Italy over the period 1995 – 2016. This was justified by the geographical distance as well as existing free trade agreements between Egypt and Italy that

facilitates trade. Therefore, the choice of Italy is based on its steadily placement as Egypt's key trading partner, top exports destination, similarity of TBs paths and extensive trade. For these reasons, Italy is selected to undertake our study that questions the existence of industry level J-curve in Egypt's bilateral TB with Italy.

3.3.2. Industry selection

The selection criteria for industries to be employed in the study is based on the Harmonized System (HS) developed by the World Customs Organization (WCO) as a unified coding system for the products traded across borders. For the purpose of examining the TB response to ER variations at the industry level, the study uses the product groups based on HS 2-digit-level chapter classification. In specific, the contemporaneous product groups mostly traded between Egypt and Italy over the period 2007 and 2019 are examined. Accordingly, the top 10 chapters that have accounted for 74.6% of total bilateral trade between Egypt and Italy over the studied period as well as 49.3% of Egypt's total trade are retrieved.

Table 3.1: The average annual trade flows shares of the top traded HS Chapters as a percentage of Egypt's bilateral trade and as a percentage of its total trade.

HS Code	HS Chapter	Shares of Products Group in Bilateral Trade with Italy (%)	Shares of Products Group in Total Trade of Egypt (%)
		2001-2019	2001-2019
'27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	27.3%	19%
'84	Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof	17.9%	7%
'73	Articles of iron or steel	7.1%	3%
'76	Aluminium and articles thereof	4.9%	1%
'85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers; television image and sound recorders and reproducers, parts and accessories of such articles	4.3%	6%
'39	Plastics and articles thereof	4.0%	1%
'72	Iron and steel	3.4%	5%
'52	Cotton	2.6%	5%
'07	Edible vegetables and certain roots and tubers	1.6%	2%
'31	Fertilisers	1.6%	1%
Total Share of Products Group		**74.6%**	**49.3%**

Source: Table constructed by the author using International Trade Center Data

The remaining trade flows that accounts for 26.4% of the bilateral trade with Italy over the same period pertain to items with less than 1% share on average. Similarly, the selected HS chapters account for almost half of the products traded currently by Egypt. As Table 3.1 illustrates, 49.3% of Egypt's total trade is carried out in the set of industries pertaining to the study on hand, which signifies the suitability of the selected chapters to the study and emphasizes their representation power.

3.4. Econometric Methodology:

3.4.1. Identifying the explanatory variables:

The undertaken study investigates the dynamics of the short-run and long-run relationship between bilateral real exchange rate (RER) and industry level trade balance (TB) of Egypt in its bilateral trade with Italy by attempting a single-country approach. For this purpose, bilateral industry level TB of the 10 previously selected HS Chapters are separately regressed on the key TB determinants. As identified by the theoretical framework, TB is defined as the difference between the values of export and import. Accordingly, to construct the model, the TB equation is derived based on the theoretical framework as follows:

$$TB = P_x. X - EP_m. M \qquad (1)$$

where TB, P_x, P_M, X, M and E represent balance of trade, export prices, import prices, exports quantity, imports quantity, and the real exchange rate expressed as units of domestic currency per a unit of foreign currency respectively. Since exports quantity depends on foreign real income, Y_f, and import quantity depends on domestic real income, Y_d, based on the theoretical framework, TB can be expressed as a function of Y_f, Y_d, and RER as follows:

$$TB = X (Y_f, RER) - M (Y_d, RER) \qquad (2)$$

where TB, X, M, RER, Y_d, and Y_f represent balance of trade, export quantity, import quantity, the real exchange rate, country's domestic real income and the foreign country's real income respectively.

In essence, the study in hand follows the reduced form model introduced by Rose and Yellen (1989) and later on frequently followed by a remarkable number of studies like Bahmani-Oskooee and Brooks (1999), Baek (2006), Halicioglu (2008), Bahmani-Oskooee and Kutan (2009), who have modeled the trade balance as a function of real exchange rate, real foreign income and real domestic income as follows:

$$TB = f(RER, Y_d, Y_f) \qquad (3)$$

Furthermore, as practiced in the previous literature, TB is expressed as a ratio of export to import values as in Bahmani-Oskooee and Brooks (1999) and Boyd et al. (2001), or the reciprocal as in Rose and Yellen (1989) and Halicioglu (2008). As noted by Bahmani-Oskooee and Alse (1994) and Bahmani-Oskooee and Brooks (1999), this TB expression is unit free and accommodates TB variables in both nominal and real terms since the ratio is insensitive to the use of price indices to transform nominal to real values. In addition, it is also not uncommon to express TB as the excess of exports value over imports values expressed as a percentage of GDP, which is criticized for overlooking the impact of RER on GDP.

To allow for the utilization of the log-transformation feature, this study followed the practice of expressing TB as a ratio of exports to imports values following Bahmani-Oskooee and Brooks (1999) since Italy is ranked top destination for Egyptian exports more often than not. Figures 3.11 – 3.20 below display the plots of the ten selected HS Chapters' TBs over the period 2007Q1 – 2019Q4. Commonly, the logarithmic transformation is employed in the

study to allow for numerical similar scale of the variables. In addition, the use of logarithmic transformation enables interpretation of coefficient estimates as elasticities.
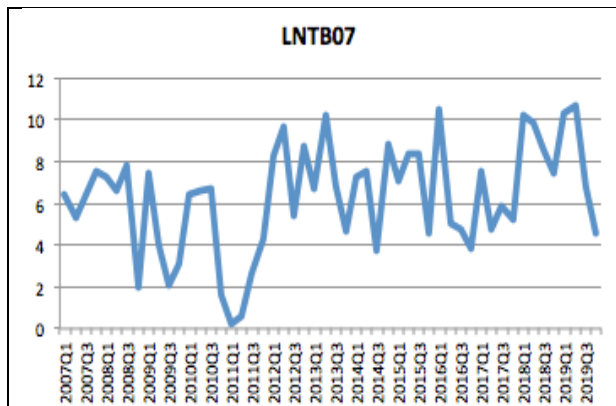
Figure 3.11: Plot of Trade Balance of Chapter '07
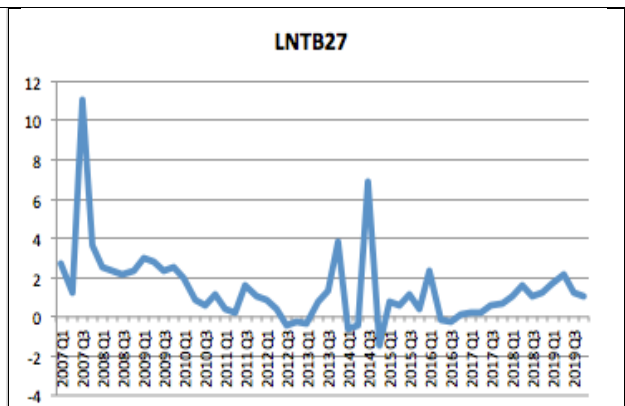
Figure 3.12: Plot of Trade Balance of Chapter '27
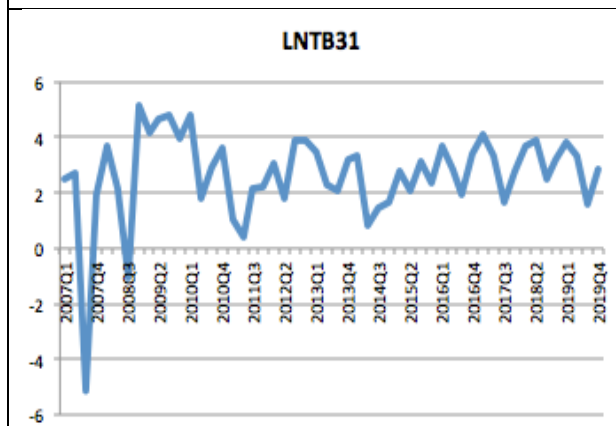
Figure 3.13: Plot of Trade Balance of Chapter '31
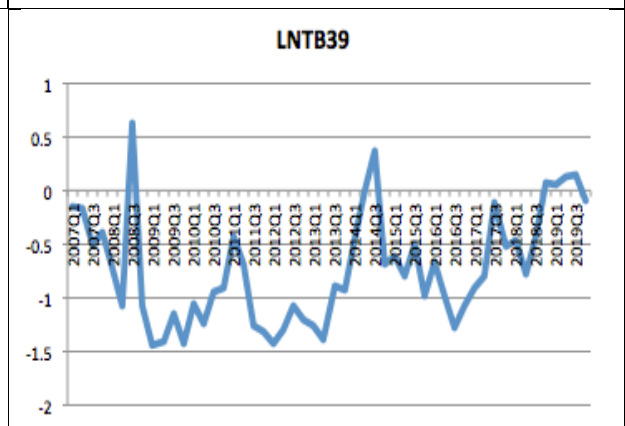
Figure 3.14: Plot of Trade Balance of Chapter '39
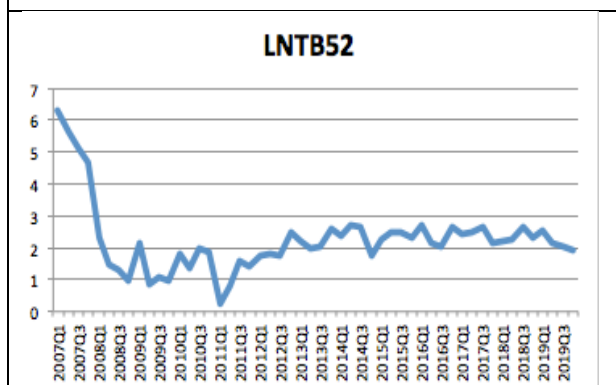
Figure 3.15: Plot of Trade Balance of Chapter '52
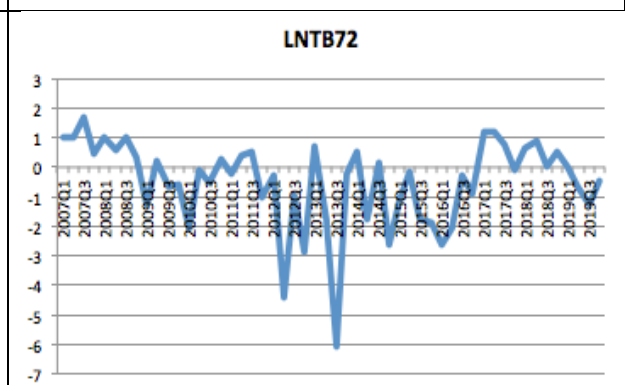
Figure 3.16: Plot of Trade Balance of Chapter '72
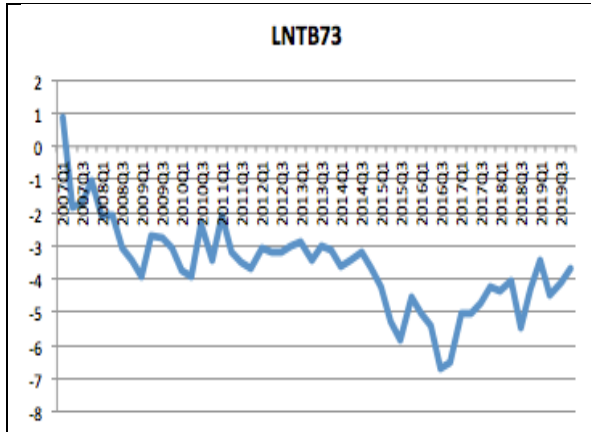
Figure 3.17: Plot of Trade Balance of Chapter '73
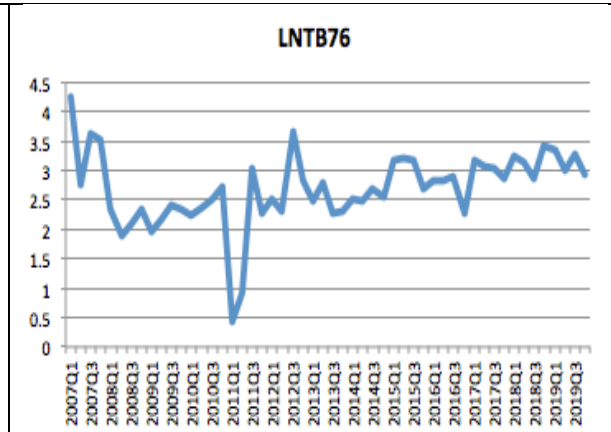
Figure 3.18: Plot of Trade Balance of Chapter '76
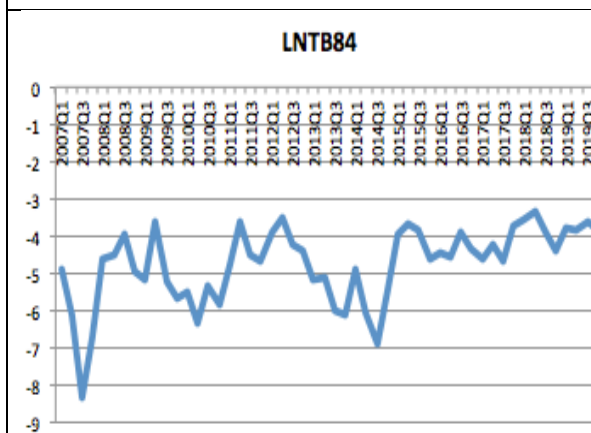
Figure 3.19: Plot of Trade Balance of Chapter '84
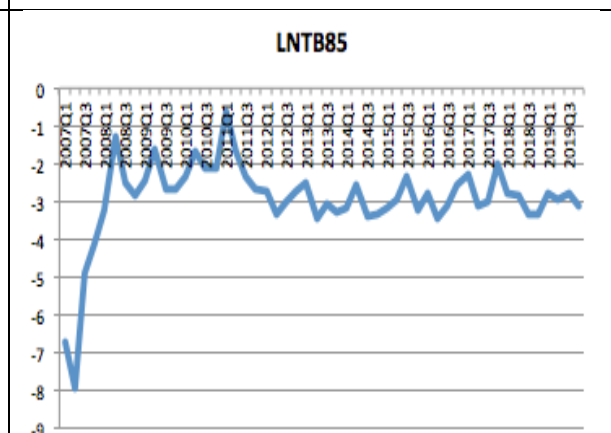
Figure 3.20: Plot of Trade Balance of Chapter '85

Afterwards, TB model is estimated as an equation that takes the following linear-logarithmic long run co-integrating form:

$$lnTB_{it} = \beta_0 + \beta_1 lnRER_t + \beta_2 lnYd_t + \beta_3 lnYf_t + \varepsilon_t \qquad (4)$$

where *lnTB_{it}* is the dependent variable that represents the TB of Egypt with Italy in industry *i* at time *t* expressed as the natural logarithm of the ratio of nominal values of exports of Egypt to Italy over imports of Egypt from Italy of industry *i* at time *t* following Bahmani-Oskooee and Brooks (1999). Next, the TB models of each of the 10 industries are singly regressed on *lnRER_t*, which is the natural logarithm of real bilateral exchange rate of the domestic currency per unit of foreign currency calculated by adjusting the nominal ER of EGP against EUR by the relative CPI of both countries to capture the inflationary effect of

currency depreciation or devaluation on relative prices; i.e., EGP/EUR weighted by CPI_{Italy}/CPI_{Egypt} at time t; $lnYd_t$ the natural logarithm of the domestic real income of Egypt proxied by real Gross Domestic Product (GDP) at time t; $lnYf_t$ denoting the natural logarithm of real income of Italy proxied by real GDP at time t and ε_t is the random error term. Finally, TB variables are obtained in EUR, domestic income is obtained in real terms in EGP and foreign income is obtained in real terms in EUR.

According to the theoretical framework, the bilateral RER variable is defined as the units of domestic currency (EGP) per unit of foreign currency (EUR), therefore, a depreciation of EGP against EUR yields an increasing lnRER. Therefore, it is expected that β_1 would be positive because a RER depreciation is expected to improve trade balance of the modeled industry in the long run as grounded in the Marshall-Lerner condition and is consistent with J-curve phenomenon in the long run as explained above. Alternatively, the reduction in the value of lnRER means appreciation in the real value of the currency that reduces the relative competitiveness of domestic production; hence, β_1 is expected to carry a negative sign if the appreciating currency worsens TB.

In addition, it is embedded in the economic theory that there is an inverse relationship between TB and Yd as higher levels of domestic real income raises demand for imports worsening TB, which implies that β_2 is expected to carry a negative sign. However, based on the findings of Narayan and Narayan (2005) and Petrovic and Gligori (2010), the sign of β_2 is indefinite in general conditions as it may vary based on whether the economy is supply-driven or demand-driven. Also, as reviewed in the literature before, domestic income could be positively or inversely related to TB depending on whether the substitution or the income effects dominate. Finally, there is a positive relationship between TB and Yf as higher levels

of foreign real income raises demand for Egyptian exports improving TB, which implies that β_3 is expected to carry a positive sign.

3.5. The Data

This section presents the data employed, its sources, frequencies and statistical properties.

3.5.1. The Data and Data Sources

The study employs quarterly data to estimate the short and long run models of the dynamic paths of the 10 industries' TB for the period 2007Q1-2019Q4. To that end, it employs quarterly disaggregated bilateral trade data at the industry level and the macroeconomic indicators of real domestic and foreign incomes over the period 2007Q1 - 2019Q4. The study is planed over this time span to capture the impact of RER evolutions as indicated in Figure 3.11 below and to factor in exchange rate policy alterations that took place in Egypt in 2016. As depicted in Figure 3.11, the RER falls short of the nominal exchange rate (NER) between 2008Q3 till 2019Q4, indicating the inflationary effect of the weaker EGP. The gap between RER and NER expanded with the floatation decision in 2016Q4 triggered by the soared price level fueled by weaker EGP and fiscal tightening. Also, the selected time span allows for the accommodation of data availability issue, since Egyptian authorities report required data at quarterly frequency starting 2004. The data is retrieved from different sources.

Nominal Vs. Real Exchange Rate Evolution
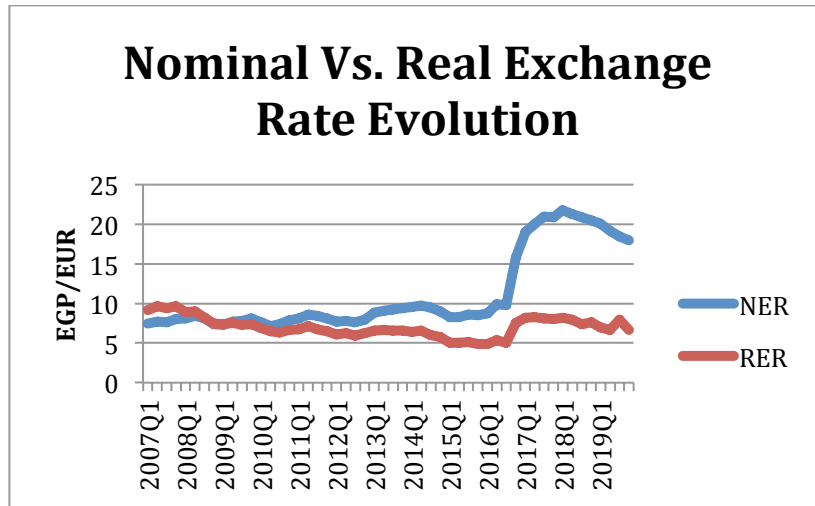
Figure 3.21: Egypt's bilateral nominal exchange rate with Italy compared to its bilateral real exchange rate movements
Source: Compiled and constructed by the author using trade data from UN COMTRADE Statistics

In specific, the quarterly industry level bilateral data of the exports and imports between Egypt and Italy in the abovementioned 10 HS Chapters are obtained from the International Trade Center – Trade Map database based on CAPMAS and Eurostat data. For quarters when no trade has been made, EUR1 worth of products is inserted to allow for meaningful TB ratio computation. Otherwise, the quarters with no exports made will yield 0 outcome for the TB ratio and quarters with no imports made will yield an undefined outcome.

Moreover, to account for the exchange rate variable, the daily nominal exchange rate time series for EGP/EUR is obtained from the Central Bank of Egypt's (CBE) database. Afterwards, the series is converted into a smaller frequency by averaging the daily rates every quarter. Next, to compute the bilateral real exchange rate, the Consumer Price Index (CPI) for Egypt is retrieved on a monthly frequency from the CBE database and averaged to obtain the quarterly series. Also, the CPI for Italy is retrieved on a monthly basis from the Eurostat database. Bilateral exchange rate is selected for this study because it estimates a bilateral trade model.

Finally, real incomes, proxied by GDP at constant prices for Egypt and Italy are both retrieved in respective local currencies on quarterly basis. Quarterly GDP at constant prices series for Egypt is retrieved from the Ministry of Planning and Economic Development

(MPED) database in EGP and converted into EUR at the respective official exchange rate retrieved from the CBE. Likewise, Quarterly GDP at constant prices data for Italy is obtained from the Federal Reserve Bank of St. Louis (FRED) database.

3.5.2 The ADF Unit Root Test Results:

As noted by Bahmani-Oskooee (1985), early studies that employed non-stationary data are poor because the outcomes could be spurious. Therefore, ensuring the stationarity of the series employed in economic empirical studies becomes a common practice. Accordingly, the same practice is employed in our study to ensure that the employed series is stationary and justify the choice of the co-integration technique. Essentially, the study applied the Augmented Dickey Fuller (ADF) unit root test for the levels and the first differences of the variables. In general, the ADF concluded the non-existence of the unit root at the level for logged TB variables of all HS Chapters at the 5% significance level and above, yet some HS Chapters fails to be level stationary if no intercept and trend are applied. Additionally, the ADF outcomes for ln(RER), ln(Yd) and ln(Yf) variables asserted their non-stationarity at the level, yet they were stationary at the first difference. The results of the ADF test are summarized in the Table 3.2 below:

Table 3.2: Summary of Unit Root Test Outcomes

Variable	Level			First Difference			Order of Integration
	No Intercept and Trend	With Intercept Only	With Intercept and Trend	No Intercept and Trend	With Intercept Only	With Intercept and Trend	
lnyd	-0.4341	-1.3848	-2.2571	-5.0455***	-5.009***	-4.987***	I(1)
lnyf	-0.44	-2.768*	-2.4676	-3.197***	-3.198**	-3.3988*	I(1)
lnrer	-0.7172	-2.0916	-1.9289	-7.1169***	-7.0897***	-7.148***	I(1)
lntb07	-1.008	-4.665***	-5.017***	-10.777***	-10.667***	-10.559***	I(0), I(1)
lntb27	-3.415***	-6.1586***	-6.8833***	-11.996***	-11.983***	-12.23***	I(0), I(1)
lntb31	-0.4396	-4.017***	-3.945***	-7.1423***	-6.9747***	-6.8567***	I(0), I(1)
lntb39	-1.93*	-3.599***	-4.0285**	-9.9785***	-9.876***	-9.9068***	I(0), I(1)
lntb52	-2.175**	-4.2945***	-4.158***	-4.8922***	-4.9246***	-4.6879***	I(0), I(1)
lntb72	-4.923***	-5.3588***	-5.3360***	-8.3788***	-8.313***	-8.2645***	I(0), I(1)
lntb73	-0.4823	-3.958***	-4.3429***	-9.8597***	-9.7879***	-9.8018***	I(0), I(1)
lntb76	-0.6975	-4.9436***	-5.7418***	-8.51***	-8.4279***	-8.4937***	I(0), I(1)
lntb84	-0.7871	-3.2476**	-4.0012**	-7.3425***	-7.2848***	-7.1983***	I(0), I(1)
lntb85	-1.469	-4.1781***	-3.9747**	-8.5837***	-8.6422***	-9.124***	I(0), I(1)

*, ** and *** indicate the statistical significance levels of 10%, 5% and 1% respectively
Source: Author's calculations

As indicated by the above ADF results, lnRER, lnYd, and lnYf are confirmed to be non-stationary at the level. Accordingly, these series are integrated of order 1, I(1), as first differencing renders the series stationary. On the other hand, the TBs of Chapter '27, '52 and '72 exhibit strong evidence of level stationarity at the 1% significance level. However, the remaining Chapters exhibited signs of level stationarity at the 5% level of significance when a constant is added as well as when a trend is factored in. Clearly, all Chapters are stationary after first differencing as shown in Table 3.2.

3.5.3. Identifying a suitable co-integration approach:

Apparently, due to the absence of lagged variables, equation (4) above expresses a long-run model and estimates of the coefficients β_1, β_2 and β_3 reflect the long-run effects of exogenous variables such as RER, Yd and Yf on the trade balance. Earlier estimates of models (4) by ordinary least square (OLS) method were proved poor and turned in spurious outcomes as noted by Bahmani-Oskooee (1985) since all variables could move together over time and the data employed was not tested for stationarity. Accordingly, Engle and Granger (1987) established co-integration as a necessary condition for long-run coefficients to be valid. Later, Engle and Granger (1987) introduced their co-integration approach and proved that the OLS estimates of equation (4) above will be valid if all variables are integrated of the same order "d" but the residuals in (4) are integrated of an order less than "d." Afterwards, Pesaran et al. (2001) proposed another approach to co-integration testing that allows mixing variables of different orders of integration.

On investigating the dynamic relationship between TB and RER, there exist many approaches to testing their co-integration in the literature. Namely, in terms of univariate models, Engle–Granger (EG) (1987) and Autoregressive Distributed Lags (ARDL) bounds testing approach developed by Pesaran and Shin (1995) are deployed to test for co-integration. In terms of multivariate models, a Vector Autoregression (VAR) model based on

Johansen (1988), Johansen and Juselius (1990) and Johansen's (1996) are used to undertake studies with multi variables. Each one of the aforementioned approaches come with advantages and shortcomings.

While Engle–Granger (1987) approach is praised for ability to test variables that are integrated of order higher than 1, it comes with a restrictive property that all variables tested must be of the same order of integration, which is circumvented in the ARDL model. In addition, Engle-Granger model is subject to endogeneity problems, which is overcome in an ARDL approach. Despite its renowned superiority over existing co-integration approaches for its applicability to variables with mixed orders of integration, I(0), I(1) or fractionally integrated, the ARDL model still comes with the limitations of inapplicability to I(2) variables. However, Pesaran et al. (2001) argue that macroeconomic variables are either I(0) or I(1) and ruled out I(2).

Moreover, both EG and ARDL approaches are commended for their parsimonious feature which places them above the Johansen (1998) and Johansen and Juselius (1990) Vector Autoregression (VAR) test that requires multitude of observations and renders the test outcomes highly sensitive to the sample size; whereas the EG and ARDL approaches circumvent the large number of specifications requirement as confirmed by Panopoulou and Pittis (2004). Lastly, for the purpose of testing the non-linear dynamic relationship, the studies commonly employ a Non-linear ARDL model introduced by Shin et al. (2014) to account for the asymmetry in the TB response to ER variability.

Additionally, evidences of Purchasing Power Parity (PPP) render the real bilateral ER stationary, yet the Yd and Yf are not stationary unless first differenced, which qualifies the bounds testing ARDL based approach of Pesaran et al. (2001) and Shin et al. (2014) for our model estimation as the variables are a combination of I(0) and I(1) as presented in the Unit

Root Test. However, building on the above-enlisted properties of ARDL and NARDL techniques, it is deemed suitable for the study in hand.

Accordingly, the ARDL and NARDL-based bounds testing approaches of Pesaran et al. (2001) and Shin et al. (2014) respectively are selected due to their compatibility with the statistical properties of the employed data and the purpose of the study. First and foremost, the ARDL-based bounds testing approach does not require the variables to be integrated of the same order as they allow for a mix of I(0), I(1) and fractionally integrated variables. Ultimately, since the examined variables are of different orders of integration and none of them is I(2), as demonstrated in Table 3.2 above, the ARDL bounds testing approach is deemed an acceptable fit for the dataset. In addition, Pesaran and Shin (1995) revealed that the ARDL model is relatively more efficient for small-sample-size datasets than other co-integration techniques, which renders it suitable for the purpose of the study, as historical dynamics may be irrelevant to the contemporary situations. Also, the limited availability of lower frequency data for Egypt render the dataset available for the study limited in size which qualifies the ARDL family as a suitable approach. Furthermore, ARDL model can simultaneously estimate the short-run and long-run dynamics of the studied variables by transforming the long-run model to generate an error correction model, which qualifies it for the analysis of J-curve as proved in the literature reviewed in Chapter 2. Finally, the ARDL model could be used to test for the asymmetries in the response of the tested variables as revealed by Shin et al. (2014), which renders it a suitable fit for the study.

However, similar to other single equation models, it poses the issue of endogeneity among independent variables. The possibility of the existence of endogenous independent variable can be overlooked as pointed by Ezzat (2018) due to the limited effect of the an industry's TB on the real income of a nation, Also, the impact of an industry's TB on the ER is overlooked as the ER regime in Egypt is shielded from TB fluctuations during most of the

period under examination by means of a fixed or managed ER regime adoption. Similarly, the same reason is used to justify the limited impact of an industry's TB on domestic real income. Ultimately, the coming Chapter presents and analyzes the outcomes of the empirical tests.

Chapter 4

The Empirical Analysis

In this chapter, the econometric analysis of Egypt-Italy bilateral TB dynamics is presented and the outcomes of the empirical examinations are analyzed to reveal the realities of the industry level TB dynamics in response in the short-run and long-run to bilateral RER movements.

To this end, the first step entails conducting the unit root test using the Augmented Dickey-Fuller (ADF) approach. As previously presented in Table 3.2, the ADF test confirmed the suitability of the ARDL-based bounds testing technique to test for co-integration between industry level TB and the explanatory dynamic regressors RER, Y_d and Y_f aiming to test for the existence of a long-run relationship between the variables under investigation as well as to examine the short-run and long-run dynamics of this relationship.

Afterwards, the long-run relationship between each of the 10 Chapters TBs and the explanatory variables is estimated to examine the existence of a significant long run relationship using the long-run model specified in the above explained equation (4) displayed here for quick reference:

$$lnTB_{it} = \beta_0 + \beta_1 lnRER_t + \beta_2 lnYd_t + \beta_3 lnYf_t + \varepsilon_t \qquad (4)$$

Following the establishment of a significant long-run relationship between each industrial TB balance and the RER, the bounds test is used to examine for the existence of a co-integration among individual industries' TB and the dynamic regressors. Afterwards, upon the detection of co-integration among the modeled variables, the short run dynamics are examined for evidence of the existence of a significant relationship between the industries' TB and bilateral RER in the short run. Finally, the presence of the J-curve effect is analyzed through identifying the negative RER coefficients in the earlier lags followed by positive

coefficients in the later lags, following Rose and Yellen's (1989) definition of the J-curve as negative short run effects of real depreciation on TB combined with positive long run effects. Finally, the RER variable is decomposed into its positive and negative components to test for the existence of an asymmetric response of each industry's TB by conduction a nonlinear ARDL (NARDL) empirical test following Shin et al. (2014).

To capture the short-run dynamics of the TB response to ER movements; i.e., hence test for the J-curve occurrence, model (4) is specified in an error-correction format as in equation (5) that follows:

$$\Delta lnTB_{it} = \beta_0 + \Sigma^p_{K=1} \beta_K \Delta lnTB_{it-k} + \Sigma^{q1}_{k=0} \beta_{2k} \Delta lnRER_{t-k} + \Sigma^q_{k=0} \beta_{3k} \Delta lnYd_{t-k}$$

$$+ \Sigma^{q3}_{k=0} \beta_{4k} \Delta lnYf_{t-k} + \phi ECM_{t-1} \qquad (5)$$

where the error correction model is specified as follows:

$$\phi ECM_{t-1} = \delta_1 lnTB_{t-1} + \delta_2 lnRER_{t-1} + \delta_3 Yd_{t-1} + \delta_4 Yf_{t-1} + \varepsilon_t \qquad (6)$$

and the model is expressed simultaneously as follows:

$$\Delta lnTB_{it} = \beta_0 + \Sigma^p_{K=1} \beta_K \Delta lnTB_{it-k} + \Sigma^{q1}_{k=0} \beta_{2k} \Delta lnRER_{t-k} + \Sigma^q_{k=0} \beta_{3k} \Delta lnYd_{t-k}$$

$$+ \Sigma^{q3}_{k=0} \beta_{4k} \Delta lnYf_{t-k} + \delta_1 lnTB_{t-1} + \delta_2 lnRER_{t-1} + \delta_3 Yd_{t-1} + \delta_4 Yf_{t-1} + \varepsilon_t \qquad (7)$$

Afterwards, the above model in is employed to estimate the short-run dynamics embodied in the coefficients' estimates attached to the first-differenced variables β_{1-4}. In essence, negative β_2 estimates attached to the earlier lags followed by positive β_2 estimates in the later lags supports the J-curve occurrence in the TB response of a specific HS Chapter. In addition, the long-run effects are judged by the estimates of $\delta_1, \delta_2, \delta_3$ and δ_4. Further, k refers to the number of time lags in equation (7). Also, LnTBit represents the trade balance of Chapter i at time t, Δ is the first difference operator, p is the order of lag of the dependent variable and q_{1-3} is the order of lag for the independent variables, and ϕ is the ECM coefficient in equation (5).

Primarily, the traditional definition of the J-curve presented by Bahmani-Oskooee (1985) relied upon the short-run coefficient estimates to test for the J-curve effect. However, Rose and Yellen (1989) improved this definition by incorporation the long run impact, so the improved definition of the J-curve becomes short-run deterioration of the TB combined with long-run improvement. Recently, as reviewed in the previous chapter, Bahmani-Oskooee and Fariditavana (2014), and Bahmani-Oskooee and Bahmani (2015) decomposed the movement of the ER variable into its negative (depreciation) and positive (appreciation) partial sum to capture the asymmetric effects of the ER movements on TB. As such, $lnRER_t = lnRER^+_t + lnRER^-_t$ where $lnRER^+_t + lnRER^-_t$ are the partial sum process of positive and negative changes in lnRER. Accordingly, to capture the asymmetric effects of the ER movements on TB of the selected 10 HS Chapters, the following non-linear model is estimated:

$$\Delta lnTB_{it} = \beta_0 + \Sigma^p_{K=1} \beta_K \Delta lnTB_{it-k} + \Sigma^{q1}_{k=0} \beta_{2k} \Delta lnPOS_{t-k} + \Sigma^{q2}_{k=0} \beta_{3k} \Delta lnNEG_{t-k} + \Sigma^{q3}_{k=0} \beta_{4k} \Delta lnYd_{t-k} + \Sigma^{q4}_{k=0} \beta_{5k} \Delta lnYf_{t-k} + \delta_1 lnTB_{i,t-1} + \delta_2 lnPOS_{t-1} + \delta_3 lnNEG_{t-1} + \delta_4 Yd_{t-1} + \delta_5 Yf_{t-1} + \varepsilon_t \qquad (8)$$

4.1. Selection of the optimal lag length for the dynamic regressors in the model:

The optimal lag length is determined based on the Schwarz Criterion (SC), which is preferred to the Akaike Information Criterion (AIC) as the former penalizes over-fitting more. The model selection criteria outcomes corresponding to each Chapter model are displayed in Table 4.1 below with the best-fitting L-ARDL and NL-ARDL models for their respective datasets. These L-ARDL and NL-ARDL processes were selected for being the ones that minimize the SC values in comparison to 20 other models tried for this dataset. In addition, the study imposed a maximum of 8 lags for L-ARDL models and 7 lags for the NL-ARDL models due to the low frequency of the employed quarterly data.

4.2 The co-integration bounds test:

To conduct the ARDL-based bounds test, Pesaran et al. (2001) proposed undertaking an F-test and provided pairs of critical values for each confidence level consisting of two

bounds. The lower bound critical value is produced assuming that all the underlying variables are I(0) and the upper bound critical value is produced assuming that all of the included variables are I(1). Accordingly, the outcomes of the bounds test are interpreted to either confirm or refute the long run co-integration between each industry's TB and the dynamic regressors by comparing them against these critical values. If the computed F-statistic value lands above the upper I(1) bound, the null hypothesis that denotes the non-existence of a long-run relationship will be rejected confirming the co-integration relationship. Conversely, if the F-statistic value lands below the lower I(0) bound, the null hypothesis that denotes the non-existence of a long-run relationship will not be rejected revealing that the variables are not co-integrated; and if it lands between the upper and lower bounds, then the results will be within the inconclusive range. The outcomes of the co-integration bounds test are summarized in the table below for both the L-ARDL and NL-ARDL models attempted.

Table 4.1: Summary of the optimal lag structure based on SC and bounds F-statistics test results

Trade Balance	L-ARDL		NL-ARDL	
	Optimal Lag ARDL (lnTBit, lnRER, lnYd, lnYf)	F-statistic	Optimal Lag NL-ARDL (lnTBit, lnRER_POS, lnRER_NEG, lnYf, lnYd)	F-statistic
lntb07	(1,0,1,1)	5.0796***	(1,2,1,0,2)	4.6806***
lntb27	(1,1,0,0)	11.978***	(1,0,0,0,0)	9.2551***
lntb31	(4,0,1,5)	4.292**	(1,0,0,0,0)	6.8759***
lntb39	(1,0,0,0)	4.371**	(6,7,6,6,5)	8.6783***
lntb52	(1,0,0,0)	4.679***	(1,0,0,0,0)	3.827**
lntb72	(1,0,0,0)	12.824***	(1,0,0,0,0)	11.5978***
lntb73	(1,0,0,0)	5.876***	(1,0,0,0,0)	4.80057***
lntb76	(1,0,0,0)	6.5107***	(1,0,0,0,0)	5.34434***
lntb84	(1,0,0,2)	5.0858***	(1,0,1,2,0)	4.45588***
lntb85	(1,0,1,0)	3.539*	(2,0,0,0,1)	11.1157***

*, ** and *** indicate the statistical significance levels of 10%, 5% and 1% respectively
Source: Author's calculations

Apparently, as displayed in Table 4.1 above, the results of the calculated F-statistics exceeded the upper bound critical value of 4.66 at 1% significance level in case of L-ARDL for 7 out of 10 Chapters implying that the hypothesis denoting the nonexistence of co-integration between these TBs and the explanatory variables (lnRER, lnYd and lnYf) is

rejected at 99% confidence level. Moreover, for 2 out of the 10 Chapters, the hypothesis of no co-integration among variables is rejected at the 5% significance level. Lastly, evidence of co-integration for only Chapter 85's TB (Electrical machinery and equipment; telecommunication equipment) and the explanatory variables is found at the 10% significance level; hence, supporting the co-integration among all studied variables for the L-ARDL model. Similarly, the calculated F-statistics exceeded the upper bound critical value of 4.37 with a 1% significance level in case of NL-ARDL for all Chapters except one, which is TB 52, whose F-statistic exceeded the upper bound at the 5% significance level.

Consequently, evidence of co-integration among the lnTBs of all 10 Chapters (100%) with lnRER, lnYd and lnYf is detected when the bounds test is carried out at the optimum lags. Moreover, evidence of co-integration among the lnTBs of all 10 Chapters (100%) with lnRER_POS, lnRER_NEG, lnYd and lnYf is confirmed. The bounds test results supports the co-integration among the studied variables implying that their path cannot remain far away from each other in the long-run; hence, the study proceeds with the estimation of the long and short-run coefficients.

4.3 The long-run elasticities results:

The long-run relationship between the variables reflects the long run impacts of a real depreciation/appreciation on the bilateral TBs of the selected chapters which is estimated by running the regression in equation (4) for each of the studied industries:

$$lnTB_{it} = \beta_0 + \beta_1 lnRER_t + \beta_2 lnYd_t + \beta_3 lnYf_t + \varepsilon_t \qquad (4)$$

Then, the residuals generated from this estimation represent the error-correction term due to Pesaran et al. (2001). The long-run estimation results are summarized in Table 4.2 below:

Table 4.2: Summary of the long-run coefficient estimation results:

TBs	Constant		LnRER	LnRER_POS	LnRER_NEG	LnYd		LnYf	
	L-ARDL	**NL-ARDL**	**L-ARDL**	**NL-ARDL**	**NL-ARDL**	**L-ARDL**	**NL-ARDL**	**L-ARDL**	**NL-ARDL**
lntb07	123.48	208.01	-1.599	-21.269	-11.79	-3.55	-18.082	-16.32	-20.24
lntb27	-56	-64.42	5.037**	0.427	2.211	1.789*	-0.814	6.6	11.71
lntb31	-145*	140.52	-5.126*	1.6295	1.2004	-2.845**	0.0146	28**	-22.76*
lntb39	-26.9	262.2**	-0.748	-2.5832	0.984	-1.149***	-5.66	5.38	-39.0**
lntb52	151.6	144.75	0.36	1.81	1.09	-1.01	0.0579	-24.1	-23.64
lntb72	-127***	-101.81**	1.53	-3.45	-0.98	-0.87	-4.54**	21.03***	20.12***
lntb73	17.84	28.22	6.015***	6.74	6.38**	2.5***	3.042	-7.28	-7.17
lntb76	7.46	0.76	-1.17	-0.328	-0.742	-1.15***	-0.53	0.402	0.62
lntb84	-154.8**	-205.7***	-6.83***	-4.97	-6.28**	-3.03***	-1.265	21.13***	33.73***
lntb85	-63.7	-96.7	-0.115	1.969	1.53	0.765	1.938	9.563	14.2

*, ** and *** indicate the statistical significance levels of 10%, 5% and 1% respectively
Source: Authors calculations

4.3.1. The long-run elasticities results discussion:

The long run coefficients estimation results reveal that in the long run, the real exchange rate (RER) movements are statistically significant in determining the TB dynamics of 4 out of 10 Chapters; i.e., 40% of the cases. In specific, the trade balances of Chapter 27 (Mineral fuels, mineral oils and products of their distillations; bituminous substances; mineral waxes), where Egypt is a net exporter and Chapter 73 (Articles of iron and steel), in which Egypt is a net importer over the past decade, are positively related RER movements; i.e., real depreciation improves their respective TBs and real appreciation worsens them. Noticeably, the observations pertaining to Chapter 27 can be interpreted as a 1% real depreciation improves Chapter 27 TB by 5%, which is explained by the increase in competitiveness gained by the lower price in line with the M-L condition theory. Also, the result indicates the high price elasticity of demand for Chapter 27 by Italy. As for Chapter 73, where Egypt is a net importer, a 1% real depreciation improves its respective TB by 6% due to the reduced demand on the imported products and replacing it with domestically produced substitute in the long-run in accordance with the M-L condition theory. Clearly, this result confirms the high price elasticity of demand for Chapter 73 by Egypt. All in all, the reported outcomes confirm the high sensitivity of these Chapters to RER movements.

Contrarily, the trade balances of Chapter 31(Fertilizers), in which Egypt is a net exporter and Chapter 84 (Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof), in which Egypt is a net importer, respond negatively to RER movements; i.e., real depreciation worsens their respective TBs and real appreciation improves it. Apparently, the observations pertaining to Chapter 31 are attributed to the inelastic nature of the tradable, which cause the volume effect of real depreciation or appreciation to lag behind the value; i.e., the relative price of fertilizers would fall without much increase in sales worsening the TB. As for Chapter 84, where Egypt is a net importer, a real depreciation worsens TB due to the high demand inelasticity of the tradable and unavailability of sufficient domestically produced substitutes.

Furthermore, the outcomes of the NL-ARDL validate the results of L-ARDL for Chapters 73 and 84, as the decomposition of RER proves to have significant asymmetric effects on their respective TBs. In specific, the TB of Chapter 73 is significantly positively related to RER depreciation implying that a 1% RER depreciation improves the TB of Chapter 73 by 6.38%. Likewise, the TB of Chapter 84 is significantly negatively related to RER depreciation implying that 1% real depreciation triggers 6.28% deterioration in Chapter 84 TB in the long run. These results are significant at the 5% significance level. For the remaining Chapters, their respective TB responses to RER movements in the long run did not prove to be statistically significant.

In short, the real depreciation of EGP against EUR is expected to worsens the TB of Chapters 84 and 31; whereas, the real appreciation is expected to result in their respective TB improvement in line with the ML condition. On the other hand, the real depreciation of EGP against EUR is expected to improve the TB of Chapters 27 and 73; whereas, real appreciation is expected to worsen their respective TB in the long run contrasting the M-L condition.

Moreover, Table 4.2 reveals that the long run impact of Egyptian real income changes

is significantly related to the TBs of 6 out of the 10 Chapters in the L-ARDL model specification and in 1 out of 10 Chapters in the NL-ARDL model. In specific, a 1% increase in Egypt's real income improves the TBs of Chapter 27 (Mineral fuels, mineral oils and products of their distillations; bituminous substances; mineral waxes) by 1.8% and Chapter 73 (Articles of iron or steel) by 2.5% in the long run. The results indicate that demand for both Chapters exhibit high income elasticity with respect to domestic income. This could be justified by the increase in domestic supply of Chapter 73 products to meet the expected increase in local demand, which substitute imports of articles of iron and steel. Alternatively, the long run positive relationship could also be explained by the increase in domestic real income triggered by increased domestic investment spending in the minerals' sector; hence, yielding the witnessed increase in exports of Chapter 27 and justifying the improvement in its respective TB.

On the contrary, the increase in Egypt's real income is significantly negatively related to the TBs of 4 out of 10 Chapters; namely, Chapter 31 (Fertilizers), Chapter 39 (Plastics and articles thereof), Chapter 76 (Aluminum and articles thereof) and Chapter 84 (Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof) in the L-ARDL model and 1 out of 10 Chapters in the NL-ARDL model; namely, Chapter 72 (Iron and steel). To elaborate, the increase in Egypt's real income worsens the respective TBs of these Chapters, which indicates that increase in real income in Egypt yields an increase in demand for these imports and dampen the production of their local replacements in the long run, which is in accordance with the theoretical expectations. Evidently, all of the above-mentioned Chapters exhibit high income elasticity with 1% increase in domestic income yielding -2.8%, -1.15%, -1.15%, and -3.03% TB deterioration due to a decrease in exports and/or an increase in imports of Chapters 31,39, 76 and 84 respectively.

Finally, changes in real income of Italy is significantly positively related to the TBs of

3 out of the 10 Chapters in the L-ARDL model specification in the long run. In specific, an increase in Italy's real income improves the TBs of Chapter 31 (Fertilizers), Chapter 72 (Articles of iron or steel) and Chapter 84 (Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof). This could be justified by the increase in demand on Egypt's exports of these products to meet the increased Italian demand triggered higher income levels, as these products are not easily replaced domestically. Apparently, the estimation outcomes for the foreign real income are in accordance with the theoretical expectations for 30% of the studied industries.

Moreover, it is noticed that there exist a significant positive relationship between TB of Chapters 72 and 84 and a negative significant relation between Chapters 31 and 39 with real income in Italy under the NL-ARDL model. Clearly, the observations for Chapters 72 and 84 come to validate the outcomes of the L-ARDL model. Alternatively, the long run negative relationship of the Italian real income with the TBs of Chapters 31 (Fertilizers) and 39 (Plastics and articles thereof) could also be explained by the decrease in demand for these products as income rises in Italy encourage Italians to invest in domestic replacements for these imports. However, it is also suggested to invalidate the outcomes of the NL_ARDL for Yf and Yd, since these two variables were not decomposed. Noteworthy, the study employs the natural algorithms of the variables in modeling the relationship; therefore, the coefficient estimates are interpreted as the long-run elasticities without further transformations.

4.4 The short-run elasticities results:

After establishing the long run relationships, the next step is to proceed with the estimation of the short run dynamics and the error correction model (ECM) specified in equations (7) and (8) for the linear ARDL and non-linear ARDL respectively. The short run coefficient elasticities and the ECM are reported in Tables 4.3a and 4.3b below due to amount of the data.

Table 4.3a: Summary of the short-run coefficient estimation and ECM results for Chapters '07, '27, '31 and '39:

Trade Balance	lntb07		lntb27		lntb31		lntb39	
	L	NL	L	NL	L	NL	L	NL
$DLnTB31$								
$DLnTB31_{t-1}$					-0.06			
$DLnTB31_{t-2}$					-0.398***			
$DLnTB31_{t-3}$					-0.306***			
$DLnTB39$								
$DLnTB39_{t-1}$								-0.031
$DLnTB39_{t-2}$								-0.163*
$DLnTB39_{t-3}$								-0.103
$DLnTB39_{t-4}$								-0.117485
$DLnTB39_{t-5}$								-0.477***
$DLnTB85$								
$DLnTB85_{t-1}$								
$DLnRER$			0.419					
$DLnRER\_POS$		-7.949						4.799***
$DLnRER\_POS_{t-1}$		24.53***						8.89***
$DLnRER\_POS_{t-2}$								7.67***
$DLnRER\_POS_{t-3}$								1.98*
$DLnRER\_POS_{t-4}$								3.39***
$DLnRER\_POS_{t-5}$								-0.798229
$DLnRER\_POS_{t-6}$								-4.09***
$DLnRER\_NEG$		15.23*						4.48***
$DLnRER\_NEG_{t-1}$								10.25***
$DLnRER\_NEG_{t-2}$								7.84***
$DLnRER\_NEG_{t-3}$								1.02
$DLnRER\_NEG_{t-4}$								-2.3*
$DLnRER\_NEG_{t-5}$								5.08***
$DLnYd$	3.8547	1.27			-6.27***			3.42***
$DLnYd_{t-1}$		20.32***						9.92***
$DLnYd_{t-2}$								8.17***
$DLnYd_{t-3}$								2.38**
$DLnYd_{t-4}$								3.26***
$DLnYf$	-38.926				7.71			6.12
$DLnYf_{t-1}$					-39.77			18.32702
$DLnYf_{t-2}$					-91.35***			70.47***
$DLnYf_{t-3}$					23.53			-41.52***
$DLnYf_{t-4}$					-118.07***			38.95***
$DLnYf_{t-5}$								39.3***
ECM_{t-1}	-0.696***	-0.68***	-1.128***	-1.09***	-0.94***	-0.95***	-0.56***	-0.82***

*, ** and *** indicate the statistical significance levels of 10%, 5% and 1% respectively
Source: Author's calculations

Trade Balance	lntb52		lntb72		lntb73		lntb76		lntb84		lntb85	
	L	NL	L	NL	L	NL	L	NL	L	NL	L	NL
$D\text{LnTB31}$												
$D\text{LnTB31}_{t-1}$												
$D\text{LnTB31}_{t-2}$												
$D\text{LnTB31}_{t-3}$												
$D\text{LnTB39}$												
$D\text{LnTB39}_{t-1}$												
$D\text{LnTB39}_{t-2}$												
$D\text{LnTB39}_{t-3}$												
$D\text{LnTB39}_{t-4}$												
$D\text{LnTB39}_{t-5}$												
$D\text{LnTB85}$												
$D\text{LnTB85}_{t-1}$												-0.17**
$D\text{LnRER}$												
$D\text{LnRER\_POS}$												
$D\text{LnRER\_POS}_{t-1}$												
$D\text{LnRER\_POS}_{t-2}$												
$D\text{LnRER\_POS}_{t-3}$												
$D\text{LnRER\_POS}_{t-4}$												
$D\text{LnRER\_POS}_{t-5}$												
$D\text{LnRER\_POS}_{t-6}$												
$D\text{LnRER\_NEG}$										-0.354983		
$D\text{LnRER\_NEG}_{t-1}$												
$D\text{LnRER\_NEG}_{t-2}$												
$D\text{LnRER\_NEG}_{t-3}$												
$D\text{LnRER\_NEG}_{t-4}$												
$D\text{LnRER\_NEG}_{t-5}$												
$D\text{LnYd}$											-0.683	-0.799053
$D\text{LnYd}_{t-1}$												
$D\text{LnYd}_{t-2}$												
$D\text{LnYd}_{t-3}$												
$D\text{LnYd}_{t-4}$												
$D\text{LnYf}$									26.65	28.36846		
$D\text{LnYf}_{t-1}$									-53.59***	-58.75***		
$D\text{LnYf}_{t-2}$												
$D\text{LnYf}_{t-3}$												
$D\text{LnYf}_{t-4}$												
$D\text{LnYf}_{t-5}$												
ECM_{t-1}	-0.247***	-0.25***	-1.16***	-1.2***	-0.54***	-0.54***	-0.68***	-0.69***	-0.6***	-0.63***	-0.34***	-0.49***

*, ** and *** indicate the statistical significance levels of 10%, 5% and 1% respectively
Source: Author's calculations

4.4.1 The short-run elasticities results discussion

Apparently, Tables 4.3a and 4.3b revealed that in the short-run, only 1 out of the 10 industries had a statistically insignificant lagged coefficient for the first differenced lnRER in the L-ARDL process implying that the real depreciation and appreciation of the EGP against the EUR has no significant impact in the short run on the bilateral trade balances between Egypt and Italy for the studied 10 Chapters. Moreover, a closer examination of the data conducted through applying a NL-ARDL process revealed that there exists a statistically significant short run relationship between the TB of Chapter 39 (Plastics and articles thereof)

and the first differenced lnRER_POS and lnRER_NEG as well as their lags. Apparently, the response of Chapter 39 TB to RER depreciation and appreciation is symmetrical in the current period and first 3 lags indicting that the real appreciation worsens the TB and real depreciation improves the TB. To clarify, there exists evidence of symmetry in the following lag 4 as a 1% real appreciation worsened Chapter 39 TB by 3.39% in the short run, and 1% real depreciation worsened it by 2.3% only implying that this industry responds more to real EGP appreciations. However, later in the 5th quarter, real EGP depreciation improved the TB again after worsening it in the 4th quarter implying that there could be evidence of improvement in later lags in support of the J-curve phenomenon. However, building on the outcomes of the long run elasticities of Chapter 39 TB, it is noticed that the significant short run effect of RER on TB does not last into the long run as evident by the statistically insignificant long-run coefficient estimates. Ultimately, together the insignificant long-run estimates and the insufficient short-run estimates reject the detection of the J-curve effect in the response of Chapter 39 TB.

Likewise, the outcomes of the NL-ARDL revealed statistical significant response of Chapter 07 (Edible vegetables and certain roots and tubers) TB to real EGP appreciations and depreciations. The results exhibit signs of asymmetry in terms of the magnitude. To illustrate, Chapter 07 TB would deteriorate by 24.53% as a result of a 1% real appreciation and would improve by only 15.23% as a result of a 1% real depreciation indication that Chapter 07 TB respond more to real appreciations rather than real depreciations. Eventually, the lack of significant statistical estimates beyond the 1st quarter impedes the detection of the J-shaped path in Chapter 07 TB. Also, the short run favorable effect of RER does not last into the long run contrasting the J-curve phenomenon.

Overall, for most of the Chapters examined, the real exchange rate proved to be an insignificant determinant of the short run dynamics of their respective trade balances as

evidenced by the statistically insignificant coefficients or the lack of RER coefficient estimates remaining from the ECM regression. Only when the RER was decomposed, evidence of a statistically significant symmetrical short run relationship between RER and TB of 2 out of 10 Chapters is witnessed. Moreover, the long run significant relationship established for Chapters '27, '31, '73 and '84 as inferred from the long-run elasticities were not supported in the short-run, which suggest that these sectors require longer time horizon to respond to RER movements warranting the need to consider the adjustment time lag before conduction ER policy alterations. Noteworthy, the study employs the natural algorithms of the variables in modeling the relationship; therefore, the coefficient estimates are interpreted as the short run elasticities without the need for further computations or transformations.

As for the short run impact of Egypt's real income changes on the TB of the 10 Chapters, Table 4.3a indicates the existence of a statistically significant relationship between real income and 3 out of 10 Chapters. Namely, Chapter 31 (Fertilizers), Chapter 39 (Plastics and articles thereof), and Chapter 07 (Edible vegetables, certain roots and tubers). A close examination of the estimates reveals that Chapter 31 is significantly negatively related to real income in Egypt in the short run indicating that a 1% increase in real income in Egypt increased the demand on imports of Fertilizers from Italy to fulfill the increased national demand on agricultural products fueling Chapter 31 TB deficit as it worsened by 6%. However, turning to the NL-ARDL model, significant positive short run relationships are spotted between real income in Egypt and Chapters 07 and 39 as evident by the positive estimates. To illustrate, a 1% increase in real income in Egypt triggered a 20% improvement in its respective TB in the following quarter implying that Egyptians lowered their imports of these products and could possibly replace them domestically. Evidently, this can be explained by the increase in investments to replace imports of these products, hence improving their respective TB. The remaining Chapters wither fail to return statistically significant short-run

estimates or any other value to be interpreted.

As for the relationship between the real income in Italy and TB of the 10 Chapters in the short run, the outcomes revealed the existence of a statistically significant relationship in 3 out of 10 Chapters. Namely, Chapter 31, Chapter 39 and Chapter 84. Essentially, Chapter 31 and Chapter 84 are negatively related to the real Italian income in the short run, as 1% increase in real income in Italy would worsen their respective TB 53% in the 1st quarter and 91% in the 2nd quarter respectively. Increase in real income would decrease the demand on these Chapters from Egypt fueling their respective TB deficits. Basically, this behavior can be justified by the fact that Egyptian products are perceived of relatively lower quality and are deemed inferior compared to European counterparts, which could replace the Egyptian products as income rises. Alternatively, Chapter 39 TB is positively related to Italy's real income in lags 2, 4 and 5 and negatively related to it in lag 3 indicating that an increase in real income in Italy would increase demand on Egyptian plastics industries improving Chapter 39 TB with a lag.

Finally, the study reported the ECM coefficients in Tables 4.3a and 4.3b. In general, a significantly negative coefficient estimates attached to ECM_{t-1} indicates adjustment towards long-run equilibrium values. Apparently, the results in Tables 4.3a and 4.3b revealed that the ECM is highly significant at 1% significant level (p-value is 0.0000 for all examined Chapters) and negative for all the studied Chapters under both L-ARDL and NL-ARDL specifications indicating that 100% of the industries TBs converge to their respective steady-state in the long run which also supports the results of the co-integration bounds tests reported in Table 4.1. Another inference form the ECM coefficient estimate is that it gauges the adjustment speed of the TB towards its long-run steady state. Clearly, our empirical estimation of the ECM suggests that approximately 69.6%, 112.8%, 94%, 56% 24.7%, 116%, 54%, 68%, 60% and 34 of the disequilibrium in the TBs of Chapters '07, '27, '31, '39, '52,

'72, '73, '76, '84 and '85 respectively is adjusted within one quarter under the L-ARDL process. Likewise, the NL-ARDL process estimation of the ECM reveals that around 68%, 109%, 95%, 82%, 25%, 120%, 54% 69%, 63% and 49% of the adjustment required in the TBs of Chapters '07, '27, '31, '39, '52, '72, '73, '76, '84 and '85 respectively occurred within one quarter. Evidently, there exist consistency regarding the speed of adjustment pattern of certain TBs like Chapters '27, '31 and '72, whose higher ECM absolute value indicates a relatively faster adjustment towards the long-run equilibrium compared to the other Chapters' lower adjustment rate that suggests a relatively slow convergence to the long-run path reflecting the persistence of TB disequilibrium.

To sum up, the findings of the empirical study does not support the existence of a significant short-run impact of the RER of EGP against the EUR on bilateral Egypt-Italy TB of 9 out of the studied 10 Chapters; whereas, it supports the existence of a significant relationship in the long-run in 4 out of the 10 Chapters. Moreover, the empirical test did not detect the J-shaped pattern in the response of all the examined TBs to RER movements of the EGP against the EUR since the significant short run impact does not last into the long run in the only industry that exhibited significant short run outcomes; namely Chapter 39. In addition, for industries that exhibit statistically significant long run impact, there was no significant short run impact obtained impeding the establishment of any solid conclusions on the existence of the J-curve effect. Eventually, the study establishes the significant impact of RER, real domestic and real foreign incomes variations on the adjustment of Egypt-Italy bilateral TBs of most of the studied Chapters in the long run and for 2 of the 10 Chapters in the short-run. Table 4.4 summarizes the outcomes of the study below and the coming chapter concludes the study and outlines the major policy implications in light of the empirical findings.

Table 4.4: Summary of the Individual Chapters' Elasticities, J-Curve Outcomes and Policy implications:

HS Chapters		L-ARDL					NL-ARDL					Exchange Rate Policy		Demand Side Policy	
Product Code	Product Label	LR Elasticities	SR Elasticities	J-Curve Observance	LR Income Elasticities	SR Income Elasticities	LR Elasticities RER POS	LR Elasticities RER NEG	SR Elasticities RER POS	SR Elasticities RER NEG	J-Curve Observance	Short-run	Long-run	Short-run	Long-run
'07	Edible Vegetables and certain roots and tubers	-1.599		NO	-3.55	3.8547	-21.269	-11.79	24.53***	15.23*	NO	Depreciation	--	--	--
'27	Mineral fuels, mineral oils and products of their distillations; bituminous substances; mineral waxes	5.037**	0.419	NO	1.789*		0.427	2.211			NO	--	Depreciation	--	Expansionary
'31	Fertilizers	-5.126*		NO	-2.845**	-6.27***	1.6295	1.2004			NO	--	Appreciation	Contractionary	Contractionary
'39	Plastics and articles thereof	-0.748		NO	-1.149***		-2.5832	0.984	4.799***, 8.89***, 7.67***, 1.98*, 3.39***,- 0.798, - 4.09***	4.48***, 10.25***, 7.84***, 1.02, -2.3*, 5.08***	NO	Depreciation	--	--	Contractionary
'52	Cotton	0.36		NO	-1.01		1.81	1.09			NO	--	--	--	--
'72	Iron and Steel	1.53		NO	-0.87		-3.45	-0.98			NO	--	--	--	Contractionary
'73	Articles of iron and steel	6.015***		NO	2.5***		6.74	6.38**			NO	--	Depreciation	--	Expansionary
'76	Aluminium and articles thereof	-1.17		NO	-1.15***		-0.328	-0.742			NO	--	--	--	Contractionary
'84	machinery, mechanical appliances, nuclear reactors, boiler; parts thereof	-6.83***		NO	-3.03***		-4.97	-6.28**		-0.354983	NO	--	Appreciation	--	Contractionary
'85	Electrical machinery and equipment and parts thereof; television image and sound recorders and reproducers, parts and accessories of such articles	-0.115	-0.683	NO	0.765		1.969	1.53			NO	--	--	--	--

*, ** and *** indicate the statistical significance levels of 10%, 5% and 1% respectively

Source: Author's calculations

Chapter 5

Conclusion and Policy Implications

Egypt's exchange rate regimes over the past 30 years have centered on attracting foreign capital and worker's remittances with little attention dedicated to non-oil merchandise exports. The matter that contributed to a persistent trade deficit over the past 15 years and over-reliance on exogenous unstable sources of foreign currency. As gathered from the study, incidents of external shocks coupled with the over-reliance on exogenous sources, rattle the Egyptian foreign exchange market warranting the CBE intervention to absorb the shock through the use of reserves. As a result, CBE interventions led to EGP overvaluation for prolonged periods to curb inflation, which contributed to furthering the TD persistence, losing competitiveness and reserves. Noteworthy, foreign exchange rate polices deployed by Egypt before and during the study period were driven by the need to either maintain or build the foreign reserves used to survive the encountered external shocks and ameliorate their repercussions on the economy rather than to stimulate the competitiveness of non-oil merchandise exports as documented in Chapter 3.

Recently, the Egyptian government embraces reform polices geared towards achieving liberalization and sustainable growth; yet the recent exchange rate liberalization targeted the immediate foreign currency sources such as workers' remittances, FPI and tourism revenues and not the more stable source of non-oil merchandise export sector to reverse the persistent TD. The findings of the study supports this measures in the sense that the former policy objectives represent short-term targets that resolve the exchange market instabilities in the short to immediate term, when the exchange rate impact on bilateral trade with Italy was not supported except for 2 Chapters. However, the findings of the study supports the statistically significant long-run implication on 40% of the Chapters, implying the potential for making use of the exchange rate policy as one of the instruments to stimulate

merchandise trade with Italy in these Chapters in the long-run as evident by the high long-run elasticities of these respective Chapters as displayed in Table 4.4 above.

Eventually, Egypt needs a sustainable ER policy that targets its persistent TD through a comprehensive plan that bundles exchange rate polices with other structural reform policies to achieve this goal. Thus, the study provides some insights for the ER policy to work on improving merchandise trade balance:

First, ER policy needs to be supplemented with measures that address Egypt's geographical and product concentrated exports such as:

a. Structural reforms relating to the promotion of export diversity through gearing the domestic production towards products of higher value added; hence engaging in differentiated product markets would enable some degree of market power; thus gains from currency depreciation could be exploited to boost global competitiveness.

b. Partake in Preferential Trade Agreements (PTA) and activate current dormant Trade Agreements that enhance economic integration to diversifying export destinations and ensure greater access to various foreign markets. More prominently, activate the existing trade agreements with African countries to unleash the potential gains with this marginalized area instead of the overtrading with EU countries as documented in the study.

c. Engage in comprehensive trade agreements that address non-tariff barriers to engage in global value chains and capitalize on the abundant labor force.

d. Enhance the substitutability between imported and domestic inputs to diversify suppliers mitigate foreign currency risk and improve merchandise trade deficit.

e. Supplement the above measures by shifting the focus of the ER policy towards the goal of stimulating non-oil merchandise exports to sustain competitiveness after restructuring the country's exports sector.

Second, a positive implication of ER liberalization is that it paves the way for the conduct of an active monetary policy, which should currently cater for stabilizing inflation rather than exchange rate or economic activity following CBE declaration of adopting inflation-targeting regime for the monetary policy rule in 2005. According to the impossible trinity conceptual framework, a rigid exchange rate and an independent monetary policy cannot coexist with free capital movement. Since restricting capital movement defies the liberalization strategy pursued by the government, then the exchange rate liberalization becomes the most reasonable policy direction in coordination with the inflation-targeting decision. Additionally, the economically sound conduct of monetary policy reflects on various areas in the economy that resonates with the exchange rate market stability. For instance, the liberalization of the EGP render the monetary easing a likely scenario to stimulate economic activity and encourage investing in potential merchandise exportable products over the long run, without the need to tighten it to support the EGP. Additionally, CBE could maintain reasonably high interest rates on long-term EGP deposits exclusively to attract remittances to reinforce the exchange rate. This measure could be exploited because the current interest rate differentials between EGP deposits at approximately 13% and those of USD at approximately 2.5% as well as EUR at approximately 0.75% is already high, with no need to increase interest rate substantially to attract remittances following external shocks.

Third, the exchange rate policy should be reinforced by institutional reforms that create an attracting environment for FDIs. In the past period under study, the floatation worked to secure foreign currency inflows through FPI channels, which are inherently short term and cannot sustain the long-term stability of the foreign exchange market. Despite their immediate remedial impact on resolving foreign currency shortages, FPI lack the reliability feature required to perpetuate a stable foreign currency market. In reverse, FDI, which is growing slower than FPI as illustrated earlier in the study, are relatively more stable. Thus, to

reinforce the success of the ER policy in shoring up foreign currency reserves, it should be propped by legislations to create an enabling environment for FDI and facilitate doing business. For instance, encourage measures to reducing bureaucracy and red tape costs to improve export competitiveness like rolling out the national single window (NSW) system, which reduces the time and financial cost of trading. Also, to tie up all loose ends, FDI promotion could also target businesses that promote export and import diversity as a way improve trade balance and stabilize foreign exchange market.

Empirically, the study examined the short and long run relationship between the bilateral RER and the TB of 10 industries that account for a major share of the trade flows between Egypt and Italy aiming to detect the existence of a J-curve effect in the responses of any of the examined Chapters. Using quarterly disaggregated trade data over the period 2007Q1-2019Q4 and adopting the partial reduced form for the TB model of Rose and Yellen (1989), the TB of each of the 10 HS chapters (defined as exports over imports) is regressed on real bilateral exchange rate (defined as units of EGP per unit of Euro), domestic as well as foreign real incomes to estimate the short and long-run relationship.

Conceptually, the M-L condition postulates that a depreciation or devaluation of EGP against Euro is expected to improve the bilateral TB in the long run. However, to confirm the "J-curve effect", an initial negative relationship between bilateral RER and a particular TB followed by positive one should be detected to reveal that initial TB worsening occurred post currency weakening that tends to improve later and to continue improving in the long run asserting the J-shaped pattern in the TB dynamics. Furthermore, negative coefficients were theoretically expected for domestic real income, yet as noted on the study no prior expectation was assigned for this variable as it is subject to the economic objectives and structure of the economy that determine whether it becomes supply or demand driven. Similarly, the positive coefficient theoretically estimated for foreign real income could not be

asserted and no a-priori expectation was assigned as its coefficient could have either sign pending the dominance of the demand and supply-side factors in trade between Egypt and Italy.

The relationship is modeled for each of the 10 HS Chapters through the ARDL bounds-testing approach to co-integration and error correction modeling developed by Pesaran, Shin and Smith (2001). The bounds testing is suitable primarily as the data series employed in the study were either level or first-difference stationary as revealed by the ADF unit root test. More importantly, ARDL was deemed the best fitted model to deploy when testing for the J- curve effect, as it conveys the short run dynamics of the variables simultaneously along with the long run model. Additionally, Pesaran and Shin (2014) developed a non-linear variation of ARDL, NL-ARDL, which was deployed to examine the existence of asymmetries in the TB response to RER variations.

The results of the bounds test indicated that statistically significant co-integration exists for all of the 10 chapters verifying the existence of a long-run relationship among the four studied variables; namely, TB, RER, Y_d and Y_f, paving the way for estimating the short and the long run responses of the industry-level TB. Afterwards, the long-run levels relationship is estimated using both the linear and non-linear ARDL processes. The findings of the long-run ARDL process conferred that 40% of the Chapters' TBs (4 Chapters) were significantly responsive to changes in bilateral RER, 60% (6 Chapters) were significantly responsive to domestic real income changes and 30% (3 Chapters) were significantly responsive to foreign real income changes.

The non-linear ARDL process corroborated the findings of the ARDL model for 20% of the Chapters (2 Chapters) as presented in Table 4.4 in chapter 4 of the study, which were statistically responsive to EGP depreciation at the 5% significance level. Specifically, EGP depreciation improved TB of Chapter 73 and worsened that of Chapter 84. Evidently, further

disaggregation reinforces the varying responses of the studied Chapters and reveals the unique patterns pursued by different products in response to currency movements. To illustrate, the EGP depreciation against the EUR improves the TB in the long run of only 2 Chapters (Chapter 27 and Chapter 73) in accordance with the expectation set forth by the ML condition. However, in contrast to the theory, TBs of 2 Chapters (Chapter 31 and 84) were significantly worsened by the EGP depreciation invalidating the M-L condition theory. Corroborating these findings, NL-ARDL model reinforced the positive impact of a depreciated EGP in the TB of Chapter 73 and the negative impact of EGP depreciation on Chapter 84 TB. Overall, the findings is in accordance with those of Bahmani and Hosny (2015) for Chapter 73, which was found to be more responsive to relative prices than to NER in their study. Generally, our findings contrast Ezzat (2018) whose study rejected the long-run impact of EGP depreciation on total bilateral trade with Italy, yet disaggregating the variables found a significant long run impact of EGP depreciation on two industries.

Furthermore, this study demonstrates a statistically significant relationship between individual Chapter's TBs and domestic real income. To illustrate, an increase in domestic real income improved the TB of 2 Chapters (27 and 73) and worsened it for 4 Chapter (31, 39, 76 and 84). The negative impact on TBs is attributed to the resulting increase in foreign products demand fueled by increase in national income, yet the positive impact can be attributed to the increase in either exports or domestic demand replacing imports triggered by increased national income. These findings are in accordance with the expected ambiguity of domestic real income coefficient, which was confirmed to be subject to whether the economy is supply or demand driven in the studied period.

Likewise, an increase in Italy's real income significantly improved the TBs of 3 Chapters (Chapters 31, 72, and 84) within the L-ARDL process indicating that increased real income in Italy increase demand on Egyptian products, which is in accordance with the

theoretical framework. Noteworthy, the NL-ARDL estimates for domestic and foreign real incomes were generally overlooked despite statistical significance, as these variables were not decomposed. However, it is noted that the findings of the NL-ARDL process corroborated those of the L-ARDL process for most Chapters as well as changing 1 statistically insignificant outcome (domestic real income estimate for Chapter 72 and foreign real income estimate for Chapter 30) into a statistically significant outcome.

Afterwards, the short run dynamics were individually estimated for the 10 Chapters. The findings of short run dynamics did not find any significant short-run relationship between RER and individual Chapter's TBs within the L-ARDL process. However, when the RER variable was decomposed into its positive and negative components within the NL-ARDL process, the significant short-run relationship was established for 2 Chapters (Chapters 07 and 39). Apparently, unlike the long-run timeframe, a majority of the Chapters were irresponsive to RER variations, indicating that exchange rate polices could not be utilized to immediately resolve TDs in Egypt with Italy for these respective Chapters.

Taking a closer look at the other explanatory variables, the lagged TB values of 3 Chapters (Chapter 31, 39 and 85) were found to be significantly and negatively responsive to their respective Chapter's TBs indicating the persistence of the deficit in these TBs. Also, TBs of one Chapter (Chapter 31) revealed a significant and negative relationship with domestic real income, yet the NL-ARDL process turned 2 more Chapters (Chapters 07 and 39) significantly and positively responsive to domestic real income in the short-run indicating that for these Chapters demand side policies like fiscal and monetary instruments could be deployed for immediate adjustment of TD in these Chapters. Similarly, the TB of Chapters (Chapter 31 and 84) were significantly negatively related to foreign real income within the L-ARDL model. However, within the NL-ARDL model, TB of 2 Chapter (Chapter 39 and 84) were significantly responsive but while Chapter 84 was negatively impacted by increases in

real foreign income reinforcing the L-ARDL findings, Chapter 39 exhibited both positive and negative significant responses indicating that supply and demand factors alternate in driving the TB responses at varying degrees.

Clearly, the study did not observe the J-curve phenomenon for any of the 10 HS Chapters under investigations as the short-run relationship was not established for most of the Chapters, except for Chapter 39, whose lagged estimates exhibited TB improvements in the short-run following EGP depreciation up until the 4th lag, when the TB worsened for one quarter, then reversed direction in the following period indicating the absence of the J-curve pattern. Similarly, the long-run relationship between RER and TB of Chapter 39 was not significant impeding the observance of the J-curve effect for this Chapter as well. Our findings regarding the J-curve are in accordance with the findings of Bahmain-Oskooee and Gelan (2012), Ezzat (2018) and Aboulyazid (2019), yet contradict those of Abdel-Kader (2013) and Nabil (2018). Focusing only on the interpretation of statistically significant coefficients and the fact that the Chapters that exhibited a short-run relationship between RER and its respective TB did not extend this significant relation into the long run, the matter that impede the detection of a complete J-curve.

Noteworthy, as presented in table 4.4 above that summarizes the exchange rate policy implications on individual chapters, the results lend themselves to insightful outcomes and comparisons. To illustrate, Chapters 27 and 73 are both dependent on exchange rate policy, EGP depreciation in particular, in the long run. Accordingly, currency depreciation policies are expected to improve their respective TB in the long run. However, the outcome of the depreciation is subject to the degree to which Egypt enjoys market power in the markets for both Chapters. For instance, in Chapter 27(Mineral Fuels, oils etc.), where Egypt is a net exporter to Italy and a price taker, depreciation is not expected to improve Egypt's competitiveness, as prices quoted in foreign currencies can't be varied to create significantly

more sales. However, exporters of Chapter 27, which is mainly the government of Egypt, would benefit from the depreciation as it increases its earned price quoted in local currency. As for Chapter 73 (Articles of iron and steel...etc.), where Egypt is a net importer from Italy and price maker, since products within this chapter are classified as finished goods, then depreciation is expected to enable Egypt to lower prices to enhance its competitiveness and negotiate prices with Italian suppliers. Contrastingly, TD in Chapters 31 and 84 could be targeted by EGP appreciation and tightened demand side polices in the long run. Further, other Chapters like 39 and 76 are mainly determined by real domestic income, indicating that the conduct of contractionary demand side polices could improve the TB of these Chapters in the long run. Also, few Chapters are not responsive to the movements of any of the specified determinants like Chapters 07, 52 and 85 in the long run.

Finally to conclude, the findings of this study asserts that exchange rate polices are not Egypt's key to an improved TB in the short-run and should not be the only policy tool used in the long-run despite the establishment of the long-run relationship in the TB of 4 Chapters, since exchange rate polices impose a national effect and can not target a specific industry. However, ER liberalization could be supplemented with structural reforms to address the product and geographical concentered exports, free the monetary to be actively deployed in stimulating investment in import-substitution and export-related industries, boost confidence in the exchange market in Egypt to attract remittances, FDI and FPI knowing that earning repatriation could be easily carried out. Further, demand side policies should be utilized to resolve TD in sectors that were sensitive to domestic real income, by directly targeting these sectors exhibiting high income elasticities such as Chapters '31, '73 and '84 and moderate income elasticities such as '27, '39 and '76 as presented in Table 4.4 above; yet these pose shortcomings on other fronts, which require prioritization. Also, Egypt's bilateral trade with Italy relies on low value-added primary commodities (Chapter 27 mineral fuels

accounts for 27.3% of total trade with Italy where Egypt is net exporter), indicating that depreciation is not as beneficial in improving the TD as export diversification endeavors, which require structural reforms within the supply side of the Egyptian economy. Moreover, Despite the potential effectiveness of contractionary demand side polices as long-run solution for Chapters '31, '39, '72, '76 and '84, the execution of these polices pose immediate threat to the economic wellbeing of the country in the short-run as it might drive a recessionary period. Lastly, various industries pose different problems that require customized solutions that cannot be empirically examined on an aggregate level; the matter that justifies the resource allocated towards disaggregation.

Finally, the literature pertaining to the dynamics of the TB response to exchange rate movements is extensively rich, yet the academic arena always welcomes further disaggregated level studies about the matter. This is attributed to the fact that the findings of the existing literature are inconclusive; the matter that qualifies the research topic for further studying, disaggregation and innovative empirical testing approaches. Focusing on the case of Egypt, exchange rate polices have widespread effect due to the fact that Egypt's economic activities heavily relies on non-substitutable imports and geographically as well as product undiversified exports. The matter that renders the impact of exchange rate policy of utmost importance and qualifies it for extensive research attempts to achieve the goal of getting objective, relevant and reliable outcomes. In particular, the most recent move to a flexible ERR in 2016 has the potential to insinuate stability and boost confidence, hence attracting capital inflows, equip the Egyptian economy with inherent automatic stabilizers to absorb external shocks in the long-run as long as other measures will supplement the ER policy to stimulate exports and replace substitutable imports.

Among the merits of the current ERR, is that it aligns with the recent economic reform plan that Egypt embarked on that targets liberalizing previously controlled prices,

such as utility prices, energy prices and exchange rate prices are no exception. This is praised because it implies that the newly adopted ERR motivated by an external shock, but is also part of an overall reform package with each measure strengthening the other leading to the success of the overall reform strategy that targets sustainable growth. For instance, flexible regimes increased import prices, which discourages non-essential imports and allowed funds to be directed towards essential imports like energy and intermediate food components; hence, preventing shortages in these essential products and curbing their respective price hikes. This is in line with the government measure to de-control their prices, which could have accelerated inflation if shortages spread in these markets. Additionally, decreasing non-essential imports would shift people demand to the domestic replacements and help shrink the TD, earning Egypt a more favorable trade balance position than the currently prevailing one. Overall, the piecemeal development of the comprehensive reform plan enhances its overall potential effectiveness as long as there is commitment towards achieving the policy objectives for each economic indicator, be it inflation, budget deficit, economic growth, or trade deficit. For the ER policy to address the persistent TD particularly, it should be supplemented with measures to enhance the export diversity in terms of products and destinations. In this direction, current effort is being made to re-activate trade relations with African countries, which is a step forward towards diversifying Egypt's export destinations.

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