The effect of exchange rate movements on trade balance performance in Egypt: Is there a J-curve phenomenon?

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Abstract

This study targets to test the J-curve hypothesis in Egypt. The dynamics of the bilateral trade balance with Egypt's main eight trading partners is investigated. The findings of the paper investigate that the J-curve hypothesis does not hold in case of Egypt, especially in the long-term. This is consistent with most of the previous studies tested the same hypothesis in developing countries. The conclusion to policy makers can be presented in two main points. First, the negative impact of the depreciation of the pound against the US dollar was confirmed in the short term. This requires action to mitigate these effects, especially for the poor. Second, it is not possible to rely only on devaluing the Egyptian pound to improve the long-term balance of trade; both of domestic production and export development policies should be developed to help improve the balance of trade as a result of the devaluation of the pound.

Key Words: Currency depreciation, exchange rate in Egypt, J-Curve, terms-of-trade, trade balance

1. Introduction

The management of the monetary policy in Egypt has witnessed a radical transformation in November 2016. The monetary policy approach has shifted from targeting the exchange rate and supporting the value of the domestic currency to trying to reform the structural imbalance in the Egyptian economy.

Practice has shown that targeting the exchange rate leads to more pressure on the Egyptian currency. In particular; while undermining the ability of the central bank to support the value of the local currency due to the severe shortage of foreign exchange sources. This has led to the official inability to meet the demand for the dollar and the enlargement of the range of the parallel market.

To support the new approach, the central bank has targeted providing further liberalization of the foreign exchange market to help address the foreign currency crisis in the medium term. The new vision of managing monetary policy has not stuck to support the value of the Egyptian pound. The main objective was to tighten the gap between the official and non-formal exchange rate, which would help to achieve medium-term reforms in many ways. First, to support the competitiveness of the country's products; second, to support the efforts to attract foreign investments; and third, to reach a value for the Egyptian pound which reflects the strength of the Egyptian economy without artificial intervention that will actually put more pressure on the local currency. This confirms that the Egyptian government, in the process of devaluation[1], assumed a long-term

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[1] The devaluation refers to the situation of an official reduction in the value of the domestic currency in terms of foreign currency as a matter of policy.

positive relationship between devaluation and trade balance while ignoring the possibility of a negative impact in the short term.

In the short term, the trade balance (TB) often deteriorates after devaluation and the main reason is the inflationary effects of devaluation[2]. This inflationary effect may prevent the reduction of relative prices of domestic products[3]. Even if the devaluation reduces the relative prices of domestic products, the increased competitiveness of the country's products depends on the foreign price elasticity of demand on domestic products and the price elasticity of demand on imported products domestically (Bahmani-Oskooee, Iqbal, Nosheen and Muzammil, 2016; Phong, Bao, and Van, 2018; Tutuianu, 2015). In order to capture the inflationary effects into exchange rate changes when measuring the impact on competitiveness, several studies used real exchange rate[4].

In the Egyptian case, many factors weaken the ability of devaluation to improve the trade balance, even in the long term. These restrictions are related to the nature of Egyptian exports and imports. First, the nature of Egyptian exports, which are predominantly either primary products whose demand are

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[2] Therefore the monetary policy makers in Egypt believed that the Egyptian pound could not be fully liberalized, leading to more inflationary pressures on the economy, especially during the period of economic reform.

[3] The devaluation of the currency affects the prices of domestic production in two opposite ways. The first is the decline in relative prices of domestic products. The second is the increase in prices of domestic products due to the high cost of the foreign components in production. This effect depends on the elasticity of substitution between foreign and domestic components. Accordingly, the net effect on the relative prices of domestic production depends on which effect dominates the other.

[4] The real exchange rate is defined as the nominal exchange rate that takes relative inflation differences into account. It is measured, in the long term, by adjusting nominal exchange rate by the foreign to domestic prices. It can use the relative price of tradable and non-tradable goods assuming that trade without restrictions can make prices of traded goods the same all over the world (Ali, Johari, and Alias, 2014).

derived demand from the demand for other products; or the low elasticity of demand for them for changes in their prices. Second, the nature of Egyptian imports which are dominated by food and investment goods. Accordingly, this paper investigates the impact of real exchange rate changes on the trade balance with a focus on testing the J-curve phenomenon.

The paper is organized into six sections. Section two reviews the theoretical and empirical literatures that studied the relationship between devaluation of the local currency and the exchange rate. The third section studies an overview of the exchange rate regimes and analyses the structure and trends of foreign trade in Egypt. The fourth section estimates the determinants of the bilateral trade balance in Egypt. The last section gives the recommendations.

2. Theoretical and empirical literature review

After the collapse of the Bretton Woods exchange rate system, several countries were forced to adopt floating exchange rate systems. Moreover, one of the main problems impeding development in developing countries was the lack of foreign exchange resources as a result of structural deficits in their balance of payments. This has led many economists to examine the relationship between devaluation of the domestic currency and improving the performance of the balance of payments and especially the trade balance, both theoretically and practically.

2.1 Theoretical literature of the relationship between exchange rate changes and the trade balance

Although economic theory has long been focused on studying the relationship between devaluation and the performance of the trade balance, there is no agreement on this relationship (Lal and

Lowinger, 2002; Tutuianu, 2015). The study of the theoretical literature of this relationship showed four theoretical bases for the transfer of the effect of exchange rate changes to improve the performance of the trade balance. These four theoretical bases are the Standard Theory of International Trade, the Elasticity, the Absorption and the Monetary approaches.

 2.1.1 The Standard Theory of International Trade
    According to the standard theory of international trade, changes in the exchange rate affects the trade balance (TB) through affecting both of trade value and volume (Andersson and Styf, 2010; Choi, 2017; Lal and Lowinger, 2002). The real depreciation (appreciation) of the country's currency value, other things remain constant, increases (decreases) the competitiveness position of the country's' products (Chiloane, Pretorius, and Botha, 2014). The real depreciation (appreciation) of the country's currency value increases (decreases) the price of imported goods in terms of domestic goods (Ali, Johari, and Alias, 2014). As a result, trade balance (TB) improves (deteriorates). Accordingly, this theory ignores the variation of the direction of this effect over time.
 2.1.2 The Elasticity approach
    The elasticity approach relates the effect of exchange rate changes on TB to the price elasticities of demand and supply for exports and imports. Studying this relationship conditional to the sum of the price elasticities of demand for exports and imports is called Marshall-Lerner Condition (Baek, Koo, and Mulik, 2009; Bahmani-Oskooee *et al.*, 2016; Drama, 2010; Masih, Liu and Pervaiz, 2018; Tutuianu, 2015). This approach studies this relationship as a net effect of real exchange rates

changes on both prices and volume of traded goods[5] (Ali *et al.*, 2014; Andersson and Styf, 2010; Chiloane *et al.*, 2014; Choi, 2017; Hussain and Bashir, 2012; Lencho, 2013). Figure 1 illustrates the effect of the depreciation of the currency on its TB assuming perfectly elastic supply.

Figure 1. Elasticity approach – The case of different elasticities of demand
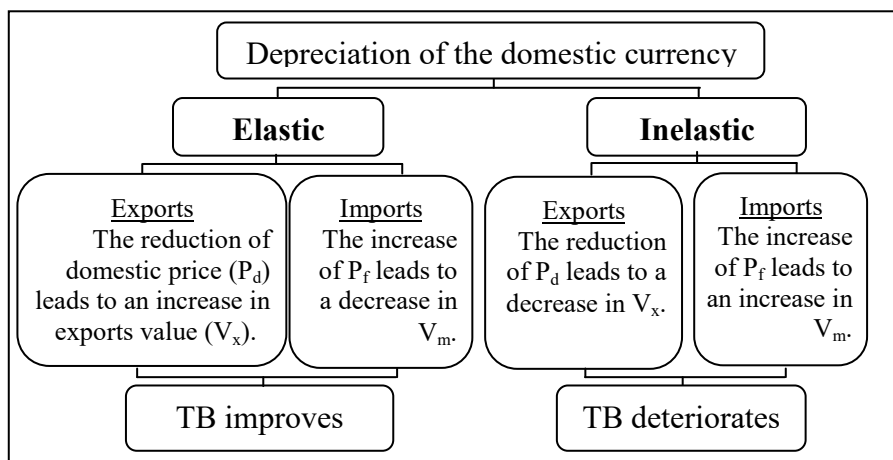
Source: Constructed by the author.

The J-curve phenomenon started as a dynamic representation of Marshall-Lerner Condition. It studied how the effects of devaluation on TB can vary over time as elasticities changes (Andersson and Styf, 2010; Chiloane *et al.*, 2014; Drama, 2010; Masih *et al.*, 2018; Musawa, 2014). In the short-term, demand for exports and imports are less-elastic. The reason for this is the length of time needed to change consumers' behavior and negotiate a change in trade deals (Baharumshah, 2001; Begović and Kreso, 2017; Khalid, 2017; Mehare and Edriss, 2012).

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[5] If the volume effect of the depreciation on the TB outweighs the price effect, TB can be improved (Lencho, 2013).

Hence, TB deteriorates in the short-term (Hussain and Bashir, 2012). In the medium-term, domestic and foreign consumers substitute foreign for domestic goods as relative prices of domestic goods decrease, assuming elastic cross price elasticity between foreign and domestic goods. In the long term, domestic supply responds to the increase in demand for domestic goods, which causes an increase in the volume of exports. Accordingly, TB recovers from the bottom of the J-Curve in the medium and long-term (Andersson and Styf, 2010; Hussain and Bashir, 2012; Lencho, 2013; Musawa, 2014; Stucka, 2004).

Price elasticity of supply of exports and imports affect the TB directly and indirectly through affecting the terms-of-Trade. If the price elasticity of supply for both exports and imports outweighs the price elasticity of demand, the terms-of-trade worsens (Lencho, 2013).

The elasticity approach is criticized as it ignores the macroeconomic effects of devaluation. In order to capture the macroeconomic effects of devaluation on the TB, both of absorption and monetary approaches are used.

2.1.3 The Absorption approach

The absorption approach uses national income identity referring to the macroeconomic equilibrium (Baharumshah, 2001; Lencho, 2013). National income identity states that aggregate supply should be equivalent to aggregate demand. Aggregate supply expresses the real domestic output or national income (Y) of the country. Aggregate demand can be explained as the domestic absorption on real output which consists of consumption expenditure (C), private investment expenditure

(I), government expenditure (G), and net exports (X-M). This can be written as:

$$Y = C + I + G + (X\text{-}M) \qquad (1)$$

In order to capture the effects of devaluation on TB, this approach uses both of national income (Y) and the absorption components (C, I, and G) as intermediates (Ali *et al.*, 2014). The changes in TB can be rewritten as:

$$\Delta\,(X\text{-}M) = \Delta\,Y - \Delta\,(C + I + G) \qquad (2)$$

Hence, the ability of currency devaluation to improve TB depends on the responsiveness of the national income and domestic absorption to the changes in the employment of resources and the terms-of-trade (ToT) regardless of the time horizon (Baek *et al.*, 2009; Choi, 2017; Khalid, 2017).

Figure 2. Absorption approach of the effect of devaluation on TB
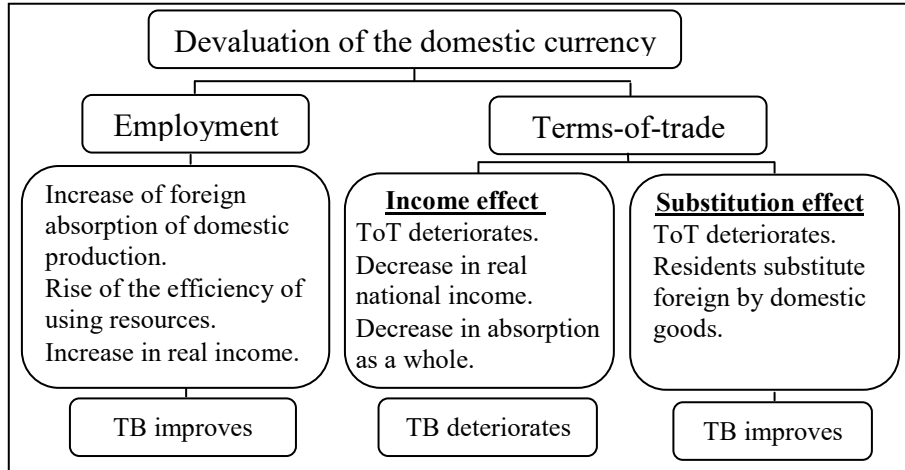
Source: Constructed by the author.

2.1.4 The Monetary approach

While the absorption approach focused attention on the real economy, the monetary approach considered the devaluation as a monetary phenomenon (Baek *et al.*, 2009; Lencho, 2013). Accordingly, the impact of devaluation on the TB is determined by the extent to which the devaluation of the currency affects real money supply (Baharumshah, 2001). With devaluation, domestic prices of traded goods are paid higher in local currency. This leads to a decline in real money supply[6] followed by a reduction in consumption and other components of absorption. Therefore, TB improves. At the same time, the nominal increase in money supply following the devaluation may lead to an expectation for individuals to increase future incomes. This will result in increasing spending and absorption, and accordingly TB deteriorates. Hence the net effect of the devaluation of the currency on the trade balance is ambiguous and it is not related to the time horizon (Ali *et al.*, 2014).

Hence, from studying the theoretical framework, the J-curve phenomenon can be explained by the previous theories with conditions. In the short term all of elasticity, absorption, and monetary approaches can explain the behavior of the J-curve. The elasticity approach can explain it assuming inelastic demand. The absorption approach explains it if the ToT income effect dominates. The monetary approach explains it when the increase in money supply following the devaluation increases spending. All of these effects can lead to deteriorating TB in the short term. In the long term all of the standard theory of international trade, elasticity approach, absorption approach, and monetary approach can explain the behavior of the J-curve. The

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[6] This is achieved provided that the increase in relative prices of domestic goods is not followed by an equivalent increase in nominal money supply.

standard theory of international trade may work if supply is elastic to the increase in competitiveness of domestic production. Elasticity approach works assuming elastic demand. The absorption approach works if the employment and ToT substitution effects dominate. Monetary approach works when the reduction of real money supply following the increase in the prices of traded goods because of devaluation reduces spending. All of these effects can lead to improving TB in the long term.

Consequently, there is no evidence to guarantee having the J-curve phenomenon because of devaluation, as its application depends on satisfying several conditions. Its existence is a matter of application.

2.2 The relationship between exchange rate changes and the trade balance in practice

A large number of empirical studies have examined the impact of exchange rate changes on the performance of the TB, whether panel studies across countries or econometric studies at the state level. There is no general agreement on the direction of this relationship in both the long-term and the short-term. Most of empirical studies failed to prove the J curve phenomenon, this group of studies are divided between three categories. First, some studies confirmed the direct positive relationship regardless of the time horizon of the study. Second, some found

a negative impact in all time horizons. Third, some failed to prove the relationship. On the other hand, few studies stated that the J curve phenomenon exists.

Lencho (2013) inspected both of short and long-term effects of exchange rate changes on the performance of TB of Ethiopia.

The study used a model that takes into consideration the theoretical approaches of elasticity, absorption, and monetary in measuring this effect. Both of long- and short-terms relationships confirmed the positive relationship between the depreciation of real exchange rate and trade balance. Hence, the study confirmed having no evidence for J-curve phenomenon. Khalid (2017) found the same results in testing the J-curve phenomenon in Pakistan's trade with its main South Asian trading partners.

Baek *et al.* (2009) assessed the dynamic effects of exchange rate variability on agricultural bilateral trade of the United States with its major trade partners. While the little evidence of the existence of the J-curve phenomenon, the study confirmed both the long-term and short-term positive relationships between exchange rate changes and the performance of agricultural trade in USA. This confirmed the absence of having an evidence for J-curve phenomenon.

Drama (2010) investigated long and short terms effects of real exchange rate changes on the TB of Cote d'Ivoire. The estimation strengthened the positive effects of real exchange rate devaluation on TB in both of the short and long terms. Hence, the findings of the study were not consistent with J-curve phenomenon.

Andersson and Styf (2010) checked out the relationship between exchange rate depreciation and TB over time in 39 countries. The results confirmed the positive effect of the depreciation on TB regardless of the time limit. Accordingly, although the study emphasized on the applicability of both of

the standard theory of trade and Marshall-Lerner condition, it was not consistent with the J-Curve phenomenon.

Musawa (2014) estimated both of long and short terms impacts of exchange rate changes on TB in Zambia. Results stressed the importance of real exchange rate devaluation in improving TB in the long term, although it failed to prove the relationship in the short term. Accordingly, the study failed to prove an evidence for having J-curve phenomenon in Zambia.

Mehare and Edriss (2012) studied the effects of exchange rate variability on Ethiopia's exports of oilseeds. The study found that the devaluation of the currency leads to permanent deterioration of the exports of oilseeds. This is explained by being a small exporter that can not affect the world price of oilseeds coupled with the theory of risk aversion, where producers expect further depreciation of the currency and store their products instead of selling whether in the domestic market or abroad. Hence, there was no evidence for having J-curve phenomenon.

Begović and Kreso (2017) confirmed the same findings in studying the effects of real exchange rate changes on TB in European transition economies. The study pointed out that the devaluation of the real value of domestic currencies worsens TB in European transition economies, even in the long-term. This was interpreted in the study by low export capability, high imported components within export commodities, and high import dependence. This strengthened the absence of having J-curve phenomenon.

Bahmani-Oskooee *et al.* (2016), Lal and Lowinger (2002), and Phong *et al.* (2018) explained having the negative relationship between exchange rate variability and the TB in both short-term and long-term, and so the absence of having J-curve phenomenon, for two reasons. The first is the time lag between the adjustment for producers and consumers decisions

to changes in buying behaviors after the devaluation. The second is the asymmetries of exports and imports prices because of the devaluation.

Baharumshah (2001) studied the main variables affecting bilateral trade of Malaysia and Thailand with USA and Japan. The estimation stressed the importance of real effective exchange rate in affecting the TB as the study discovered that devaluation improves the trade balance of both countries in the long-term as it increase the competitiveness. On the other hand, the ability to have the J-Curve phenomenon varies. While it was proved in case of Thailand's trade with US and Japan, it was not for Malaysia's trade balance against US and Japan.

Masih *et al.* (2018) tested the relationship between exchange rate changes and TB in China. The study found that there is no evidence for this relationship whether in the long-term or the short-term. Accordingly, the study found no evidence of the J-curve phenomenon in China.

Tutuianu (2015) found the same result in investigating the J-curve phenomenon in the case of forest products in Romania. The study failed to prove the relationship between the devaluation of the Romanian currency and affecting bilateral

trade. Hence, the study found no evidence of the J-curve phenomenon.

Bahmani-Oskooee *et al.* (2016) estimated short term and long term effects of currency depreciation on TB in Pakistan using disaggregated data from 77 industries. While the results confirmed the significant short term effect in few industries, the long term effect does not be proven. Consequently, the study failed to prove the J-curve phenomenon.

Phong *et al.* (2018) assessed short term and long term effects of devaluation on TB in Vietnam. The results confirmed having the
J-curve phenomenon as devaluation of the real exchange rate in Vietnam worsens TB in the short term then improves it in the long term.

Stucka (2004) estimated both of short and long term effects of currency depreciation on TB in Croatia. The study strengthened having J-curve phenomenon as the permanent depreciation of the domestic currency improves the TB of the country after a deterioration of it in the short-term.

Chiloane *et al.* (2014) examined the relationship between exchange rate changes and manufacturing trade balance in South Africa. Even though the estimation results concluded that the depreciation of the currency worsens the manufacturing trade balance in the short-term, it improves it in the long-term. The estimation confirmed that J-curve phenomenon holds.

Mallick (2011) assessed the main determinants of goods and services exports in 48 countries using the gravity model approach. While the findings stressed the importance of devaluation of the

currency in improving services exports, it adversely affects goods exports. The study explained this surprising finding for goods by two reasons. First, exports of goods in most of the countries, included in the estimation, are imports intensive. Second, that J-curve phenomenon holds.

Lal and Lowinger (2002) studied the main determinants of TB in seven East Asian countries. The study confirmed the applicability of J-curve phenomenon although the differences in the duration to change the effects of devaluation on TB between countries.

Hussain and Bashir (2012) investigated whether Pakistan's international trade with its main trading partners, US and UK, follows the J-curve phenomenon in response to the depreciation. The study concluded that the depreciation of the currency worsens TB in the short term and then improves it in the long term with both partners. Consequently, they concluded that J-curve phenomenon holds for Pakistan's international trade with its main trading partners.

3. An overview of the exchange rate regimes and the structure and Trends of Exports and Imports in Egypt

This section reviews exchange rate regimes and their impact on changes in the exchange rate of the pound against the currencies of Egypt's main trading partners and the structure and trends of Egypt's foreign trade.

3.1 The exchange rate regimes in Egypt

A study of the exchange rate (EXR) regime in Egypt since the 1960s shows that it has undergone four fundamental

changes. These EXR regimes are fixed adjustable peg, managed floating, crawling peg, and floating.

Since the 1960s till February 1991, Egypt adopted a fixed multiple exchange rate arrangement, in the majority of the period, with some adjustments (Zaki, Ehab and Abdallah, 2017). During this period, EXR of the Egyptian pound (LE) was stable against the American dollar ($US) except during periods when the monetary authorities resorted to devaluate the pound in order to reach a competitive price of it instead of having multiple exchange rates (Mohieldin and Kouchouk, 2004). This period witnessed three major devaluations in EXR. These adjustments include a devaluation from 0.39 LE/$US in 1978 to 0.7 LE/$US in 1979, then in 1989 to 1.1 LE/$US, and then to 2 LE/$US.

In February 1991, following an economic reform program, the Central Bank of Egypt (CBE) announced the transition from an adjustable peg EXR regime to a managed float system. As a result, the EXR devaluated to 3.33 LE/$US in 1991. EXR increased slowly with an average growth rate of 0.3% between 1991 and 1999. Since 1997, several factors affected the Egyptian inflows of foreign currencies which led to pressure on the foreign exchange market. These factors include the terrorism attack of Luxor in 1997 and its impact on the decline in tourism revenues, the decline in the international prices of oil, and the emerging markets financial crisis (Massoud and Willett, 2014; Mohieldin and Kouchouk, 2004). In a trial to support the currency, the central bank used international reserves which deteriorated by 44% during 5 years, from $18.7 billion in 1997 to $13.8 billion in 2001 (Elsherif, 2016). This forced the Egyptian authorities to abandon managed float system and to take a more flexible system so as to stop losing more reserves.

In January 2001, the CBE announced the adoption of a de jure crawling peg exchange rate regime. During two years from the start of adopting the crawling peg regime, EXR devaluated three times, in order to avoid the deterioration in international reserves. The first followed adopting the new regime by 13% to reach 3.85 LE/$US. The second was after the terrorist attack in the United States in 9-11 by 7.5% to 4.14 LE/$US. The third came because of the continuous losses to the Egyptian economy because of the terrorist attack in the United States by 8.7% to 4.5 LE/$US. This rate is kept until the announcement of adopting floating exchange rate regime (Elsherif, 2016; Massoud and Willett, 2014).

In an attempt to counter the dollar shortage of markets due to the continued shortage of foreign exchange resources, the CBE announced in January 2003 adopting floating exchange rate regime (Zaki *et al.*, 2017). The value of the Egyptian pound kept depreciated till reaching 6.3 LE/$US in December 2004. During this period, although the CBE announced in adopting floating

 exchange rate regime, it was always intervening in the exchange market to maintain the stability of the exchange rate (Massoud and Willett, 2014). The depreciation of the value of the Egyptian pound accelerated inflation which reaches 8% in January 2004 then spiraled to 12.2% in 2004. This put pressure on the Egyptian government to better manage inflation in a more efficient manner.

The CBE announced in 2005 applying inflation targeting as a formal framework for monetary policy. Accordingly, the CBE intended to stop the devaluation of the pound, which in turn led to higher inflation rates. As a result, the EXR appreciated from

6.1 LE/$US to be 5.8 LE/$US. At the same time, because of controlling inflation, international reserves increased from $15.4 billion in January 2005 to $21.3 billion in June 2006. Reserves continued to increase until December 2010 when reserves reached $33.6 billion (Massoud and Willett, 2014).

Starting from January 2011, Egypt began a period of economic, political, social, and security instability that followed the 25th of January revolution. This has negatively affected Egypt's foreign position. The expected result is the deterioration of the value of the Egyptian pound significantly. However, this is not the case where the Egyptian authorities have used reserves to preserve the value of the currency. The Egyptian Pound fell very slightly from 5.8 LE/$US in January 2011 to 6.1 LE/$US in November 2012. The price of maintaining the pound was the deterioration of foreign exchange reserves from $32.6 billion in January 2011 to $15.5 billion in June 2012 and $15.4 billion in January 2015 (Zaki *et al.*, 2017).

In December 2012, the CBE adopted a new system to manage foreign exchange transactions depending on auctions in a trial to stop the deterioration in foreign reserves that reached critical level. Following the new system, Egyptian Pound depreciated 11%, reaching 6.7, since its adoption till June 2013. Since then, the large support from gulf countries helped the CBE to stabilize the official exchange rate during the year 2014.

In February 2015, CBE imposed caps on the deposit and withdrawal of foreign currencies in a trial to limit trading on the black market. But this has had the opposite effect as transactions have increased in the black market to meet the needs of foreign currency. This put CBE under pressure trying to bring the official market price closer to the black market price by making almost daily

devaluations in the pound rate. The crash of the Russian aircraft in October 2015 further put pressure on the foreign exchange market as a result of recession in the tourism sector. Accordingly, the Egyptian Pound depreciated from 7.15 LE/$US in January 2015 to 8.85 LE/$US in October 2016, losing 23% of its value.

In October 2016, Egypt's Chamber of Commerce banned the import of more than 50 types of nonessential goods. Moreover, the demand for the foreign currencies in the black market was strengthened by raising the deposit cap for importers of basic foodstuffs, medicines, and material needed for export-oriented businesses.

In an attempt to contain the foreign exchange crisis and eliminate the black market, the floating of the Egyptian pound against the US dollar was announced in November 2016. This led to the loss of the pound about 45% of its value to reach 13 LE/$US in November 2016, which was followed by continuous declines to reach more than 18 LE/$US by the end of the year 2016. Since then, Egypt has taken a number of reform steps those support the value of the pound including raising interest rates and reducing energy subsidies. These steps enabled the government to conclude a loan agreement with the IMF worth 12 billion dollars over three years to support the economic reform program. The government also used the deal with the IMF to boost foreign borrowing both internationally and through issuing dollar bonds. This was supported by the increase in Egyptian remittances from abroad by 16% in December 2016 compared with the same period last year and the start of the Chinese Christmas that began in mid-January and ended up in the mid-February 2017. All of these led to increase foreign reserves to over $26.4 billion as of 2017.

These factors have been mutually reinforcing with the dollar failing globally to the appreciation of the Egyptian pound by about 3 pounds during the first two months of 2017 to reach 15.76 LE/$US by the end of February.

Since then, the pound has fluctuated against the US dollar depending on several factors those affected demand and supply forces. These factors include issuing Eurobonds bonds, improving in the revenues of tourism, a gradual improvement in Egypt's exports, the start of production from the giant Zohr gas field, and the efforts to affect the dollar exchange rate, especially customs exchange rate, whether to respond to the changes in the market or to control production costs and inflation changes.

3.2 The structure and Trends of International Trade in Egypt

Both exports and imports of Egyptian goods took an upward trend during 1994-2017. The rate of growth in imports exceeded the growth rate of exports. This was reflected in the increase in the deficit in the TB during this period. This deficit exceeded $US 40 billion in 2017, while the highest deficit was $US 52.4 billion in 2015. Figure 3 illustrates the evolution of Egypt's foreign trade values during 1994-2017.

Figure 3. Egypt's foreign trade values during 1994-2017
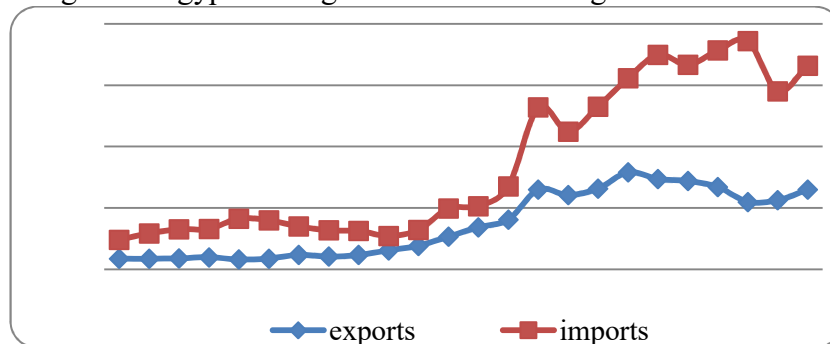
Source: United Nations Comtrade online Database (UN Comtrade)- International Trade Statistics.

It is clear from the previous figure that, despite the general upward trend during the period, however, the study of the development of Egyptian commodity exports can be divided during the period to three sub-periods. The first is the period before the revolution of 25 January 2011, in which Egyptian exports took an upward trend with an average annual growth rate of 15%. Then commodity exports followed a downward trend during the period 2012-2015 with an annual average rate of 8.5%. After 2015, Egyptian exports resumed their rise again until 2017. As for Egyptian commodity imports, it took an upward trend over the period from one year to another, except for some years. The average annual growth rate of imports was 11%. Both have led to an increase in the trade deficit which reached an annual growth rate of 14.5%, except for some years in which the trade deficit declined due to the decline in commodity imports.

This is confirmed by the value of the correlation coefficient between the value of the TB deficit from one side and the values of both exports and imports from the other. The correlation coefficient states that the TB deficit is more closely related to the changes in the value of imports, where the correlation coefficient between them was 97%, while it is 83% in the case of exports. This led us to calculate the correlation between the values of the exchange rate of the pound against the dollar with the values of foreign trade. The results confirmed two key points. First, imports are more closely related to exchange rate changes (correlation coefficient is 61% versus 56% for exports). Second, there is a positive correlation coefficient between the exchange rate values and the balance of payments deficit. This gives an initial indication that the increase in the exchange rate (depreciation of the pound) is accompanied by an increase in the balance of payments deficit.

In terms of trade destination, during the last two decades, the main trade partners for Egypt are USA, China, Saudi Arabia, Italy, Germany, France, Japan, and India. Their minimum share of the Egyptian trade was 34.5% in 2014 and their maximum share was 49.1% in 2011.

Figure 4. Egypt's main trade partners during 1998-2017
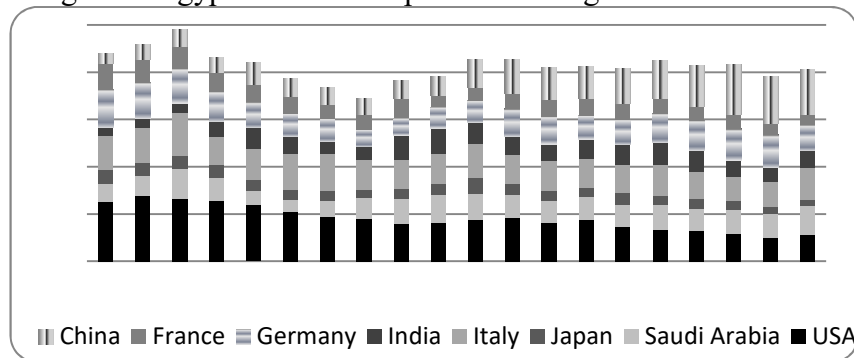
Source: UN Comtrade - International Trade Statistics.

A number of observations can be drawn from the evolution of Egypt's trading partners during the past two decades, as illustrated in the previous figure. First, the US share of Egypt's foreign trade took a downward trend, which fell from 12.5% in 1998 to 5.7% in 2017. Second, China replaced the United States with time as Egypt's main trading partner. Its share of Egypt's foreign trade increased from 2.2% In 1998 to 9.5% in 2017. Thirdly, there is a slight upward trend in Egypt's foreign trade with both Saudi Arabia and India. Fourthly, there is a slight downward trend in Egypt's trade with France and Japan.

As for the commodity structure of Egypt's foreign trade, Egypt's exported products are distributed between agriculture products (26% in 2016), fuels and mining products (25%), and manufactures (49%). The main agricultural exports are fruits

and nuts (4.9%) and vegetables (4.1%) in addition to cheese and curd. The main non-agricultural exports include mineral fuels including oil (19.5% of total exports in 2017), gold and precious metals (8.2%), electrical machinery and equipment (6.7%), plastics and its articles (5.8%), fertilizers (4.1%), clothing and accessories (3.5%), iron and steel (3.3%), and perfumes and cosmetics (2.1%). These products account for more than 62% of Egyptian exports value in 2017.

Egypt's main commodity imports are divided between agriculture products (23% in 2016), fuels and mining products (21%), and manufactures (56%). The main agricultural imports are cereals (6.6% of total imports in 2017) including wheat and meslin and maize (corn), meat (2.3%) as frozen meat of bovine animals, and Solid residues from soya-bean oil. The main non-agricultural imports include mineral fuels including oil (17.4%), machinery (8.6%), electronic equipment (7.3%), iron and steel (4.9%), plastics (4.8%), vehicles (4.7%), iron and steel products (4.2%), and pharmaceuticals (3.3%). These products account for more than 64% of Egyptian imports value in 2017.

4. Methodology, empirical model, and results

In order to test the application of J-curve phenomenon in Egypt, both of short and long run effects of changes in the exchange rate of the Egyptian pound on the bilateral trade balance should be checked out. For this purpose, a regression model for the bilateral TB between Egypt and its major trading partners will be estimated; including a variable that measures bilateral exchange rate changes as an independent variable.

4.1 Methodology

Panel annual data is used to estimate both of the long and short run models for the period 1994-2016. Bilateral trade data were obtained from the United Nations Comtrade online Database (UN Comtrade); real GDP data in Egypt and its main trading partners were obtained from The World Bank World Development Indicators data. The same source was used to obtain the exchange rate of the Egyptian pound against the currencies of the other partners. The same TB model estimated in several researches (Baek *et al.*, 2009; Bahmani-Oskooee and Ratha 2004; Khalid, 2017) is used. The long-term model takes the following form:

$$\ln RTB_{i,t} = \alpha + \beta \ln Y_{Eg,t} + \theta \ln Y_{i,t} + \delta \ln REX_{i,t} + \in_t \quad \dots (1)$$

The equation takes the linear-logarithmic form where the bilateral real TB is a dependant variable. The GDP deflator in Egypt and its partners are used to generate real exports and imports. Here the bilateral real TB depends on real GDP in Egypt (Y_{Eg}), real GDP of the partners (Y_i) where i refer to the partner, real bilateral exchange rate (REX_i), and a stochastic disturbance term ($\in$). The main trade partners of Egypt, included in the study, are USA, Saudi Arabia, Japan, Italy, India, Germany, France, and China.

The real TB is defined as the ratio of the real value of Egypt's imports from country i to its real exports to the same country referring to the trade deficit. Using TB as a ratio benefits in showing it as unit free terms. Moreover, the ratio can be transformed into a logarithmic form in case of having a deficit (Baek *et al.*, 2009; Bahmani-Oskooee and Ratha 2004). The REX_i is defined as the bilateral nominal exchange rate of the

foreign currency per unit of the domestic currency weighted by the domestic CPI relative to the foreign CPI.

The international trade theory illustrates that the increase in the country's GDP/income can have a direct (or inverse) effect on the TB depending on which effect dominates the other, income or (substitution) effects. Therefore; β_1 can be positive or negative. Similarly, the increase in the country's GDP/income can also be negative (or positive) depending on which effect dominates the other, income (or substitution) effects. Therefore; β_2 can be positive or negative. The reduction in the value of REX means depreciation in the real value of the currency which increases the relative competitiveness of domestic production. Hence; δ is expected to be positive if the depreciation of the currency improves TB which is consistent with J-curve phenomenon in the long run.

In order to capture the short run dynamics of exchange rate depreciation on TB, the error correction model (ECM) is estimated using Autoregressive Distributed Lag (ARDL) model. The ARDL is chosen as it avoids spurious regression in case of non-stationary time-series data, it gives unbiased estimates of long term relationships, and it is relatively more efficient for small-sample data size. But it is as flawed as other single equation models that it ignores the possibility that some independent variables are endogenous (Baek *et al.*, 2009). This can be ignored in our model as the ability of the Egyptian TB to influence the real output of the partner countries is limited as a small economy. Additionally, the impact of the trade balance on

the exchange rate can also be ignored as the majority of the period under study has been followed by a fixed or managed system; also Egypt is more dependent on the balance of services in the provision of sources of foreign exchange. For the same reason, the ability of TB to affect real output in Egypt is limited. Thus, the possibility of having endogenous independent variables will be ignored.

The ARDL model is structured as follows:

$$\Delta \ln RTB_{i,t} = \Phi \; + \Sigma_{k=1}^{n} \eta_k \Delta \ln TB_{i,t-k} + \Sigma_{k=0}^{n} \beta_k \Delta \ln Y_{Eg,t-k} + \Sigma_{k=0}^{n} \theta_k \Delta \ln Y_{i,t-k} +$$

$$... (2)$$

$$\Sigma_{k=0}^{n} \delta_k \Delta \ln REX_{i,t-k} + \lambda_1 \ln TB_{i,t-1} + \lambda_2 \ln Y_{Eg,t-1} + \lambda_3 \ln Y_{i,t-1} + \lambda_4 \ln REX_{i,t-1} + \mu_t$$

In equation 2, k refers to the number of time lags. The short run dynamics of exchange rate effect on TB is captured in the coefficients of δ_ks of equation 2. If the lower lags of δ are negative and followed by positive values for upper lags, J-curve phenomenon holds. Otherwise, it does not apply (Bahmani-Oskooee and Ratha 2004).

4.2 Empirical model and results

All the variables included for this study were stationary at the first difference and are I (1). This confirms the ability to use ARDL model. This leads us to study the short term relationship in equation 2. Table 1 summarizes short run dynamic effects of real exchange rate changes on real bilateral trade balance.

Table 1. Coefficient estimates of REX lags and EC term in bilateral TB model

Country	No. of lags of REX				EC_{t-1}
	1	2	3	4	
8 partners	-3.63** (-2.33)	4.75 (1.51)	-3.34 (-1.28)	0.84 (1.09)	-0.17** (-2.12)
China	-3.61 (-0.67)	3.18 (0.32)	-3.02 (-0.36)	1.5 (0.56)	-0.87 (-1.13)
France	-0.88 (-1.24)	0.67 (0.60)	-0.52 (-0.06)	-0.004 (-0.02)	0.03 (0.67)
Germany	-2.36* (-1.76)	2.15 (1.02)	-0.83 (-0.55)	0.08 (0.19)	0.001 (0.03)
India	-4.27* (-1.84)	7.04* (1.66)	-6.96** (2.07)	1.67 (1.58)	-0.34** (-2.53)
Italy	-0.18** (-2.46)	0.019 (1.45)	-0.11 (-1.06)	0.05 (1.56)	0.017* (1.77)
Japan	-6.57*** (-3.29)	11.78*** (3.44)	-9.97*** (-3.41)	3.17*** (3.09)	-0.4*** -3.15
Saudi Arabia	1.40 (0.88)	-8.41** (-2.37)	9.24*** (2.76)	-3.3*** (-2.83)	-0.31 (-0.66)
USA	-12*** (-4.27)	21.36*** (4.74)	-15*** (-4.49)	3.62*** (3.62)	-0.6*** (-4.42)

Note: ***, **, and * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively. Parentheses are t-statistics. EC_{t-1} refers to the error-correction term.

The results shown in table 3 indicate that the error correction mechanism in the short-term as a result of the changes in the exchange rate works only for Egyptian trade for the eight members as a whole and especially with India, Japan, and USA. Even though the error correction mechanism was proved for trade with these three members, the first lag was negative and significant while the second was positive and significant and then the third came back negative and significant. Hence, it is clear that the short-term adjustments do not follow any specific pattern. This is consistent with the main findings of previous

studies regarding the short-term adjustments of TB because of

currency depreciation (Baek *et al.*, 2009; Bahmani-Oskooee and Ratha 2004). Thus, the results do not suggest the existence of J-curve effect in Egypt's trade with its main eight trading partners. However, at least the negative significant effect of the error correction mechanism remains to confirm the long-term relationship.

The results of the long-term coefficient estimates of the RTB model for Egypt's bilateral trade with its main trading partners are shown in Table 2. Both of the trade with the group of the eight partners as a whole and the bilateral trade with each partner in separate are estimated. When estimating the model, Hausman test showed that the data follows the fixed effect.

Table 2. Coefficient estimates of long-term RTB model

Country	$RGDP_E$	$RGDP_i$	REX_i	Constant
8 partners	1.69***	-1.02***	-0.08	-4.52
	(5.02)	(-3.91)	(-1.57)	(-1.53)
China	-13.8	6.53	0.10	69.62
	(-1.27)	(1.02)	(0.07)	(1.64)
France	4.97***	-13.80**	0.09	143.65*
	(4.02)	(-2.59)	(0.27)	(2.03)
Germany	1.21	6.29*	-0.37	-107.01**
	(0.85)	(1.79)	(-1.11)	(-2.48)
India	-20.26***	13.27***	-1.47	55.18**
	(-3.02)	(2.97)	(-1.29)	(2.67)
Italy	2.38***	-9.12***	-0.03	103.77**
	(5.07)	(-3.47)	(-0.52)	(2.62)
Japan	1.13	-14.73*	1.15	220.07**
	(0.42)	(-1.92)	(1.53)	(2.13)
Saudi Arabia	1.76	-1.95	-0.27	4.84
	(1.01)	(-0.96)	(-0.34)	(0.19)
USA	3.85**	-6.21***	0.11	56.22**
	(2.52)	(-2.97)	(0.24)	(2.44)

The results of estimating the long-term RTB model confirm the absence of the J-curve effect in Egypt's bilateral trade with its main partners as the coefficients of the real exchange rate were insignificant in all cases. This negates any positive long-term relationship of the depreciation of the Egyptian pound on

 the real trade balance with Egypt's main trading partners. The coefficients of RGDP in Egypt (foreign) are statistically significant and positivity (negatively) related to RTB in cases of France, Italy, and USA. This can be explained through the increase in demand for foreign imports (domestic exports) because of the increase in domestic income (foreign income). The RGDP in Japan has the same significant and negative relationship in its bilateral RTB with Egypt for the same previous reason. On the other hand, the coefficients of RGDP in Egypt (foreign) are statistically significant and negatively (positivity) related to RTB in case of India. This can be explained by the increase in real domestic (foreign) income because of the increase in RGDP increases the demand for domestic goods rather than foreign ones in both countries, which thus leads to a reduction in Egypt imports to (exports from) India (Bahmani-Oskooee and Ratha 2004). The RGDP in

Germany has the same significant and positive relationship in its bilateral RTB with Egypt for the same previous reason (Baek *et al.*, 2009).

5. Conclusions and Policy Implications

With the tendency in Egypt to adopt successive reductions in the value of the Egyptian pound against the US dollar, this study targets to test the J-curve phenomenon in Egypt. In this paper the dynamics of TB in Egypt with its main 8 trade partners is investigated using annual data over 1994-2016 period. The J-curve hypothesis is interpreted as deterioration in the TB in the short-term followed by an improvement because of the depreciation of the currency.

The findings of the paper investigates that the J-curve hypothesis does not hold in case of Egypt, especially in the long-term. This is consistent with most of the previous studies those tested the J-curve hypothesis in developing countries.

The conclusion to policy makers can be presented in two main points. First, the **negative** impact of the depreciation of the pound against the US dollar was confirmed in the short term. This requires action to mitigate these effects, especially for the poor. Second, it is not possible to rely only on devaluing the Egyptian pound to improve the long-term balance of trade; both of domestic production

and export development policies should therefore be developed to help improve the balance of trade as a result of the devaluation of the pound.

References

Ali D. A., F. Johari, and M. H. Alias (2014), "The Effect of Exchange Rate Movements on Trade Balance: A Chronological Theoretical Review," *Economics Research International*, pp. 1–7. Available at: <https://doi.org/10.1155/2014/893170> [3/15/18]

Andersson, A. and S. Styf (2010), "How does a depreciation in the exchange rate affect trade over time?" Bachelor's Thesis in Economics, Jonkoping International Business School, Jonkoping University. Available at: <https://www.divaportal.org/smash/get/diva 2:305957/FULL TEXT02.pdf> [4/6/18]

Baek J., W. W. Koo, and K. Mulik (2009), "Exchange Rate Dynamics and the Bilateral Trade Balance: The Case of U.S. Agriculture," *Agricultural and Resource Economics Review*, Vol. 38, No. 2, pp. 213–228

Bahmani-Oskooee, M., and A. Ratha (2004) "Dynamics of the U.S. Trade with Developing Countries," *Journal of Developing Areas*, Vol.37, No. 2, pp. 1–11.

Bahmani-Oskooee M., J. Iqbal, M. Nosheen and M. Muzammil (2016) "Pakistan-EU Commodity Trade: Is there Evidence of J-Curve Effect?," *MPRA Paper*, No. 82686.

Baharumshah, A. Z. (2001) "The Effect of Exchange Rate on Bilateral Trade Balance: New Evidence from Malaysia and Thailand," *Asian Economic. Journal*, Vol. 15, pp. 291 - 312.

Begović S. and S. Kreso (2017), "The adverse effect of real effective exchange rate change on trade balance in European transition countries," *Original scientific paper*, Vol. 35, No. 2, pp. 277-299. Available at:<https://doi.org/10.18045/zbefri.2017.2.277 > [4/13/18]

Chiloane L., M. Pretorius, and I. Botha (2014), "The relationship between the exchange rate and the trade balance in South Africa," *Journal of Economic and Financial Sciences*, Vol. 7, No. 2, pp. 299-314.

Choi M. S. (2017), "The Recent Effects of Exchange Rate on International Trade," *Prague Economic Papers*, Vol. 26 No. 6, Available at: <https://www.vse.cz/pep/632> [3/23/18]

Drama, B. G. H. (2010), "The effects of real exchange rate on trade balance in Cote d'Ivoire: Evidence from the cointegration analysis and error-correction models," *MPRA Paper*, No. 21810.

Elsherif M. A. (2016), "Exchange Rate Volatility and Central Bank Actions in Egypt: Generalized Autoregressive Conditional Heteroscedasticity Analysis," *International Journal of Economics and Financial Issues*, Econjournals, vol. 6(3), pp. 1209-1216.

Hussain M. and U. Bashir (2012), "Dynamics of Trade Balance and the J-Curve Phenomenon: Evidence from Pakistan," *Journal of Commerce*, Vol. 5, No. 2, pp. 16-31.

Khalid W. (2017), "Empirical Evidence on the J-Curve between Pakistan and Selected South Asian Trade Partners," *European Business & Management*, Vol. 3, No. 4, pp. 57-64.

Lal, A. K. and T. C. Lowinger (2002) "The J-Curve: Evidence from East Asia," *Journal of Economic Integration*, Center for Economic Integration, Sejong University, Vol. 17, No. 2, pp. 397-415.

Lencho, B. D. (2013), "The effect of exchange rate movement on trade balance in Ethiopia," Tokyo: The University of Tokyo. Available at: <http://www.pp.u-tokyo.ac.jp/graspp-old/courses/2013/documents/ 5140143_8b.pdf> [3/12/18]

Mallick, H.(2011), "Role of Exchange Rate on Services and Goods Exports: A Comparative Empirical Analysis", 7th

Annual Conference on Economic Growth and Development. Available   at: <https://www.isid.ac.in/~pu/conference/dec_11_conf/Papers/ Hrushikesh Mallick.pdf> [4/6/18]

Masih J., D. Liu, and J. Pervaiz (2018), "The Relationship between RMB Exchange Rate and Chinese Trade Balance: Evidence from a Bootstrap Rolling Window Approach," *International Journal of Economics and Finance*, Vol. 10, No. 2.

Massoud A. A. and T. D. Willett (2014), "Egypt's Exchange Rate Regime Policy after the Float," *International Journal of Social Science Studies*, Vol. 2, No. 4. Available at: <http://redfame.com/ journal/index.php/ijsss/article/view/445>[4/25/18]

Mehare A. and A. K.. Edriss (2012) "Evaluation of Effect of Exchange Rate Variability on Export of Ethiopia's Agricultural Product: Case of Oilseeds," *Journal of Economics and Sustainable Development*, Vol.3, No.11

Mohieldin, M., and Kouchouk, A. (2004), *On exchange rate policy: The case of Egypt 1970-2001*, Industrial Bank of Kuwait. Available at: < http://erf.org.eg/wp-content/uploads/2017/04/Mohieldin_   Kouchouk.pdf>[4/25/18]

Musawa N. (2014), "Relationship between Zambias Exchange Rates and the Trade Balance – J Curve Hypothesis," *International Journal of Finance and Accounting*, Vol. 3 No. 3, pp. 192-196.

Phong L. H., H. G. Bao, and D. T. B.h Van (2018), "Testing J-Curve Phenomenon in Vietnam: An Autoregressive Distributed Lag (ARDL) Approach," in H. Anh et al. (eds.), *Econometrics for Financial Applications*, Studies in Computational

Intelligence 760, Available at: <https://doi.org/10.1007/978-3-319-73150-6_39>[4/25/18].

Stucka P. T. (2004), "The Effects of Exchange Rate Change on the Trade Balance in Croatia," *IMF Working Papers* 04/65, International Monetary Fund

Tutuianu G. A. (2015), "Measuring the Influence of the J-curve Effect on Trade in Romanian Forest Products," *ECOFORUM*, Academy of Economic Study Bucharest, Vol. 4, No. 1, pp. 276-283.

Zaki C., M. Ehab and A. Abdallah (2017), "How Do Trade Margins Respond to the Exchange Rate? The Case of Egypt," Egyptian Center for Economics Studies, Working Paper no. 189.