J-CURVE HYPOTHESIS:
EVIDENCE FROM AFGHANISTAN

Master's Thesis

Fareshta REZAEE

Eskişehir, July, 2018

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Department of Economics

Supervisor: Assoc.Prof.Dr. Zekeriya YILDIRIM

Eskisehir
Anadolu University
Graduate School of Social Science
July, 2018

This study was supported by Anadolu University Scientific Research Projects Commissions under the grant no:1706E372.

FINAL APPROVAL FOR THESIS

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This thesis titled "**J-Curve Hypothesis: Evidence From Afghanistan**" has been prepared and submitted by **Fareshta REZAEE** in partial fullfillment of the requirements in "**Anadolu University Directive on Graduate Education and Examination**" for the Master of Arts in **Department of Economics** has been examined and approved on **12/07/2018.**

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ABSTRACT

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Department of Economics

Anadolu University, Graduate School of Social Sciences, July, 2018

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This thesis investigates both the short- and long-term effects of exchange rate depreciation on the trade balance of Afghanistan for the period from 2005:1 to 2017:12. We adopt the vector auto regression (VAR) model and Cholesky decomposition analysis to examine the effect of a positive exchange rate shock (depreciation) on exports, imports, and consequently the trade balance. Our findings reveal that a positive exchange rate shock has a strong effect on imports while its effect on exports is not significant. Therefore, our results suggest that exchange rate depreciation improves the trade balance by decreasing imports, which indicates the existence of the J-curve pattern in Afghanistan.

Keywords: Exchange rate depreciation, Structural VAR model, Afghanistan's trade balance, National currency, Aggregate data, J-curve phenomenon, NATO forces, International aid

ÖZET

J-EĞRİSİ HİPOTEZİ: AFGANİSTAN ÖRNEĞİ

Fareshta REZAEE

İktisat Anabilim Dalı
Anadolu Üniversitesi, Sosyal Bilimler Enstitüsü, Temmuz, 2018
Danışman: Doç.Dr. Zekeriya YILDIRIM

Bu tez, 2005:1- 2017:12 dönemi için Afganistan'da ulusal para değer kaybının kısa ve uzun vadeli etkilerini incelemektedir. Çalışmada, pozitif döviz kuru şokunun (devalüasyon) ihracat, ithalat ve dolayısıyla ticaret dengesi üzerindeki etkisi incelenmektedir. Bu doğrultuda vektör otoregresyon (VAR) modeli ve Cholesky ayrıştırma analizi kullanılmıştır. Çalışma bulgularına göre pozitif kur şoku ithalat üzerinde güçlü bir etkiye sahipken kur şokunun ihracat üzerinde anlamlı bir etkisi bulunmamaktadır. Bu nedenle çalışmanın sonuçları, döviz kurundaki değer kaybının ithalatı azaltarak ticaret dengesini iyileştirdiğini ortaya koymaktadır. Sonuç olarak, bu tez Afganistan ekonomisin de J-eğrisinin geçerli olduğuna ilişkin güçlü deliller sunmaktadır.

Anahtar Sözcükler: Döviz kuru değer kaybı, yapısal VAR modeli, Afganistan'ın ticaret dengesi, ulusal para birimi, J-eğrisi, NATO kuvvetleri , uluslararası yardımlar

12 / 07 / 2018

STATEMENT OF COMPLIANCE WITH ETHICAL PRINCIPLES AND RULES

I hereby truthfully declare that this thesis is an original work prepared by me; that I have behaved in accordance with the scientific ethical principles and rules throughout the stages of preparation, data collection, analysis and presentation of my work; that I have cited the sources of all the data and information that could be obtained within the scope of this study, and included these sources in the references section; and that this study has been scanned for plagiarism with "scientific plagiarism detection program "used by Anadolu University, and that "it does not have any plagiarism" whatsoever. I also declare that, if a case contrary to my declaration is detected in my work at any time, I hereby express my consent to all the ethical and legal consequences that are involved.

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Fareshta REZAEE

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SYMBOLS AND ABBREVIATIONS

IMF	: International Monetary Fund
VAR	: Vector Auto Regression
NATO	: the North Atlantic Treaty Organization
DAB	: De Afghanistan Bank
ML	: Marshall-Lerner
FDI	: Foreign Direct Investment
BOP	: Balance of Payment
BOT	: Balance of Trade
NX	: Net Export
RER	: Real Exchange Rate
NER	: Nominal Exchange Rate
TB	: Trade Balance
GDP	: Gross Domestic Product
ADF	: Augmented Dickey-Fuller
AIC	: Akaike information criterion

INTRODUCTION

The direction and extent of the effects of exchange rate movements on trade balance is one of the fundamental subjects that needs to be addressed by governments, policymakers, and academics because economic theory suggests that a country can improve its trading position by weakening its domestic currency. From the theoretical perspective, the following are the three important approaches regarding the impact of devaluation or depreciation on trade balance: the elasticity, absorption, and monetary approaches.

The absorption approach generally explains the effect of currency depreciation on trade balance through income and absorption effects. According to the income effect, depreciation can increase exports, consequently increasing the home income, and subsequently creating a positive effect on trade balance. On the other hand, the absorption effect indicates that an increase in the home income increases domestic absorption, consequently worsening the trade balance. The logic behind the absorption approach is that at the time of devaluation, if a country's total production or total income exceeds its domestic absorption, the trade balance begins to improve.

The monetary approach states that changes in the demand and supply of real money determine the changes in trade balance. This approach shows that when depreciation increases the real income, economic agents are encouraged to fulfill higher consumption, eventually increasing the money demand consequently; this excess demand for money in the economy improves the trade balance.

The elasticity approach becomes popular with the Marshall-Lerner condition, according to which, devaluation may improve the trade balance if the demand elasticities of exports and imports were greater than one unit. However, some empirical evidence reveals that the Marshall-Lerner condition does not always improve the trade balance because the effect of the exchange rate change on trade balance is observed after a delay (or, with a time lag), and is not immediate. Thus, based on the importance of time's role, devaluation has different effects (price and volume effects) on trade balance in both the short and long terms.

In the first few months after the devaluation, the price effect of imports is immediate. According to the price effect, following the devaluation, imports become relatively more

expensive for domestic residents. Thus, due to the increased import price, factories cannot immediately decide to place a new import order for vital inputs and raw materials. In addition, domestic residents are unable to find any good replacement for the foreign imported goods. In these circumstances, both the import price and the total value of the imports increase, eventually worsening the trade balance. Therefore, the Marshall-Lerner condition fails in the short term because of weak export and import demand elasticities. However, as time progresses the demand elasticities for exports and imports improve; consequently, the export volume increases and import volume decreases, thus improving the trade balance (volume effect). In other words, domestic producers and exporters increase their supplies due to the presence of cheaper goods abroad. Likewise, in the long term, consumers can find domestic substitutes for imported goods. Thus, the total of these effects on the trade balance over time generates the J-curve phenomenon.

Although many studies have investigated the effect of the J-curve pattern on trade balance, researchers have not yet reached a consensus regarding whether or not devaluation improves trade balance. Consequently, related studies have generally presented mixed results. One group of studies could not find evidence for the J-curve, including Miles (1979), Akbostancı (2004), Costamagna (2014), Trabelsi and Jelassi (2016), and Suleman et al. (2014). Another group empirically provided some evidence for the existence of the J-curve pattern; this group included Bahmani-Oskooee (1985), Kapoor and Uma (1999), Jouhari Salmasi (2013), Aziz (2012), Boyd et al. (2001), Lal and Lowinger (2002), Petrović and Gligorić (2010), and Prakash and Maiti (2014). The empirical studies that investigated the effect of devaluation on trade balance discussed this concept from the perspective of different country groups: developed, developing, and least-developed countries. However, since Afghanistan is among the least-developed countries, we compared our findings with the empirical results of only those studies that covered this group. To the best of our knowledge, no study has examined the existence of the J-curve hypothesis in Afghanistan. Thus, this thesis aims to address this gap in the related literature by providing evidence on the effects of exchange rate change on the trade balance in Afghanistan. In other words, we seek to answer the following research question: "What are the effects of exchange rate depreciation on exports, imports, and trade balance in Afghanistan?" Additionally, we also aim to answer the following question: "Does the J-curve pattern continue to exist, following the

depreciation in Afghanistan?" To answer these questions, we adopt the vector auto regression (VAR) model covering the period from 2005:1 to 2017:12. Also, we employ the Cholesky decomposition analysis to identify structural shocks.

We found evidence for the presence of the J-curve pattern in Afghanistan. Our results indicate that after depreciation, the imports decreased sharply, while the exports did not significantly respond to it. Therefore, the findings indicate that after depreciation, trade balance improves due to the decreasing imports and not the increasing exports. Our findings are consistent with Afghanistan's economic structure. Afghanistan's economy has a high import dependency and weak export capacity. Hence, the response of exports to depreciation is not satisfactory because of this low export capacity. In addition, due to the high import dependency of most economic sectors, after the increase in the import prices, the demand of imports decreased sharply, thereby decreasing the import expenditure, and slightly increasing the trade balance.

The remainder of my thesis is structured as follows. Chapter 1 presents the detailed theoretical background. Chapter 2 reviews the economic structure of Afghanistan while Chapter 3 presents the data, empirical methodology, analysis, and discusses the results and robustness checks.

CHAPTER ONE

1. J-CURVE HYPOTHESIS: THEORETICAL FRAMEWORK

The purpose of this chapter is to study the theoretical relationship between exchange rate and trade balance. This chapter is organized as follows: Section 1 introduces the concept of exchange rate and its variants. Sections 2 and 3 explain the exchange rate regimes and their classification, respectively. Section 4 analyzes trade balance and the factors affecting it. Finally, Section 5 discusses the following three important approaches regarding the link between trade balance and exchange rate—the elasticity, absorption, and monetary approaches.

1.1. Exchange Rate Definition

The foreign exchange market converts a national currency into other national currencies. The price of one country's currency in terms of another country's currency is called the exchange rate (Appleyard and Field, 1995, p. 391).

1.2. Exchange Rate Measures

Economists usually use the bilateral, real, and effective exchange rates to analyze the effects of exchange rate changes.

1.2.1. Bilateral (nominal) exchange rate

The bilateral exchange rate measures the number of units of the home country's currency, which can purchase one unit of a foreign currency. Also, this exchange rate is nominal because it is expressed in nominal terms (Dornbusch and Fischer, 1990, p. 183, 184).

1.2.2. Real exchange rate

The real exchange rate (RER) expresses the nominal exchange rate by the relative price of domestic and foreign goods and services, and describes the competitiveness of a country in international trade. On the other hand, the RER contrasts the relative price of two

countries' consumption baskets together. Thus, we can calculate RER by using the nominal exchange rate and the price of two countries' consumption baskets with the following equation, RER = (E.P*)/P, where (E) represents the nominal exchange rate, and (P*) and (P) indicate the price of the foreign consumption basket and the price of the domestic consumption basket, respectively (Dornbusch and Fischer, 1990, p. 184, 185).

1.2.3. Effective (multilateral) exchange rate

The effective or multilateral exchange rate is an index of a currency's value, and describes the currency's strength relative to a group or basket of foreign currencies. Thus, the effective exchange rate is also called trade-weighted exchange rate (Dornbusch and Fischer, 1990, p. 184).

1.3. Exchange Rate Regimes

Governments generally manage their currencies in relation to other currencies and intervene in the foreign exchange market in the framework of an exchange rate regime, which is closely related to countries' monetary policies. Thus, the choice of an exchange rate regime is one of the requirements of each country. The evolution of exchange rate regimes can be divided into two main parts. A fixed exchange rate, sometimes referred to as a pegged exchange rate, is a type of exchange rate regime in which a currency's value can be fixed against the values of other currencies. Based on this exchange rate regime, by using foreign reserves, the central bank intervenes in the foreign exchange market directly to maintain the value of the domestic currency against foreign currencies. A floating or flexible exchange rate is a type of exchange rate regime in which the value of a currency is determined according to market conditions. Thus, a currency in a floating exchange rate regime is known as floating currency. In this regime, the central bank does not intervene in the foreign exchange market to determine the value of the currency. Consequently, the value of the currency is determined by the market conditions (Bordo, 2003, p. 3- 6).

In addition, in 1982, the modern exchange rate regime was created by the International Monetary Fund (IMF), and was completed in early 1999. This classification is

arranged based on the fixed and flexible exchange rate, and includes nine categories as shown in Table 1.1 (Bordo, 2003, p. 4).

FLEXIBLE CORNER	
1) Independent floating	**2)** Managed floating
3) Target zone or band	**4)** Basket peg
5) Crawling peg	**6)** Adjustable peg
FIXED CORNER	
7) Currency board or Dollarization	**8)** Currency unions
9) Truly fixed the exchange rate	

Table 1.1. *Exchange rate regimes* (Bordo, 2003, p. 4)

1.4. Exchange Rate Classification (De jure and De facto exchange rate regimes)

After being founded in the early 1970s, the IMF required its member countries to officially announce their exchange rate regimes. Accordingly, member countries must have officially announced their fixed or floating exchange rate regimes to the IMF for evaluation of their currencies in the foreign exchange market. Official evidence showed that many member countries, despite having officially announced the fixed exchange rate as their chosen regime, continued to practice full or partial flexibility in their currencies. In other words, in order to achieve political goals or implement anti-inflationary policies, these member countries allowed their domestic currencies to vary. That is, almost all countries used different exchange rate regimes (de facto) based on their actual behaviors over time rather than their officially declared exchange rate regimes (de jure), in one or more stages. Thus, they used the new criteria of the exchange rate systems based on the actual behavior of the currency (de facto exchange rate regime). Therefore, we can define the de facto exchange rate regime as the true behavior of countries in opposition to the exchange rate regimes that they claim to follow. Thus, since 1974 the IMF requested its member countries

to officially report their exchange rate regimes for its annual report on exchange rates. However, since 1999, the IMF has presented a new exchange rate classification based on the actual behavior of the countries (Guisinger and Singer, 2010, p. 313–319).

1.5. Balance of Payment and Trade Balance

The balance of payment (BOP) indicates a country's economic transaction with other countries in a particular period. We can divide the BOP into two main accounts: capital and current (Gordon, 1993, p. 117). The capital account records all international purchases or sales of assets such as money, stocks, government debts, bonds, and land. The current account includes transactions of income related to the export or import of goods or services provided. The income from investments enters this account directly. Exports are depicted as credit items (+) and imports as debit items (-). The current account balance measures the inflow and outflow of goods and services into and from a country, respectively (Krugman and Obstfeld, 1994, p. 317). Thus, the sum of the goods and services constitutes a country's balance of trade (BOT).

The trade balance is usually the biggest part of a country's BOP because it constitutes the total value of imports and exports. A deficit in trade balance implies that a country's imports exceed its exports, while a surplus implies that exports exceed imports. Trade balance can also show the net money earned by the trade. This net money is called the net export, and refers to the difference between the values of a country's total exports and total imports. Net export shows that the home country's export earnings are more than its spending on foreign goods and services. We can use net export for calculating the aggregate expenditures or income of a country in an open economy (Gordon, 1993, p. 118, 123, 124). Net exports and trade balance depend on three major factors—domestic income Y, foreign income Y^*, and the RER, EP^*/P (Feenstra and Taylor, 2014, p. 257, 258).

$$\mathrm{TB} = \mathrm{TB}\left(\underbrace{EP^*/P}_{\text{Increasing function}}, \underbrace{Y - T}_{\text{Decreasing function}}, \underbrace{Y^* - T}_{\text{Increasing function}}\right)$$

1.6. Effects of Some Major Factors on Trade Balance

1.6.1. Effects of real exchange rate on trade balance

After a domestic real depreciation, exports become cheaper in terms of other currencies. Thus, foreigners' demand for exports from home country tends to increase. Also, the higher price of imports tends to decrease the quantity of imported goods in the home country. Thus, domestic consumers begin to shift their demand for foreign goods to domestically produced goods. Thus, we can say that a rise in the RER alters the spending patterns of domestic and foreign consumers. This phenomenon is called expenditure switching. As a result, the RER is known to be an increasing function of trade balance, as a rise in RER increases exports and decreases imports, and thereby improves the trade balance of the home country (Feenstra and Taylor, 2014, p. 257, 258).

1.6.2. Effects of income on trade balance

The level of income of each country (foreign and domestic) is one of the other determinants of the home country's trade balance. Domestic income (Y) can affect import spending when the domestic income induces domestic consumers to increase their consumption of goods. This increase in imports worsens the trade balance of the home country. Thus, domestic income is known as a decreasing function of trade balance (Dornbusch and Fischer, 1990, p. 186, 187). On the other hand, foreign income (Y^*) affects the foreign demand for the output of the home country, so that a rise in a foreigner's income or in the level of income of the rest of the world can increase the foreigner's demand for output, causing high net exports, and improving the home country's trade balance. Therefore, we can determine the level of foreign income as an increasing function of the trade balance. Figure 1.1 illustrates the link between trade balance and RER, and shows that a real depreciation increases exports and decreases imports, thereby improving the trade balance. In contrast, an increase in domestic income shifts the trade balance to the right as it deteriorates the trade balance by increasing imports (Feenstra and Taylor, 2014, p. 257-260).

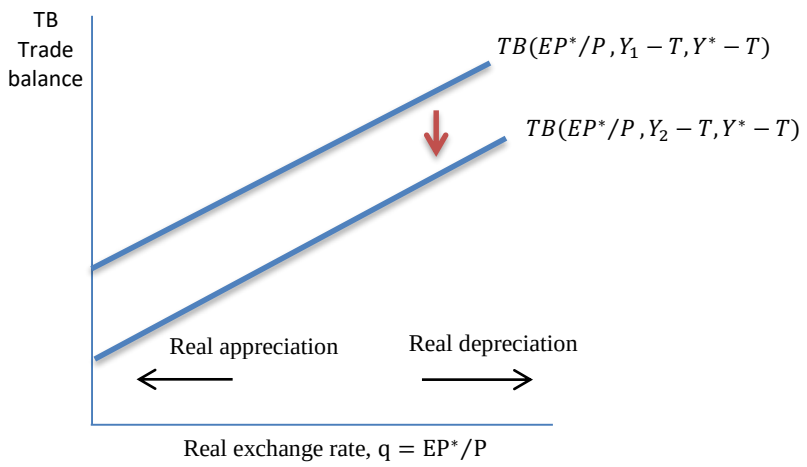

Figure 1.1. *Exchange rate and income effects on trade balance* (Feenstra and Taylor, 2014, p. 260)

1.7. Exchange Rate and Trade Balance

The direction and extent of the effects of exchange rate fluctuation on trade balance are important subjects because exchange rate depreciation or devaluation is assumed to affect trade balance significantly. Understanding the relationship between exchange rate movement and trade balance is necessary for policymakers. If the exchange rate depreciation does not adjust the current account, policymakers should resort to another tool to improve the current account situation. Based on the principles of international trade, the devaluation or depreciation of the national currency could provide a basis for improving the trade balance. Therefore, with the devaluation of the national currency, the export value of the country increases and the import value decreases, and the outcome of these two effects improve the trade balance. Therefore, from a theoretical perspective, there are many views about the impact of devaluation on trade balance. In this regard, we consider three important approaches: the elasticity, absorption, and monetary approaches.

1.7.1 Elasticity approach

1.7.1.1. Marshall-Lerner condition

Investigating the relationship between trade balance and other influential variables of international trade has always been one of the major issues in the macro economy. Nevertheless, the elasticity approach reveals the relationship between the exchange rate and

trade balance by focusing on the current account of trade balance without considering capital account or capital flow (Terra, 2015, p. 173, 174). This approach suggests that devaluation or depreciation makes domestic goods cheaper abroad, thus increasing exports. Also, exchange rate changes in forms of devaluation or depreciation can decrease the home country's imports by increasing foreign goods' prices in the home country. Marshall (1923) was the first economist who showed that a real devaluation of a country's currency either improves or worsens its trade balance. This theory was restated later by Lerner (1944), and was thereafter known as the Marshall-Lerner condition (Moosa and Bhatti, 2010, p. 108). The Marshall-Lerner condition investigates the effects of devaluation on trade balance through the demand elasticity of exports and imports.

If we know EX and EM as export and import demand elasticity, respectively, the following propositions state the Marshall-Lerner condition:

A. If, $E_X + E_M > 1$, the domestic currency's depreciation would improve the trade balance of the home country;

B. If, $E_X + E_M = 1$, the domestic currency's depreciation would not be available to influence the trade balance; and

C. If, $E_X + E_M < 1$, the domestic currency's depreciation can deteriorate the trade balance of the home country (Wang, 2009, p. 109–112).

Currency depreciation has different effects on trade balance—the price and volume effects—with the former deteriorating the trade balance and the latter improving it. The price effect works on consumption and demand. After currency depreciation, the import price measured in the home currency increases and the trade balance deteriorates because of the high cost of imported goods. On the other hand, exports of the devaluing country, measured in foreign currency, becomes cheaper abroad for foreign consumption. While the price of imports can affect the trade balance directly, that of exports does not have any direct effect on trade balance. Consequently, the price effects worsen the trade balance by more expensive foreign-imported goods. The volume effect occurs due to changes in supply and demand after currency depreciation, and it can improve the trade balance in two ways. Following the depreciation, the demand for expensive imported goods denominated in the home currency falls. Thus, the trade balance improves due to the volume effect of imports. On the other hand, after currency depreciation, exports measured in the foreign currency become cheaper

from the foreign consumption viewpoint, leading to a higher demand and supply of exportable goods. Therefore, the volume of exports increases and improves the trade balance due to the volume effect of exports. The total of these effects on trade balance over time is known as the J-curve phenomenon (Pilbeam, 2013, p. 58, 59, 60).

1.7.1.2. The J-Curve phenomenon

It is clear that the effects of exchange rate changes on relative prices and on the trade balance is not immediate, but rather is observed with a time delay. Therefore, time plays an important role in shaping the effect of exchange rate on trade balance. Empirical evidence shows that long-term elasticities are approximately twice as great as the short-term ones. The short-term elasticities of exports and imports are lower than one unit, while long-term elasticities are always greater than one unit. Thus, in the short term, the Marshall-Lerner condition does not hold although in the long term it occurs gradually (Pilbeam, 2013, p. 61, 62, 63).

The time effects of currency depreciation on trade balance are explained as the J-curve phenomenon, as illustrated in Figure 1.2. The J-curve depicts that following currency depreciation; the trade balance deteriorates shortly due to inelastic demand of exports and imports but improves over time. At the moment of the devaluation, quantities of exports and imports have no time to adjust so that trade balance worsens with increasing import price and the initial level of exports; thus, we can say that the Marshall-Lerner condition is not met in the short term. However, as time progresses, the demand elasticities for exports and imports begin to pick up so that the export demand increases and the import demand decreases; consequently, the Marshall-Lerner condition holds, and trade balance begins to improve. Thus, the Marshall-Lerner condition easily describes the J-curve effects on trade balance (Gandolfo and Federici, 2016, p. 169, 170).

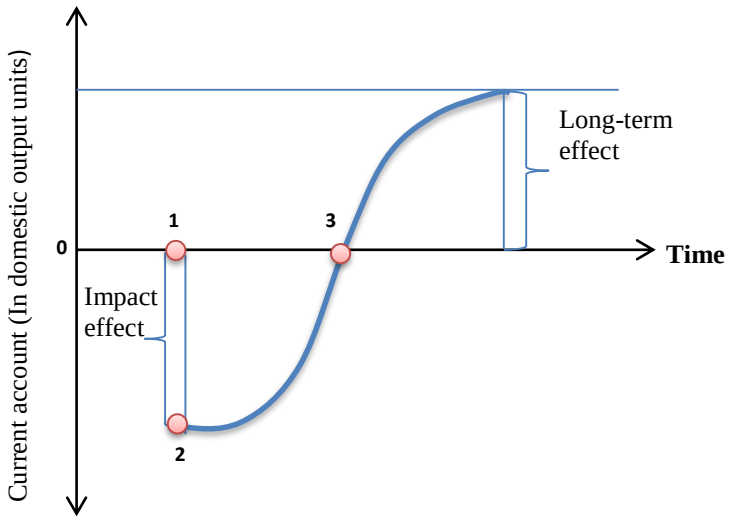

Figure 1.2. *The J-curve effect* (Marrewijk et al., 2007, p. 492)

In the following paragraph, we briefly explain why devaluation has different effects on the trade balance in the short and long terms. In the first few months after the devaluation, the price effect of imports occurs immediately, because most import orders are placed several months in advance and contractors cannot cancel them in the short term. Therefore, factories cannot immediately decide to place new import orders for vital inputs and raw materials. As a result, the import price increases in domestic terms faster than export prices do, without exchange in the quantity of the initial value (currency contract period). Furthermore, in the short term, the demand for imports and exports is inelastic. Following the devaluation, domestic residents do not find any good replacement for the foreign-imported goods because consumers are concerned about issues other than price change (Blanchard, 2017, p. 384).

Foreign consumers, due to confidence in their domestic production, may be reluctant to switch from domestically produced goods toward cheaper goods from the devaluing country's exports. Therefore, changing the consumption habits takes time. In addition, even though currency depreciation can improve the competitive position of the exports of the devaluing country abroad, but the domestic producers cannot immediately use the full operation capacity to expand their production of exportable goods in foreign markets. In these circumstances, the import price increases and the total value of imports also increase definitely, but the quantity of exports is likely to adjust only slowly. Therefore, initially, the effect of the devaluation on the prices is more than that on the quantities. It is expected that

in the short term, export and import elasticities are lower than their long-term values. As a result, the primary effect of the depreciation on the trade balance implies that export and import volumes do not change much, so the devaluing country earns lower income from exports and spends more on imported goods, leading to a current account deterioration as shown in Figure 1.2 (the move from point 1 to point 2) (Caves et al., 1990, p. 372, 373, 374, 375).

After the old export and import contracts, new shipments take time to adjust the relative price. In addition, implementation of substitution effects from imported goods to domestic goods requires time to adjust. On the production side, domestic producers and exporters increase their supplies due to cheaper domestic goods abroad so that the competitive position of exports in the foreign market can encourage domestic producers to install additional plans and equipment, hire new workers, and build new distribution channels. Likewise, in the long term, consumers can find domestic substitutes of imported goods. Thus, this behavior decreases their demand for imports. As time progresses, the responses of export and import quantities are greater after an exchange rate change. Therefore, in the long term, volume effects are greater than price effects. As a result, the long-term elasticities of exports and imports are high enough to improve the trade balance, so currency depreciation improves the current account, as shown in Figure 1.2, so that after point 3, the Marshall-Lerner condition is observed and the trade balance begins with a surplus (Krugman and Obstfeld, 1991, p. 451, 452). In addition, Figure 1.3 clearly presents the time path of the exchange rate, imports, exports, and trade balance following exchange rate depreciation.

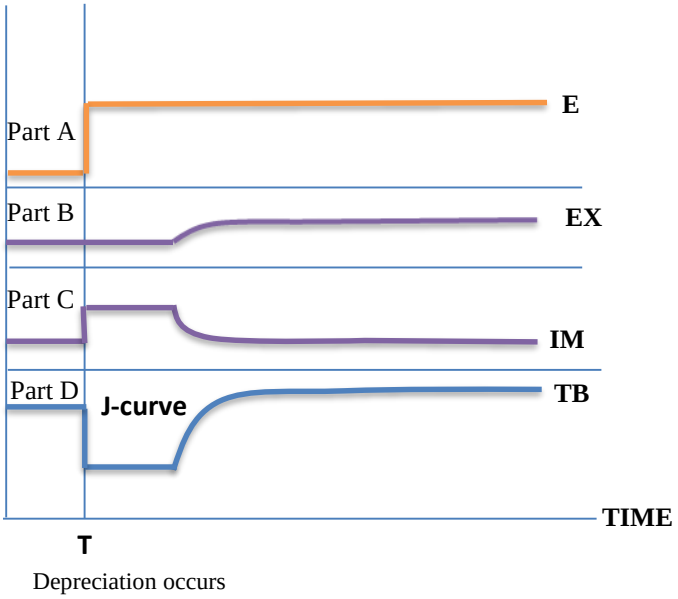

Figure 1.3. *Short- and long-term effects of depreciation* (Feenstra and Taylor, 2014, p. 264)

In Figure 1.3, Part A indicates the exchange rate depreciation at time T, and Part B shows the behavior of exports following depreciation. The quantity of exports remains unchanged during the first few months of depreciation because export demand is inelastic in the short term. However, the quantity of exports increases in the long term due to a rise in demand for cheaper exports abroad. Part C demonstrates the changes in imports following currency depreciation. After depreciation, the price of imports rises but the quantity of imports remains unchanged due to the inelastic demand for imports in the short term. In addition, in the long term, the demand for imports decreases due to the creation of new import contacts and use of substitute goods. Finally, Part D indicates the BOT during currency depreciation. The trade balance deteriorates immediately following currency devaluation due to the inelastic demand of exports and imports, and leading trade balance into deficit in the short term, although it improves over time by an increase in the demand of cheaper exports abroad and decreases in imports. Therefore, the trade balance starts to become surplus following devaluation in the long term.

1.7.2. Absorption approach

The absorption approach investigates the effects of exchange rate change on trade balance through income and absorption effects. According to the absorption approach, devaluation has indirect effects on trade balance through the absorption channel whereby the income and relative price change and adjust. The absorption approach describes only the effects of devaluation on trade balance without focusing on capital account or capital flows (Husted and Melvin, 1990, p. 427, 428). For more understanding of the absorption approach, we need to describe the national income equation as follows:

$$Y = C + I + G + (X - M) \ldots\ldots\ldots (1)$$

Where C is consumption; I and G represent the investment and government spending, respectively; and X and M denote exports and imports, respectively. Also, we can define C+I+G=A as domestic expenditure (domestic absorption) as a part of the total income, and net export as X – M. Therefore, we can rewrite as follows:

$$Y = A + X - M$$
$$X - M = Y - A \ldots\ldots\ldots (2)$$

Equation 2 describes trade imbalance as the difference between total domestic output and domestic absorption, so that if a country's total production (Y) or total income exceeds its domestic absorption, the trade balance is in surplus. However, if a country's total production is less than its domestic absorption (due to excess domestic demand over domestic production) then (Y – A) is negative and the trade balance is in deficit (Pilbeam, 2013, p. 64, 65).

Contrary to the Marshall-Lerner condition, the absorption approach definitely does not express that devaluation improves the trade balance. This approach generally explains the effect of currency depreciation on trade balance through income and absorption effects. If the economy is at its full employment level at the time of devaluation, there are no unutilized resources available to produce more goods and services due to having used the full capacity. In this case, devaluation cannot increase the total output. Therefore, increase

in foreigners' demand for domestic output cannot increase the exportable goods of the devaluing country. As a result, both wage rate and other factors' prices increase, leading to inflationary pressures. In this case, devaluation has a negative income effect as the terms of trade deterioration. In this circumstance, the only method for increasing the net exports is by cutting domestic absorption (Dunn and Mutti, 2004, p. 386, 387).

In addition, the absorption approach shows that devaluation has positive effects on trade balance through an increase in the aggregate demand for domestic output (if the elasticity conditions are satisfied) when an economy has unemployed resources. In this case, devaluation could tend to increase the net exports (through the increase in income) by increasing foreigners' demand for domestic production, which encourages firms to increase equipment investment. However, currency depreciation may increase the output and improve trade balance, as it reduces the relative price of domestic production, due to the substitution effect of domestic output for imported goods (positive income effect) (Garbaugh, 2006, p. 434, 435).

1.7.3. Monetary approach

In this part, we review the monetary approach to the BOP. The monetary approach was first discussed in late 1960 by Robert A. Mundell and Harry G. Johnson, and fully discussed in 1970 by their students at the University of Chicago (Krugman, 1991, p. 506). The elasticities approach and absorption approach investigate the BOT through trade in goods and services with unemployed resources, while the monetary approach emphasizes issues related to BOP in full employment level. According to the monetary approach, disequilibrium between the amount of money supply and the amount of money that people wish to hold leads to the BOP disequilibrium. According to this approach, the BOP is a quiet monetary phenomenon. For this reason, demand and supply of money play an important role in creating disorder and in the long-term adjustment of the BOP of a country. Therefore, money plays a vital role in maintaining the equilibrium of BOP (Husted and Melvin, 1990, p. 429, 430, 431).

This approach shows that excess money supply causes a deficit while the excess demand for money leads to a surplus in the BOP. Thus, based on the monetary approach, devaluation can improve the trade balance by adjusting the supply and demand for money.

In addition to money, other real variables, such as national income level, interest rate, and real expenditure also have a direct impact on the behavior of the BOP (Kenen, 2000, p. 393, 394).

CHAPTER TWO

2. STYLIZED FACTS ON THE J-CURVE IN AFGHANISTAN

The purpose of chapter two is to investigate the structure of Afghanistan's economy. The chapter is divided into five sections. Section 1 describes Afghanistan's exchange rate regime. Section 2 presents the monetary policy of Afghanistan's central bank for maintaining the value of the national currency against foreign currencies. Section 3 discusses the depreciation in Afghanistan, while Section 4 presents the eight major factors responsible for it. Finally, Section 5 investigates the impact of depreciation on the three important economic sectors in Afghanistan.

2.1. Exchange Rate Regime in Afghanistan

Choice of the exchange rate regime is one of the fundamental issues in international trade. Exchange rate regimes are divided into eight categories based on fixed and flexible exchange rate bounds. A system of pure floating (or flexible) exchange rate can be considered an exchange rate band with infinite bounds, while a scheme of pure fixed (or pegged) rates is a band with zero bounds. The currency systems used by countries for maintaining their value of the national currency against other currencies and trading issues depend on the geographical situation, political situation, state of the domestic economy, and most importantly, the international relations (Stockman, 1999, p. 1484, 1485).

After the fundamental change was established in Afghanistan's economy in 2005, the country started using the Managed Floating Exchange Rate regime as its exchange rate system, following the suggestion of the IMF. Since Afghanistan has a strong import dependency, a change in the value of the Afghan currency can lead to imported inflation in the country. Thus, stability of the national currency against foreign currencies is necessary to control inflation, and this is the main goal of the country's monetary policy. Accordingly, Afghanistan's central bank follows its goals under the managed floating exchange rate regime. The central bank minimizes fluctuations of the Afghan currency by intervening in the foreign exchange market. Figure 2.1 presents the movements of the Afghan currency against the dollar, and monetary policy of Afghanistan's central bank for exchange rate

management during the last decades. According to Figure 2.1, the exchange rate regime in Afghanistan used by the central bank can be classified into three periods in the recent decade.

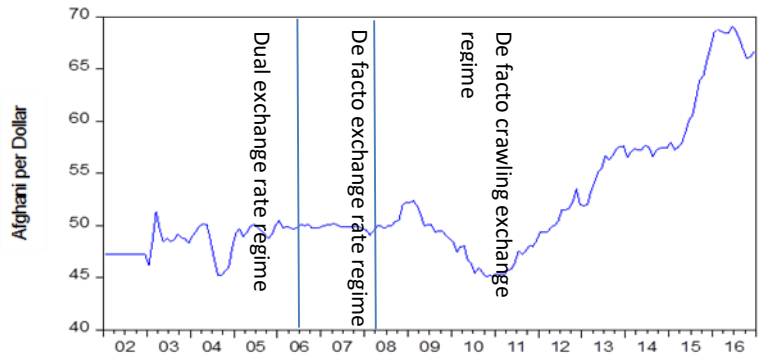

Figure 2.1. *Movements of the Afghani against the dollar* (http://www.carmenreinhart.com/data/browse-by-topic/topics/11/)

In the first period, Afghanistan used the dual exchange rate regime from January 2002 to May 2006 to maintain the value of the national currency without excessive pressure on foreign reserves as well as the solution to reduce the imported inflation (Exchange Rate Regime Reinhart and Rogoff Classification). Under the dual exchange rate regime, both fixed and floating exchange rates existed in the market. The fixed rate was applied to certain segments of the market, such as for managing imports more, improving the BOP, and increasing investments. At the same time, the price of capital account transactions was determined by free market forces with floating rates in Kabul's money bazaar (Shafaie, 2014, p. 1, 2).

Then, the dual exchange rate caused an imbalance in the currency market, the central bank used a more efficient mechanism for addressing economic shock and inflation, by adopting a floating currency since June 2006. In the second period, the central bank implemented a de facto managed floating system with no predetermined path for the exchange rate, to maintain the value of the national currency and to preserve confidence in the Afghan currency for undertaking international transactions (IMF, November 2015, p. 23, 76). Since 2008, due to oil price shock and increase in global food and fuel prices, the central bank used the crawling de facto exchange rate system with a degree of 5% flexibility by

December 2010 (Exchange Rate Regime Reinhart and Rogoff Classification). In the third period, the central bank increased the degree of flexible currency to reduce the inflationary impact of the global food and fuel price crisis on the domestic price level (The World Bank, April 2013, p. 8, 9).

Within a decade, Afghanistan was able to maintain the value of its national currency against other currencies, especially the dollar, by using its foreign exchange reserves and the dollar supply in the money market. At the same time, the central bank maintained the inflation rate at a low level (below 10%). However, after reducing the country's foreign exchange reserves due to the reduction in international aid and the declining policy and security stability, the central bank could not avoid Afghani depreciation. Consequently, the national currency declined sharply by the end of 2012 (The World Bank, April 2014, p. 14, 15).

2.2. The Central Bank's Monetary Policy to Preserve the Value of the Afghani

After the formation of the new government in 2002, the central bank of Afghanistan (Da Afghanistan Bank), was determined as an independent organization by the guidance of the IMF (Bennett, 2004, p. 2). According to Article II of Da Afghanistan Bank's law, the ultimate objective of the bank is to achieve and maintain domestic price stability and low inflation. However, without providing and maintaining the value of the national currency against the dollar, achieving this aim is not possible. While Afghanistan has an open economy with a large trade deficit, exchange rate fluctuations can influence the domestic prices. Thus, the central bank intervenes in the money market within the framework of the managed floating exchange rate regime to maintain the value of the Afghani and to avoid the negative impact of currency fluctuation on the domestic prices. The central bank has been using its monetary policy instruments to control the money in circulation and maintain the value of the Afghan currency. Foreign exchange auction is the central bank's primary instrument of monetary policy to maintain the value of the Afghani. The central bank intervenes by auctioning dollars in the money market and in this way, it maintains the value of the Afghan currency against foreign currencies by increasing the demand for the Afghani.

The second tool that the central bank uses to control liquidity and maintain the value of the national currency is the capital notes, which are sold to commercial banks once a week.

2.3. Devaluation in Afghanistan

By studying the history of Afghanistan's economy, we can say that the value of the Afghan national currency could be affected by two major factors: (1) Internal and external wars in Afghanistan, and (2) Afghan leaders' lack of attention to economic growth and maintaining the national currency's value.

2.3.1. Devaluation of the Afghani in the 1990s

After the withdrawal of the Soviet Union from Afghanistan in 1989, the civil conflict commenced between the government and various Afghan factions. Following the wars, the country was divided into several regions ruled by various political factions. During Mujahideen's period[1], Afghan leaders had begun to fight to gain power instead of focusing on restoring the country's economy and weak infrastructure. After the financial collaborations between the Soviet Union and Afghanistan ceased, political groups, as competing governments, had begun to print their own currencies to earn income and accumulate wealth. The printing of money had caused a rapid increase in the money supply in circulation, a sharp devaluation of the local currency, and consequently a rise in domestic prices. During this period (throughout the 1990s), the single Afghan currency changed to different currencies with different values. As a result, 5000 and 10,000 Afghani banknotes were, for the first time, combined with the existing Afghan banknotes. This increasing money in circulation without any economic backing led to a decline in the credibility of Afghan currency. Thus, people maintained their assets in the form of foreign currencies like the Pakistani rupee, Indian rupee, and US dollar. Consequently, the demand for the Afghani decreased and it devalued sharply. In conclusion, during the civil war[2], Afghanistan

[1]Mujahideen's period: Mujahideen is an Arabic word, which refers to someone engaged in Jihad. The term Mujahideen is considered to have emanated first in the 19th century in Afghanistan when the local people fought with the invading British. The widespread use of this term refers to the war between guerrilla-type military groups led by the Islamist Afghan fighters against the Soviet Union during the late 1970s.

[2] Civil war: The civil wars in Afghanistan refer to the period after the Soviet withdrawal from the country on February 15, 1989, and are divided into two periods. The first period (1989–92) was begun by the then President Mohammad Najibullah. The collapse of the Communist Najibullah government and the Taliban's conquest of Kabul and their

witnessed the biggest recession and devaluation of its local currency. The absence of an independent central bank (due to the central bank's inability to design and implement a monetary policy and control the printing of money), lack of attention to domestic activities, and the sharp increase in the money in circulation led to high inflation and devaluation of the Afghani throughout the nineties (Nijssen, 2010, p. 1, 2, 3, 4, 5).

2.3.2. Devaluation of the Afghani since 2013

In post-conflict countries, governments strive to maintain the financial and monetary policies that increase people's trust toward the government. One of these policies is to maintain the value of the national currency and control inflation. After the collapse of the Taliban regime in September 2001, the central bank of Afghanistan maintained a stable value of the national currency against foreign currencies to control the high inflation. Thus, during the decade, the stable exchange rate limited the inflationary pressure resulting from the import of goods into the country. However, as mentioned earlier, Afghanistan relied on foreign exchange reserves and the supply of the dollar to maintain the value of the national currency during the decade. Thus, the value of the Afghan currency has been maintained artificially through the dollar auction policy in the money market. Such a monetary policy has not been sustainable and would not be good for Afghanistan's economy in the long term because this policy was not designed with the fiscal policy and other economic policies. However, the central bank's dollar auction policy was affected by the decline in the international aid and foreign exchange reserves. Reducing the supply of dollars in the money market increased the demand for it, and declined the value of the Afghan currency (The World Bank, April 2014, p. 14, 15).

As a result, the Afghan currency lost its value against the US dollar by the end of 2012, and its downward trend started by the declining international assistance, and the emergence of political and security uncertainty. Thus, after a decade, the Afghan currency reached a relative stable value (average value 48 Afghani against 1 US dollar), and in December 2013 sharply depreciated against the US dollar (68 Afghani against 1 US dollar) (The World Bank, October 2016, p. 8).

establishing the Islamic Emirate of Afghanistan started the second civil war period (1992–2001). The US and the UK's invasion of Afghanistan on October 7, 2001 ended the Afghan civil wars.

2.4. Reasons for Devaluation of the Afghani Since 2013

Since 2013, the Afghan currency has sharply depreciated, because of various factors, such as: (i) a decline in foreign exchange inflow, which reflects a decline in foreign aid; (ii) a decline in investments that are associated with capital inflows; (iii) withdrawal of the North Atlantic Treaty Organization (NATO) forces, which resulted in security instability; and (iv) possibly an increase in migration that led to capital outflows, and many other reasons that are explained in Table 2.1.

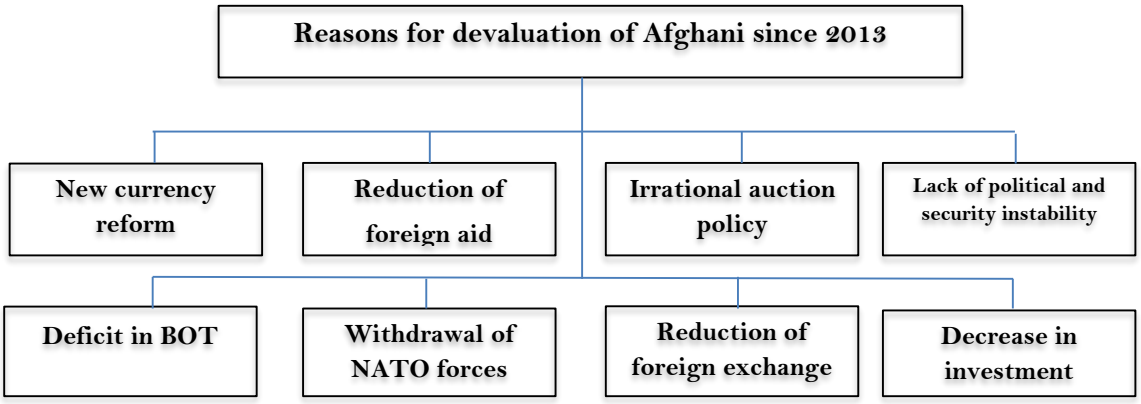

Table 2.1. *Reasons for devaluation of Afghani since 2013*

2.4.1. New currency reform

One of the most fundamental factors of the devaluation of the Afghan currency since 2013 is a structural problem. Following the formation of the new Afghan government, the central bank, in collaboration with the IMF, created a new currency reform to end the high inflation of the 1990s. Accordingly, new Afghan banknotes were introduced into the money market by removing three zeros from the national currency in 2002. But removing the three zeros from the national currency regardless of other economic factors such as economic backing was contrary to the principles of the exchange rate (Hogg et al., 2013, p. 44, 45).

Additionally, the central bank of Afghanistan has relied on foreign aid and its foreign exchange reserves to maintain the value of the Afghan currency by implementing dollar

auction in the money market instead of strengthening foreign trade by supporting domestic production. Therefore, the fact that the central bank maintained the value of the Afghan currency artificially during the decade was an important factor for the devaluation of the national currency since 2013 (IMF, December 2017, p. 12.60.61)

2.4.2. The irrational auction policy

The main goal of the central bank of Afghanistan is maintaining stability of the domestic prices. Although Afghanistan has an open economy with a trade deficit, domestic price stability is affected by exchange rate fluctuation. Therefore, the central bank uses the sale of currency and the capital note auction to prevent exchange rate fluctuation, and maintain the value of the national currency. Afghanistan's central bank has collected the surplus Afghan currency from the money market to increase the demand for the Afghani by the dollar auction policy. By this policy, the central bank has controlled the inflation and maintained the value of the Afghan currency against foreign currencies, especially the dollar. The auction policy is the central bank's only monetary policy to control exchange rate movements. It is noteworthy that in some cases the auction policy can be used, but it can never provide economic policy goals alone. In other words, when the entire economic policy has failed and is not effective, then this auction policy can be used for a limited period (IMF, November 2015, p. 76).

2.4.3. Deficit in trade balance

Although the newly formed government undertook structural changes in the economy from 2005, Afghanistan failed to strengthen its economic infrastructure. In the recent decade, the government has not supported the private sector to increase domestic investments and strengthen domestic products. Thus, Afghanistan's domestic products have remained very weak, and exports have continued to remain very low (Export-to-GDP ratio is estimated nearly at %20) and limited to agricultural products and some minerals such as precious and semiprecious stones. In contrast, Afghanistan has a high import dependency. The import-to-GDP ratio is %65 and all the economic sectors are heavily dependent on imports. Thus,

Afghanistan's high import needs skewed the trade balance heavily toward deficit (Hogg et al., 2013, p. 77, 78, 181, 182).

2.4.4. Reduction in foreign exchange reserves

Afghanistan's central bank has been using foreign aid and its foreign exchange reserves for maintaining the value of the Afghan currency against other foreign currencies. However, the central bank's monetary policy has not been a reasonable and sustainable one to maintain the value of the Afghani because foreign exchange reserves of the country have begun to decrease due to the reduction in international aid. Additionally, after the withdrawal of the NATO forces from the country, political and security uncertainty increased in Afghanistan reducing the investments and capital outflow from the country. Therefore, these factors increased the fluctuation in the foreign exchange reserves of the central bank (The World Bank, April 2016, p. 8, 9).

2.4.5. Decrease in investments

After the formation of the new government, Afghanistan's security was provided completely by the NATO forces. Providing security led to inflows of domestic and foreign investments. During the last 10 years, private investment experienced a strong and rapid growth. Foreign direct investment (FDI) constituted approximately one-third of all the private investments in Afghanistan (AISA, 2012, p. 2, 11, 12).

However, after the withdrawal of the NATO forces since 2013 from the country, Afghanistan's political and security uncertainty has increased. Insecurity in the country raised fears among the people and led to a slump in investor and consumer confidence. With increasing migration from the country, people withdrew their money from the banks and transferred them abroad. Consequently, the liquidity of banks decreased sharply. With the withdrawal of money from the banks, the money flow in the market reduced, the volume of investments declined, and further recession followed. Furthermore, foreign investors avoided investing in Afghanistan because of the changing unstable environment. This reduction in the quantity of money and investments was also one of the reasons for the devaluation of the Afghani since 2013 (The World Bank, April 2014, p. 3, 5, 6).

2.4.6. Reduction in international aid

According to the Boon Conference, after the fall of the Taliban regime and the acceptance of the political agreement between the various factions of Afghanistan, the international community announced their abundant assistance to support the reconstruction of Afghanistan (Bennett, 2004, p. 1). The high flow of foreign assistance preserved the value of the Afghani against foreign currencies, especially the US dollar. However, the international aid started to reduce with the end of the global community's commitment to Afghanistan since 2012. In this way, the supply of the dollar reduced in the money market by the reduction of foreign aid, thereby devaluing the Afghani (The World Bank, April 2016, p. 8, 9).

2.4.7. Withdrawal of NATO forces

According to the Lisbon Conference, the NATO accepted to undertake the complete security of Afghanistan until 2014 (The World Bank, April 2013, p. 3). To provide for the exorbitant military costs, foreign forces needed to introduce the dollar into Afghanistan frequently. Of course, this process increased the supply of the dollar in Afghanistan, which helped preserve the value of the Afghan currency against the dollar and other foreign currencies. Withdrawal of the NATO forces from Afghanistan in mid-2013 had a profound negative impact on the economic development and increased the insecurity in the country, in addition to reducing the dollars in the market, consequently devaluing the Afghani (The World Bank, October 2015, p. 1, 9).

2.4.8. Political and security instability

During a decade, Afghanistan maintained its security by relying on foreign security forces (Hogg et al., 2013, p. 16). The withdrawal of foreign forces from Afghanistan since mid-2013 and the starting of the 2014 elections heavily influenced the political and security situation of the country. Therefore, all elements of the economy were affected by the unsafe political situation. Deterioration of the political situation led to increased migration, capital reduction, increased unemployment levels, and finally, a sharp decline in economic growth.

Forasmuch as, if there is no political stability, economic stability will not be possible. Therefore, the Afghan currency was severely devalued due to the reducing security. Among all the factors, the loss of political stability and security was the most important reason for the Afghan currency devaluation since 2013 (The World Bank, April 2016, p. 1).

2.5. Impact of Devaluation on Various Economic Sectors

Devaluation creates destruction and sudden changes in a country's economic sectors in the short term and can improve it over time. The devaluation of the Afghan currency since 2013 affected various economic sectors including industry, services, and some sections such as trade balance and inflation.

2.5.1. Impact of devaluation on economic growth

By the end of the international community's commitment, and the rise in political and security problems, the Afghan currency devalued sharply. Because of the devaluation, imported goods became more expensive. Although Afghanistan is not a self-sufficient country and almost all of its economic sectors depend on imports, this increase in the price of imports affected the country's economic sectors and led to a decline in economic growth. It is worth noting that one of the risks of devaluation is the psychological risks. If currency depreciation were considered a sign of economic weakness, it would jeopardize the credibility of the country. Therefore, devaluation of the Afghani since 2013 declined the confidence of investors, manufacturers, and consumers leading to a significant decline in the gross domestic product (GDP) (The World Bank, February 2016, p. 1, 23, 24). The negative impact of Afghani depreciation was observed in all economic sectors. Thus, despite the developments in the agricultural sector in the recent years, economic growth has declined considerably with large deterioration in non-agricultural sectors including industrial production, construction, and services (The World Bank, April 2015, p. 6, 7)

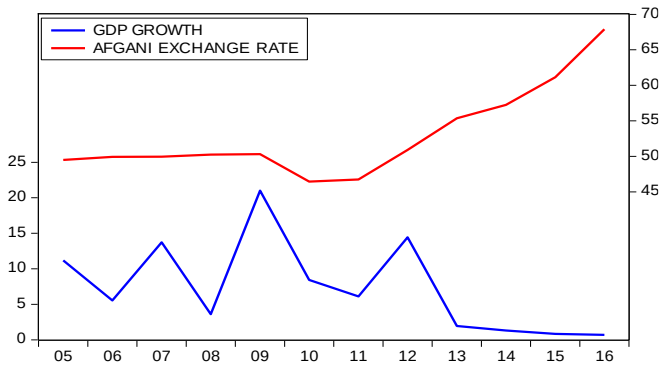

Figure 2.2. *GDP growth following Afghani depreciation* (IMF)

Figure 2.2 shows the economic growth over the past decade and the effects of the Afghan currency depreciation on economic growth. According to the figure, Afghanistan witnessed satisfactory economic growth between 2003 and 2012. However, a sharp decrease in GDP growth is observed since 2013, which is significantly lower than the economic growth rate during 2003–2012.

2.5.2. Effects of devaluation on trade balance

Afghanistan is a least-developed country with a large trade deficit and high import dependency. The country's imports include major parts of machinery and other capital goods, petroleum products, food, and textiles. In contrast to these vast imports, Afghanistan's exports are negligible and limited to agriculture products and a few natural resources such as precious and semiprecious gems. Therefore, this significant difference between Afghanistan's exports and imports indicates a high deficit in its trade balance (The World Bank, April 2015, p. 9, 15).

Nevertheless, the depreciation of 2013 led to a slight decline in Afghanistan's deficit trade balance. Increase in import price reduced consumers' purchasing power and the motivation of producers to produce. Hence, the domestic demand for imports dropped. On the other hand, the level of investment reduced due to the decline in domestic demand. As a result, the country's imports decreased (The World Bank, April 2016, p. 4, 8).

The effects of devaluation on exports are far less than that on imports because of the low export capacity. Therefore, devaluation could not increase Afghanistan's exports significantly. Therefore, a slight increase in the country's exports was observed due to robust

agriculture performance in recent years. As a result, although the trade deficit remained large, it declined slightly (The World Bank, April 2014, p. 13, 14).

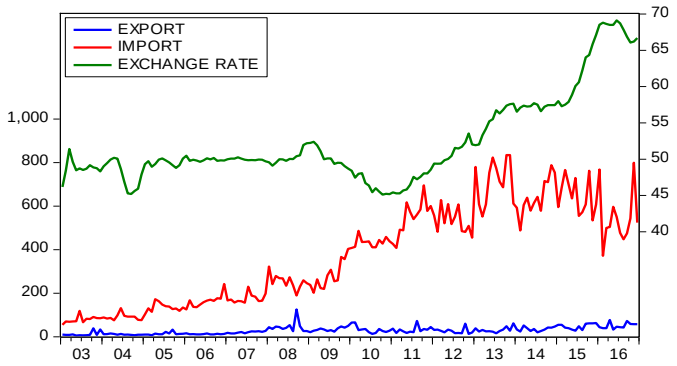

Figure 2.3. *Trade balance following Afghani depreciation* (IMF)

Figure 2.3 reveals the export and import behavior following Afghani depreciation. The figure indicates that since 2013, the volume of imports has changed so that imports decreased slightly while the export volume had not increased.

2.5.3. Effects of devaluation on inflation

Between 2002 and 2012, the central bank maintained the domestic inflation at the low level (average inflation: 10%) by ensuring the stability of the domestic currency (Afghanistan Investment Support Agency, 2012, p. 2). But since 2013, depreciation of the domestic currency affected the level of domestic prices (rise in food prices from 4.4% in December 2012 to 9.8% in December 2013, and an increase in non-food prices from 4.8% to 7.4% in the same period).

Additionally, since Afghanistan has a high import dependency, the global price has a strong impact on domestic prices in the country. Thus, the global price level is one of the determinants of inflation in Afghanistan. Therefore, between 2014 and 2015 Afghanistan benefited from the decline in global fuel and cereals prices. The decline in these prices has reduced the inflationary pressure of Afghani depreciation on domestic prices. As a result, the impact of the Afghan currency depreciation on the domestic price level has been less than its

effects on the other economic sections such as economic growth and trade balance (The World Bank, October 2016, p. 6).

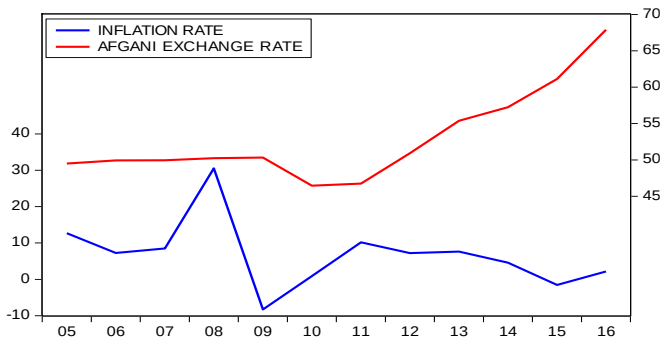

Figure 2.4. *Inflation behavior following depreciation* (IMF)

Figure 2.4 shows the domestic price level during a decade. As shown in the figure, currency depreciation has no negative effects on the domestic prices.

CHAPTER THREE

3. J-CURVE HYPOTHESIS: EMPIRICAL ANALYSIS FOR AFGHANISTAN

This chapter is organized as follows: Section 1 reviews the literature, Section 2 provides the empirical analysis and an overview of our model and data collection. Sections 3 and 4 describe the VAR model, Cholesky decomposition, and the empirical results.

3.1. Literature Review

Table 3.1 presents our literature review. This table indicates the empirical studies that investigate the effect of devaluation on trade balance for different countries including developed, developing, and least-developed countries. The table reveals that the empirical results are mixed. Some countries exhibit the J-curve pattern following exchange rate depreciation, while other countries do not exhibit it. In this part, we divided the countries into three categories: developed, developing, and least developed.

Authors	Countries	Aggregation	Time period	Model	J-curve assessed by	Findings	Table 3.1
Miles (1979)	the UK, Denmark, France, Finland, Ireland, Iceland, Spain, New Zealand, Costa Rica, Ecuador, Guyana, Israel, Sri Lanka, and Philippines	Aggregate: 14 developing countries	Q: 1956–1972	OLSs, CORC model	LR effects	No evidence is found to support the hypothesis that devaluation improves trade balance	Empirical studies of the J-curve effects
Bahmani-Oskooee (1985)	Greece, India, Korea, and Thailand	Aggregate: 4 developing countries	Q: 1973–1980	ARDL, Johansen	SR, LR effects	J-curve in all the countries	
Bahmani-Oskooee and Alse (1994)	Developing and least-developed countries	Aggregate: 19 DCs and 22 LDCs	Q: 1971–1990	ECM, Co-integration	SR, LR effects	J-curve for 6 countries	
Shirvani and Wilbratte (1997)	the US and G7 countries	Bilateral with the US and other G7 countries	M: 1973–1990	Multivariate Co-integration approach	SR, LR effects	Long-term effects of devaluation and Marshall-Lerner condition for the US	
Kapoor and Uma (1999)	Japan	Aggregate	Q: 1975–1996	ECM	SR, LR effects	Existence of J-curve in Japan	

Author	Countries	Aggregation	Time period	Model	J-curve assessed by	Findings	Table 3.1
Bahmani-Oskooee and Kantipong (2001)	Thailand	Bilateral with Germany, Japan, Singapore, the UK, and the US	Q: 1973–1997	ARDL, Co-integration analysis	SR, LR effects	Existence of the J-curve only between Thailand and Japan, and between Thailand and the US	Empirical studies of the J-curve effects
Wilson (2001)	Singapore, Malaysia, and Korea	Bilateral with the US and Japan	Q: 1970–1996	Johansen–Juselius co-integration tests	SR, LR effects	Existence of weak J-curve pattern only for Korea with the US, and Japan	
Boyd et al. (2001)	8 OECD countries Canada, France, Germany, Italy, Japan, the Netherlands, the UK, and the US	Aggregate	Q: 1975–1996	VAR, ARDL model	SR, LR effects	Existence of the J-curve in all the countries	
Lal and Lowinger (2002)	India, Bangladesh, Pakistan, Nepal, and Sri Lanka	Aggregate: 5 South Asian countries	Q: 1985–1998	ECM, Co-integration	SR, LR effects	Existence of the J-curve in all the countries	
Arora et al. (2003)	India	Bilateral with 7 largest trading partners	Q: 1977–1998	ARDL, Co-integration analysis	SR, LR effects	Existence of the J-curve only with Australia, Germany, Italy, and Japan	
Hacker and Hatemi (2003)	Belgium, Denmark, the Netherlands, Norway, and Sweden	Aggregate for 5 small North European countries	M:1976–1999	VEC model	SR, LR effects	Empirical evidence for existence of J-curve in all the countries	

Author	Countries	Aggregation	Time period	Model	J-curve assessed by	Findings	Table 3.1
Onafowora (2003)	Thailand, Malaysia, and Indonesia	Bilateral 3 East Asian countries with the US and Japan	Q: 1980–2001	VECM	SR, LR effects	Existence of J-curve in all the countries	Empirical studies of the J-curve effects
Kulkarni (2003)	Ghana and Egypt	Aggregate	Y: 1983–1994	VAR model	SR, LR effects	Existence of the J-curve in both countries	
Akbostancı (2004)	Turkey	Aggregate	Q: 1987–2000	ECM	SR, LR effects	Do not exactly support the J-curve hypothesis in the short term	
Sahlan et al. (2008)	Malaysia	Bilateral with Japan, Singapore, the UK, and the US	Y: 1970–2003	ECM, Co-integration	SR, LR effects	J-curve for Malaysia with the US and Japan	
Petrović and Gligorić (2010)	Serbia	Aggregate	M: 2002–2007	ECM, VAR model	SR, LR effects	J-curve in Serbia	
Aziz (2012)	Bangladesh	Aggregate	Q: 1980–2009	ECM, VAR model	SR, LR effects	J-curve in Bangladesh	
Raza et al. (2013)	Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka	Aggregate: 6 South Asian countries	Y: 1970–2012	VAR model, multiple regression analysis	SR, LR effects	J-curve only in Pakistan	

Author	Countries	Aggregation	Time period	Model	J-curve assessed by	Findings	Table 3.1
Jouhari Salmasi (2013)	Iran and South Korea	Aggregate	Q: 2001–2011	CUSUM and CUSUMSQ technique	SR, LR effects	Existence of the J-curve in both Iran and South Korea	Empirical studies of the J-curve effects
Ogundipe et al. (2013)	Nigeria	Aggregate	Y: 1970–2010	Johansen, variance decomposition	LR effect	Exchange rate devaluation has a negative effect on Nigeria's trade balance	
Suleman et al. (2014)	Pakistan	Bilateral with Saudi Arabia	Y: 1973–2010	ARDL model	LR effects	No J-curve for Pakistan with Saudi Arabia	
Prakash and Maiti (2014)	Fiji	Aggregate	Y: 1975–2012	VECM	SR, LR effects	Existence of the J-curve in Fiji	
Costamagna (2014)	Argentina and Brazil	Aggregate	Q: 1990–2010	VAR, Johansen, VECM	SR, LR effects	No short-term effects in both countries	
Mengistu and Lee (2014)	14 Asian countries	Aggregate	Q: 1990–2012	REM and FGLS methods	LR effects	Devaluation improved trade balance in only 8 Asian economies	
Trabelsi and Jelassi (2016)	Tunisia	Aggregate	Q: 1993–2014	VAR model	SR, LR effects	No J-curve in Tunisia	
Kurtović (2017)	Albania	Aggregate	Q: 1994–2015	VECM	SR, LR effects	Weak presence of the J-curve	

3.1.1. Empirical studies on developed countries

Shirvani and Wilbratte (1997) conducted an empirical study of the J-curve between the US and other G7 countries. They used the multivariate co-integration approach by using monthly data for the period 1973–1990. Their results showed that in the long term devaluation improved the trade balance of the US. However, they did not find short-term effects of devaluation for the US with major trading partners.

Kapoor and Uma (1999) investigated the effects of the yen depreciation on Japanese exports and imports data with respect to seven major trading partners. They employed a vector error correlation model (VECM) by using quarterly data for the period 1975–1996. They found that the following depreciation of Japan's trade balance worsened for the first few months and improved in the long term. Thus, they emphasized that Japan's trade balance exhibited a J-curve pattern when the yen depreciated.

Boyd et al. (2001) conducted similar research on eight OECD countries including Canada, France, Germany, Italy, Japan, the Netherlands, the UK, and the US by using aggregate data. They employed structural co-integrating vector autoregressive distributed lag (VARDL), VECM, and vector autoregressive distributed lag (VLDL) models by using quarterly data for the period 1975–1996. They also found evidence for the existence of the J-curve pattern in all the countries.

Hacker and Hatemi (2003) employed the VECM to examine the impact of devaluation on five small North European countries including Belgium, Denmark, the Netherlands, Norway, and Sweden. They used monthly data spanning 1979–1999. Their results provide empirical support for the existence of the J-curve pattern in all the countries.

3.1.2. Empirical studies on developing countries

Miles (1979) examined the statistical relationship between devaluation and trade balance for 14 developing countries. She used the Cochrane-Orcutt technique (CORC) by using quarterly data for the period 1956–1972. She did not find any evidence to support the hypothesis that devaluation improves trade balance; however, her estimation showed that devaluation can improve BOP.

Bahmani-Oskooee (1985) estimated the impact of devaluation on the BOP of four developing countries including Greece, India, Korea, and Thailand. He employed

quarterly data and the vector auto-regression (VAR) technique for the period 1973–1980. His results revealed an improvement in the BOP following devaluation, and thereby the empirical evidence supported the existence of the J-curve in all the countries.

Bahmani-Oskooee and Alse (1994) used the error correlation model (ECM) and co-integration model for testing the effects of devaluation on the trade balance of 19 developing and 22 least-developed countries. They employed quarterly data for the period 1971–1990. Their estimation showed the existence of the J-curve pattern for only six countries.

Costamagna (2014) examined the J-curve pattern for the trade balance of Argentina and Brazil by using the VECM) for the period 1990–2010. His results indicated the existence of long-term effects of devaluation on trade balance.

Petrović and Gligorić (2010) used the VECM to examine Serbia's trade balance behavior following devaluation. They employed monthly data for the period 2002–2007. Their study revealed that Serbia's trade balance deteriorated for few months and improved over time when the exchange rate depreciated.

Bahmani-Oskooee and Kantipong (2001) examined the short- and long-term effects of devaluation on Thailand's trade balance with the major trading partners including Germany, Japan, Singapore, the UK, and the US They used autoregressive distributed lag (ARDL) and co-integration analysis for the period 1973–1997 with quarterly data. Their estimations confirmed the existence of the J-curve phenomenon only between Thailand and two trading partners, Japan and the US.

The same research was undertaken by Wilson (2001) on Singapore, Malaysia, and Korea's trade balance with the US and Japan. He used quarterly data for the period 1970–1996 employing the Johansen–Juselius and co-integration tests. His research showed that RER change had no significant effect on the trade balance of Singapore and Malaysia. In addition, his finding proved the existence of a weak J-curve pattern for Korea with the US and Japan.

Onafowora (2003) examined the short- and long-term effects of RER changes on the trade balance of three ASEAN countries including Thailand, Malaysia, and Indonesia by using bilateral data with the US and Japan. He employed quarterly data for the period 1980–2001 within a co-integrating VECM. His results suggested that the Marshall-Lerner condition holds in the long term. In addition, he found evidence for the J-curve phenomenon in all the countries.

The research of Arora et al. (2003) on India's trade balance with seven largest trading partners showed the existence of the J-curve pattern for India's trade balance with only Australia, Germany, Italy, and Japan. They used quarterly data for the period 1977–1998 within the ARDL model and co-integration analysis.

Raza et al. (2013) conducted a research on six South Asian countries including Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka with aggregate data. They investigated the short- and long-term effects of devaluation on the trade balance of these countries by utilizing the VAR technique and annual data for the period 1970–2012. Their results indicated the existence of the J-curve pattern only for Pakistan's trade balance.

Suleman et al. (2014) examined the behavior of Pakistan's trade balance with Saudi Arabia during the period 1973–2010. They applied annual data and the ARDL approach for examining the relationship between exchange rate depreciation and trade balance, and did not find any significant impact of RER depreciation on Pakistan's trade balance. Thus, their results did not support the existence of the J-curve pattern for Pakistan with Saudi Arabia.

Akbostancı (2004) investigated the short- and long-term effects of devaluation on the trade balance of Turkey. She used the ECM and the generalized impulse response methodology using quarterly data for the period 1987–2000. Her results indicated the improvement of the trade balance in response to a real depreciation in the long term but her results did not support the J-curve hypothesis in the short term.

Jouhari Salmasi (2013) showed that depreciation improved the trade balance between Iran and South Korea, and found the evidence for the existence of the J-curve pattern for both countries during the period 2001–2011. She used ARDL model and ECM by using quarterly data.

Trabelsi and Jelassi (2016) examined the effects of exchange rate depreciation on the trade balance of Tunisia. They employed quarterly data for the period 1993–2014 within the VAR model. Their results did not support the existence of the J-curve pattern for the trade balance of Tunisia.

Kurtović (2017) employed the VECM to examine the impact of devaluation on Albania's trade balance. He used quarterly data for 1994–2015 and revealed the weak presence of the J-curve pattern for Albania.

Mengistu and Lee (2014) tested the effects of devaluation on the trade balance for 14 Asian countries (Bangladesh, Brunei, China, Hong Kong, India, Indonesia, be

Republic of Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, and Vietnam). They applied the REM and FGLS estimation methods for 1990–2012 by using quarterly data. They indicated that devaluation improved the trade balance in the long term in only eight Asian countries.

Sahlan et al. (2008) conducted another study to examine the effects of RER devaluation on the trade balance of Malaysia with trading partners (the US, the UK, Japan, and Singapore). They employed yearly data spanning 1970–2003, the ECM, and co-integration analysis. They found evidence for the existence of the J-curve pattern for Malaysia with Japan and the US.

3.1.3. Empirical studies on the least-developed countries

Lal and Lowinger (2002) used the ECM and co-integration technique to determine the J-curve pattern for five South Asian countries including India, Bangladesh, Pakistan, Nepal, and Sri Lanka by using quarterly data from 1985–1998. Their analysis showed the existence of the J-curve on all countries' trade balance.

A similar study was conducted for Bangladesh's trade balance by Aziz (2012). He employed the ECM and VAR technique by using quarterly data for the period 1980–2009, and found evidence of the J-curve for Bangladesh's trade balance.

Kulkarni (2003) examined the devaluation effects on Ghana and Egypt's trade balance for the period 1983–1994. He employed the VAR technique and annual data, and showed evidence of the existence of the J-curve in both countries.

Ogundipe et al. (2013) also provided an explanation for devaluation effects on Nigeria's trade balance. They employed a co-integration method by using annual data for the period 1970–2010. Their results suggested that exchange rate devaluation has a negative effect on Nigeria's trade balance in the long term. In addition, their analysis indicated that domestic money supply volatility contributes more to variance in trade balance than in exchange rate, so that a monetary expansion stimulates domestic demand and increases export demand, thereby worsening the trade balance

Prakash and Maiti (2014) used the VECM to examine the J-curve effects on Fiji's trade balance. They applied annual data for 1975–2012 and revealed the evidence for the existence of the J-curve phenomenon.

3.2. Empirical Analysis

In this study, in order to analyze the short- and long-term effects of exchange rate depreciation on trade balance in Afghanistan, we use the VAR model, which has some important features for analyzing the existence of the J-curve pattern. First, the effects of exchange rate depreciation on exports and imports likely occur with some time lags instead of during particular months or a specific time. The VAR model provides flexibility for these time lags. Second, the existence of short- and long-term effects of exchange rate depreciation on trade balance is well known. Using the VAR model allows us to identify these effects. Thus, we adopt the VAR model to examine how trade balance reacts to exchange rate depreciation due to its useful features.

3.3. Empirical Data

The variables used in this study include trade balance (lnTB), nominal exchange rate[3] (lnNER), export value (lnEXP), and import value (lnIMP) of Afghanistan, in logarithmic form. I used monthly data, from January 2005 to December 2017, for empirical analysis. The data used in this study were obtained from DataStream.

The reasons, mostly related to the structural characteristics of Afghanistan's economy, for choosing 2005 as the start date in this study are explained as follows. The first and most important reason is that after the collapse of the Taliban regime in 2001, the new government's initial focus was mostly on security and policy reforms rather than on improving the economic structure of the country; therefore, the necessity of economic structure reforms did not warrant significant attention till 2005. In addition, in 2005, Afghanistan constituted a new framework for trade policies to liberalize the economy and to integrate it with the world economy by encouraging import policies, introducing the new currency (by removing three zeros from the national currency), and some other export propagation policies. Besides, the ban on poppy and opium production and the support from the agriculture sector to strengthen formal trade have been key achievements of Afghanistan's new trade framework since 2005. Furthermore, the government has followed the new exchange rate regime—the managed floating exchange rate—to maintain the price stability in the country. As Afghanistan's economy observed

[3] The nominal exchange rate is defined as the local currency (Afghani) units per unit of US dollar.

significant changes and improvement from 2005 onwards, this study does not include the data before 2005 to avoid unrealistic results.

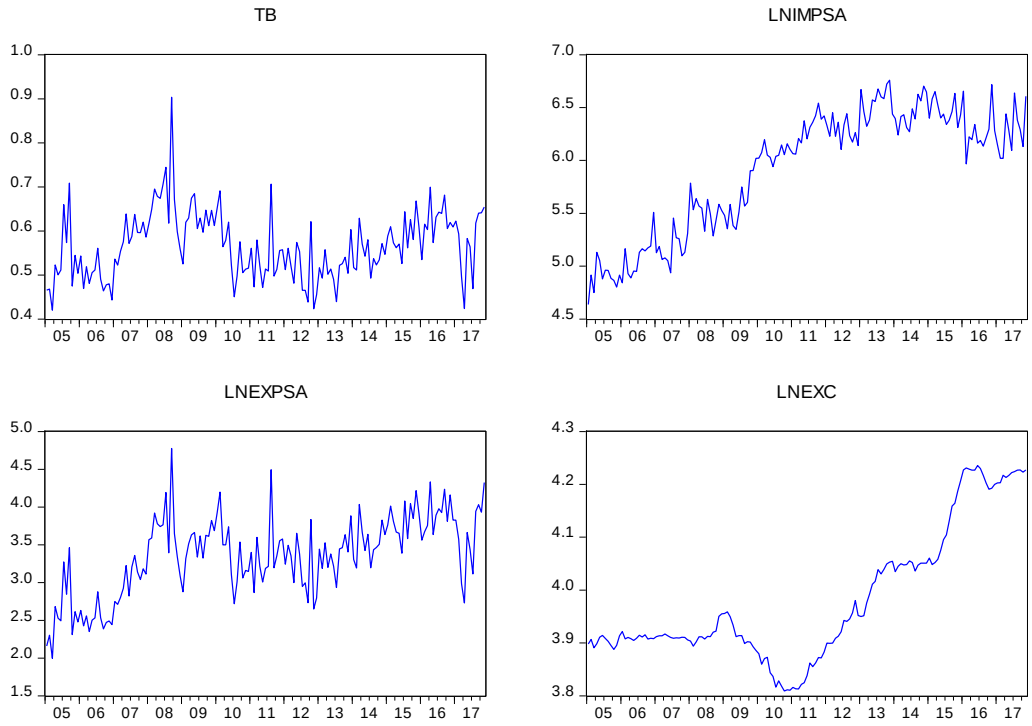

Figure 3.1. *Time series of our variables using empirical analysis*

As Figure 3.1 depicts, the import volume has increased since 2005. However, the import quantity shows a slight decrease after 2013 due to the Afghan currency's depreciation. In contrast, exports exhibited a satisfactory growth between 2005 and 2008. However, more significant fluctuations are seen in the export quantity during 2009–2012. According to the graph of exports, depreciation of the Afghani has led to an initial growth in exports since 2013. Figure 3.1 also shows that domestic currency remained constant between 2005 and 2009, but has sharply depreciated against the US dollar since 2010. According to the trade balance graph, the trade balance improved during 2005–2008, but exhibited more fluctuations between 2008 and 2012. Due to the currency depreciation, the trade balance has improved after 2013.

We used the Augmented Dickey-Fuller (ADF) test to assess the stationarity of our variables. As expected, the test revealed that all the variables have a unit root. For the ADF test's report, see Table 3.2 in Appendix A. Despite the unit roots, the VAR in level

specification was applied to avoid losing any information on the long-term relationships among the variables.

3.4. Empirical Model and Results

We use the VAR model to investigate the effects of devaluation on the trade balance in Afghanistan. To determine the lag length, we employ lag length selection criteria. The results are reported in Table 3.3 in Appendix B. According to the Akaike information criterion (AIC), the model with two lags is accurate, and according to the Schwarz criterion the model with one lag is accurate. We choose two lags since four criteria selected two lags.

Also, we use the LM test to examine whether residuals of our reduced form VAR model have serial correlation. Table 3.4 in Appendix B reports the results for the LM tests. Results of the autocorrelation test showed that there is no serial correlation between the error terms, and the model does not have autocorrelation.

This study intends to investigate the effects of exchange rate depreciation on both exports and imports, and thereby on trade balance. Thus, we should use two models (two-variable model and three-variable model). In model 1, we investigate the effect of the exchange rate shock on exports and imports, and in model 2, we estimate the effects of exchange rate shock on trade balance.

3.4.1. Vector auto-regression and Cholesky decomposition

We consider the following VAR model:

$$Y_t = B(L)Y_t + \mu_t \qquad (1)$$

Where Y_t denotes a (3 × 1) vector of endogenous variables, t defines a time index, and μ_t is a (3 × 1) vector of error terms.

The moving average of the VAR model is as follows:

$$Y_t = D(L)\mu_t$$

The structural form of the VAR model is:

$$Y_t = G(L)\varepsilon_t$$

Where $G(L) = D(L)P$ and $\mu_t = P\varepsilon_t$. $\varepsilon_t = (\varepsilon_t^{imo}, \varepsilon_t^{exp}, \varepsilon_t^{ner})$ represents structural shocks.

We start the VAR analysis by estimating the reduced-form VAR model (Equation 1). Then, to identify structural shocks, we adopt a Cholesky scheme. With the Cholesky identification procedure, our structural form VAR model is as follows:

$$Y_t = D(L)\begin{bmatrix} 1 & 0 & 0 \\ p_{21} & 1 & 0 \\ p_{31} & p_{32} & 1 \end{bmatrix}\begin{bmatrix} \varepsilon^{exp} \\ \varepsilon^{imp} \\ \varepsilon^{ner} \end{bmatrix}$$

The ordering of variables matters in identifying the structural shocks through the recursive method. We ordered our variables as follows: exports, imports, and exchange rate. Note that exchange rate is ordered last. Our ordering implies that exports and imports respond to exchange rate depreciation with a lag. In other words, the two variables do not immediately react to the exchange rate. This is consistent with the argument that firms cannot immediately react to fluctuations in exchange rate by changing production or imports decisions, and consumers cannot instantaneously react to these fluctuations by altering purchasing decisions on imported goods and domestically produced goods. Firms' decisions are required to time. Therefore, changing consumption habits takes time.

3.4.2. Effects of exchange rate depreciation on exports and imports

The model we used in this section includes three variables, ordered as follows: export value (lnEXP), import value (lnIMP), and nominal exchange rate (lnEXC). In this section, we investigate how the exchange rate shock affects exports and imports. To analyze this, we used an impulse response function, as illustrated in Figure 3.2, which indicates the responses of EXP and IMP to an exchange rate shock. The blue lines show the estimated impulse responses while the dotted lines represent the 95% confidence intervals for all the estimates.

Figure 3.2 clearly shows that a one standard deviation increase in the exchange rate (exchange rate depreciation shock) affects imports strongly and statistically

significantly. Following the exchange rate shock, the imports decrease sharply and respond negatively to the change in the exchange rate throughout the period. However, the exchange rate shock has no statistically significant effect on exports. These results imply that exchange rate depreciation has strongly affected imports but not exports.

Our findings based on the impulse response function documented in Figure 3.2 are consistent with the structure of Afghanistan's economy. One reason for the weak response of exports is that since Afghanistan's exports account for around 20% of the country's GDP, the exports do not contribute significantly to Afghanistan's trade. In addition, Afghanistan's main exports are carpets and rugs, dried fruits, and medicinal plants, which depend on the agriculture sector. Therefore, insufficient export capacity, and other problems such as the lack of Afghanistan's transit facilities with trading partners, and not having a competitive position in the global market weaken the reaction of exports to the exchange rate changes. However, Afghanistan has a high import dependency. The import-to-GDP ratio in Afghanistan is 65% and all of Afghanistan's economic sectors are heavily dependent on imports. Most of the imported goods in Afghanistan are basic and capital goods that cannot be directly replaced with domestic goods. This fact may lead the imports to respond strongly to the exchange rate changes. As a result, considering the statistical results and the structure of Afghanistan's economy, we can state that the effects of exchange rate shock (depreciation) on the import level are stronger than its effect on the export level. This implies that exchange rate depreciation improves trade balance by decreasing imports in Afghanistan.

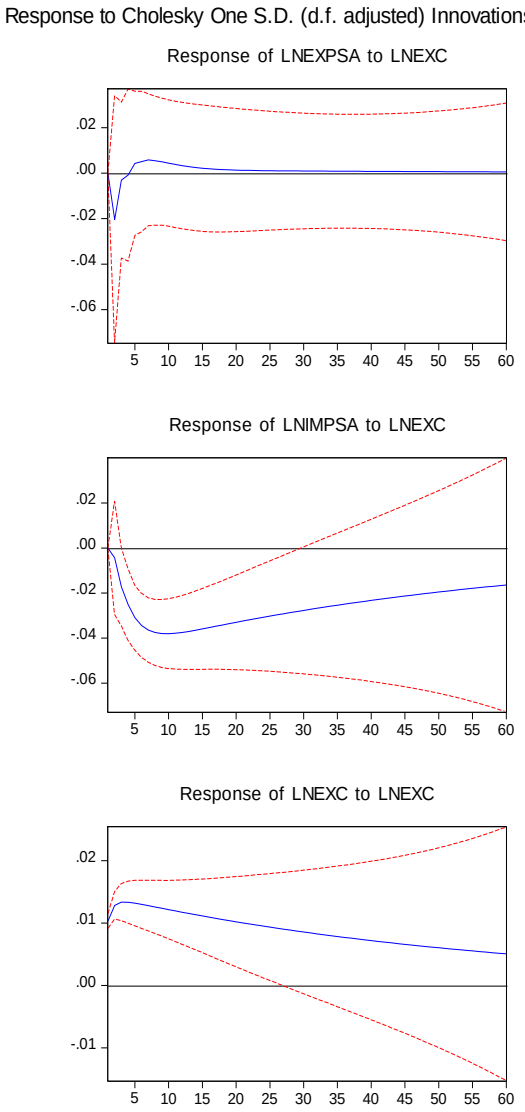

Figure 3.2. *Effect of exchange rate shock on exports and imports*

3.4.3. Effects of positive exchange rate shock on trade balance

In model 1, we investigate the effect of the exchange rate shock on export and import. However, this model does not allow us to examine the effect of exchange rate shock on trade balance. To investigate whether the J-curve pattern exists, we must estimate the two-variable VAR model. By excluding exports and imports from model 1 and adding trade balance to it, we set up model 2. This model includes two variables: exchange rate and trade balance. The variables are ordered as follows—trade balance and exchange rate. This ordering implies that trade balance does not contemporaneously react to exchange rate shocks. We estimate model 2 with two lags selected by AIC and SBC. The corresponding impulse response function is illustrated in Figure 3.3.

The figure reveals that positive exchange rate shock (depreciation) deteriorates trade balance at first and then improves it. The effects are statistically significant. Our results suggest that the J-curve pattern exists in Afghanistan. Combining these results based on model 2 with those from model 1 indicates that exchange rate depreciation affects trade balance in Afghanistan by influencing imports. As a result, we found evidence supporting the existence of the J-curve in Afghanistan.

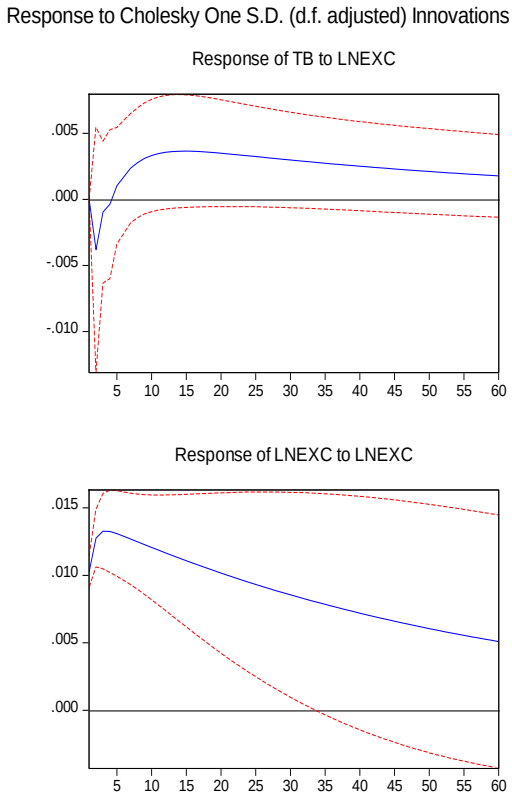

Figure 3.3. *Effect of exchange rate shock on trade balance*

The review of empirical studies on least-developed countries indicates the existence of the J-curve pattern. Compared to similar studies, we find on one hand the same results as some previous studies such as Bahmani-Oskooee (1998) and Kulkarni (2001), which show that the trade balance has increased through reduced imports, and on the other hand our results differ from other empirical studies, which indicate that the growth of exports has improved the trade balance (Lal and Lowinger, 2002; Aziz, 2012; Prakash and Maiti, 2014; Ogundipe et al., 2013).

3.5. Robustness Checks

The results of our empirical models indicate that the positive exchange rate shock (depreciation) significantly affects trade balance by influencing imports. In this section, we check the robustness of the baseline results by altering the specification of the VAR models.

First, according to the AIC and the other four criteria we have selected two lags, but since some residual serial correlation may still exist, we re-estimate our VAR models with 6 and 12 lags. Second, we de-trend the variables as they are non-stationary at level. Consequently, we de-trend the variables by removing the cyclicality for obtaining stationary variables in the robustness checks. Therefore, for all variables we use linear de-trending to obtain stationary series.

Figures 3.4 and 3.5 show the impulse response functions, which indicate the response of the de-trended variables (export, import, and trade balance) to one standard deviation increase in the exchange rate. Other figures (Figures 3.6, 3.7, 3.8, and 3.9) in Appendix C reveal the impulse response functions of all variables to the exchange rate shock by employing 6 and 12 lags, which indicate the results from robustness checks.

Since the response of the variables under different lags is similar to Figures 3.2 and 3.3, we can infer that different lags do not change our baseline results. In addition, the reaction of the de-trended variables to exchange rate shock resembles our baseline results, thereby indicating that our baseline results are robust.

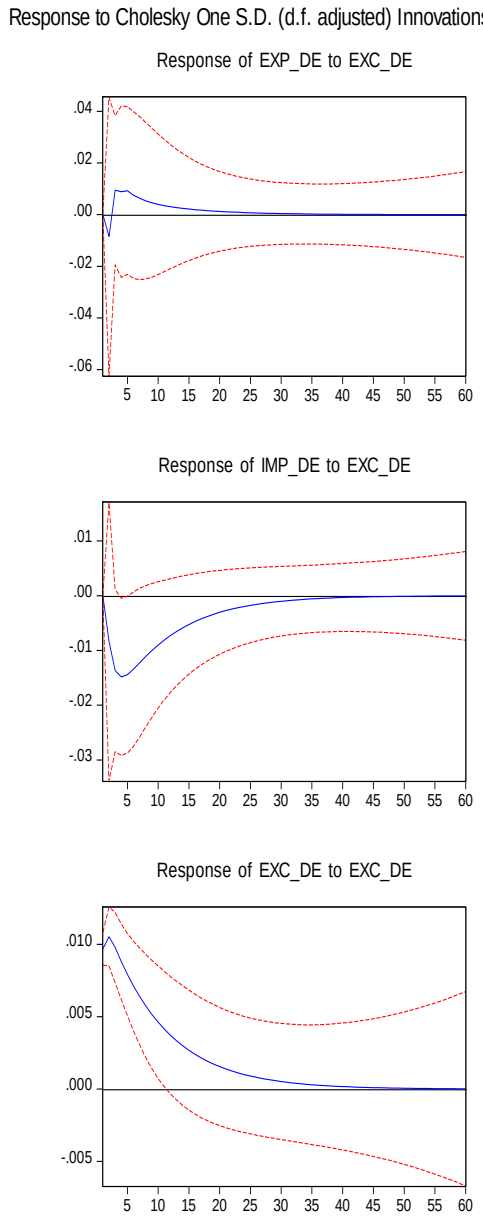

Figure 3.4. *Robustness check*
Note: This figure reveals the results from robustness checks for de-trended variables (export, import, and exchange rate) to the positive exchange rate shock

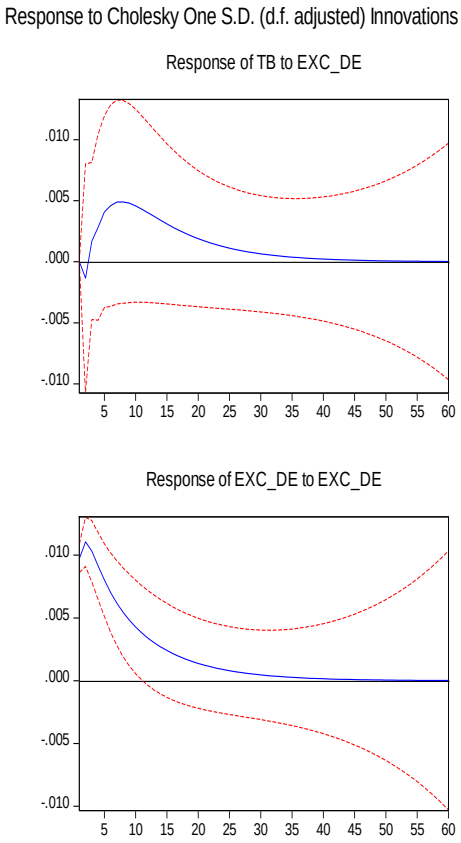

Figure 3.5. *Robustness check*
Note: This figure shows the results from robustness checks for de-trended variables (trade balance and exchange rate) to the positive exchange rate shock

3.6. Conclusion

Theoretically, devaluation of domestic currency is useful for the export sector. Exchange rate depreciation is expected to reduce the relative price of exports abroad, thereby increasing the competitive position of exportable goods in the foreign market. Consequently, the export earnings rise and improve the trade balance. On the other hand, exchange rate devaluation would increase the price of imported goods, eventually increasing import expenditure and deteriorating trade balance. Hence, the overall economic impact of depreciation on trade balance appears as the J-shaped, which reveals that depreciation first worsens the trade balance and improves it later. Thus, the J-curve phenomenon provides opportunities for policymakers and economic analysts to understand deeply the consequences of devaluation on trade balance in both the short and long terms. Additionally, we do not find empirical evidence regarding the existence of the J-curve in Afghanistan. This study aims to address this gap in the related literature by

documenting evidence on the effects of exchange rate depreciation on the trade balance of Afghanistan.

The aim of this study is to examine the short- and long-term effects of exchange rate depreciation on Afghanistan's trade balance. For this, the VAR model was used as the econometric method. To investigate the effects of exchange rate shock on the variables, we employed Cholesky decomposition. The impulse responses show that the trade balance responds significantly to the positive exchange rate shock. According to these impulse responses, trade balance improved over time.

Our findings are consistent with the theoretical considerations that suggest that trade balance exhibits the J-curve behavior after exchange rate depreciation. The findings clearly show that exports weakly react to exchange rate depreciation. This weak reaction may stem from some characteristics of Afghanistan's economy, including insufficient capacity of domestic production, reliance of exports on agricultural products, and other problems such as the lack of Afghanistan's transit facilities with trading partners, and not having a competitive position in the global market. Our findings also indicate that imports sharply respond to exchange rate depreciation, which is also consistent with one structure of Afghanistan's economy. On the other hand, despite Afghanistan having adopted the policies based on the prevention imports since 2008 to improve its trade balance and reduce the trade deficit, a high import dependency still exists in most economic sectors. Thus, after currency depreciation, expensive imports affected the purchasing power of consumers and producers, causing a decline in the demand for imports. Hence, the main conclusion of this study is that during local currency depreciation, the slight improvement in trade balance is due to the decrease in imports and not the increase in exports.

Our suggestion to the policymakers of Afghanistan is that the country must develop its competitiveness in the foreign trade arena, by strengthening domestic product market. Thus, policymakers should focus on the activities of the industrial sector in order to enhance the competitiveness of their domestic products in the global market. In addition, despite Afghanistan being one of the least-developed nations, it has rich mineral resources valued at nearly $1 trillion. Extraction of these mines can help raise the capacity of the country's exports sector. If the policymakers would focus on strengthening the domestic production and increasing export earnings, the import dependencies would decrease over time.

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A Appendix

Null Hypothesis: LNEXPSA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on AIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.710319	0.0245
Test critical values:	1% level	-4.018349	
	5% level	-3.439075	
	10% level	-3.143887	

Table 3.2. *Unit root test for export based on ADF test*

Null Hypothesis: LNIMPSA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on AIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.279963	0.4419
Test critical values:	1% level	-4.018349	
	5% level	-3.439075	
	10% level	-3.143887	

Table 3.3. *Unit root test for import based on ADF test*

Null Hypothesis: LNEXC has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on AIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.109492	0.9233
Test critical values:	1% level	-4.018349	
	5% level	-3.439075	
	10% level	-3.143887	

Table 3.4. *Unit root test for exchange rate based on ADF test*

B Appendix

VAR Lag Order Selection Criteria
Endogenous variables: LNEXPSA LNIMPSA LNEXC
Exogenous variables: C @TREND
Date: 03/05/18 Time: 15:21
Sample: 2005M01 2017M11
Included observations: 155

Lag	LogL	LR	FPE	AIC	SC	HQ
0	134.9484	NA	3.80e-05	-1.663850	-1.546040	-1.615998
1	488.5881	684.4640	4.45e-07	-6.110814	-5.816289*	-5.991185
2	**507.3441**	**35.57593***	**3.93e-07***	**-6.236698***	**-5.765458**	**-6.045291***
3	512.6684	9.892947	4.12e-07	-6.189270	-5.541315	-5.926085
4	516.6034	7.159011	4.40e-07	-6.123914	-5.299244	-5.788952
5	523.9855	13.14495	4.50e-07	-6.103038	-5.101653	-5.696298
6	526.7276	4.776575	4.89e-07	-6.022292	-4.844191	-5.543774
7	529.8602	5.335559	5.28e-07	-5.946583	-4.591768	-5.396288
8	537.7399	13.11586	5.38e-07	-5.932128	-4.400598	-5.310055
9	542.3719	7.530763	5.71e-07	-5.875767	-4.167522	-5.181916
10	549.8767	11.91083	5.85e-07	-5.856474	-3.971514	-5.090845
11	551.9439	3.200857	6.43e-07	-5.767018	-3.705343	-4.929612
12	559.5432	11.47251	6.59e-07	-5.748945	-3.510555	-4.839761

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 3.5. *VAR Lag Order Selection Criteria*

VAR Residual Serial Correlation LM Tests
Date: 03/05/18 Time: 15:22
Sample: 2005M01 2017M11
Included observations: 155

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	12.32186	9	0.1958	1.379568	(9, 345.7)	0.1958
2	8.855372	9	0.4507	0.986524	(9, 345.7)	0.4508
3	5.498801	9	0.7888	0.609642	(9, 345.7)	0.7889
4	11.40818	9	0.2488	1.275593	(9, 345.7)	0.2488
5	7.401961	9	0.5953	0.822887	(9, 345.7)	0.5954
6	4.079908	9	0.9061	0.451412	(9, 345.7)	0.9061
7	6.938260	9	0.6435	0.770823	(9, 345.7)	0.6436
8	5.777423	9	0.7620	0.640788	(9, 345.7)	0.7620
9	10.76251	9	0.2923	1.202281	(9, 345.7)	0.2924
10	12.43787	9	0.1897	1.392790	(9, 345.7)	0.1898
11	6.836069	9	0.6542	0.759359	(9, 345.7)	0.6542
12	17.52491	9	0.0411	1.976883	(9, 345.7)	0.0411

Table 3.6. *VAR Residual Serial Correlation LM Tests*

C Appendix

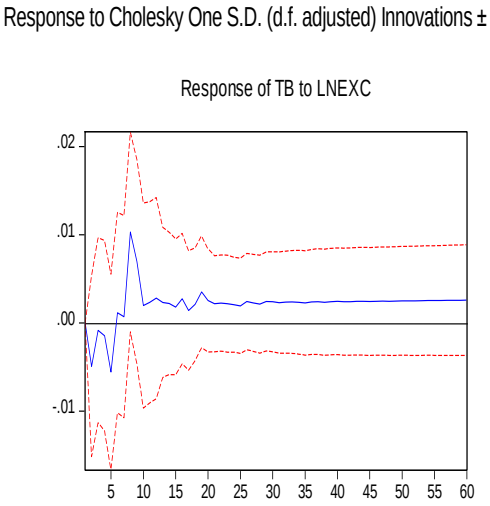

Figure 3.6. *Robustness checks, the effect of exchange rate shock on trade balance using 12 lags instead of 2 lags*

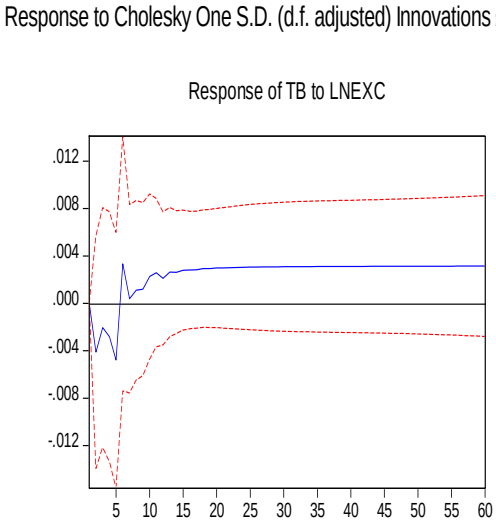

Figure 3.7. *Robustness check, the effect of exchange rate shock on trade balance using 6 lags instead of 2 lags*

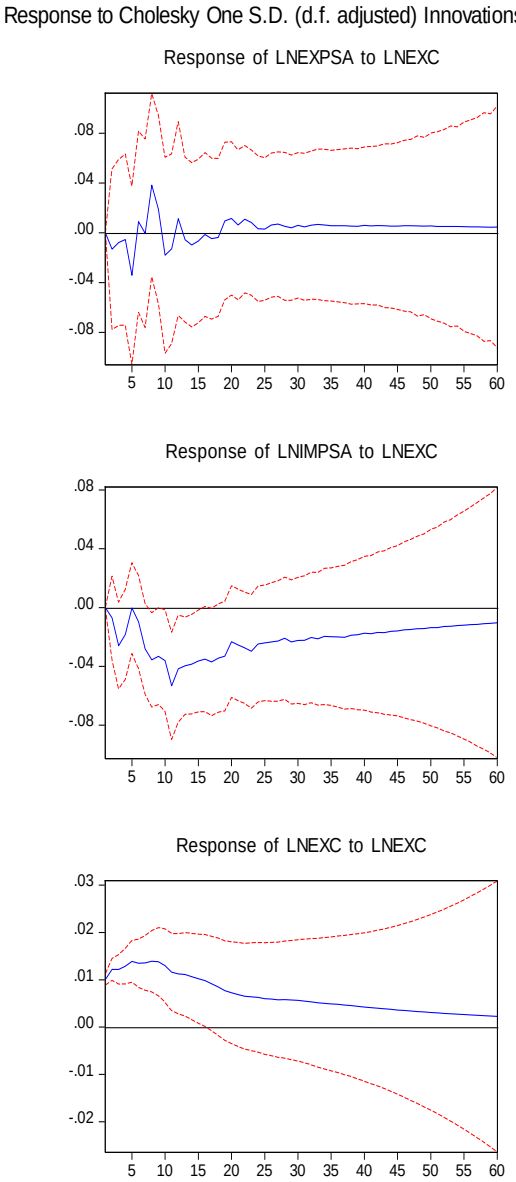

Figure 3.8. *Robustness check, the effect of exchange rate shock on export and import using 12 lags instead of 2 lags*

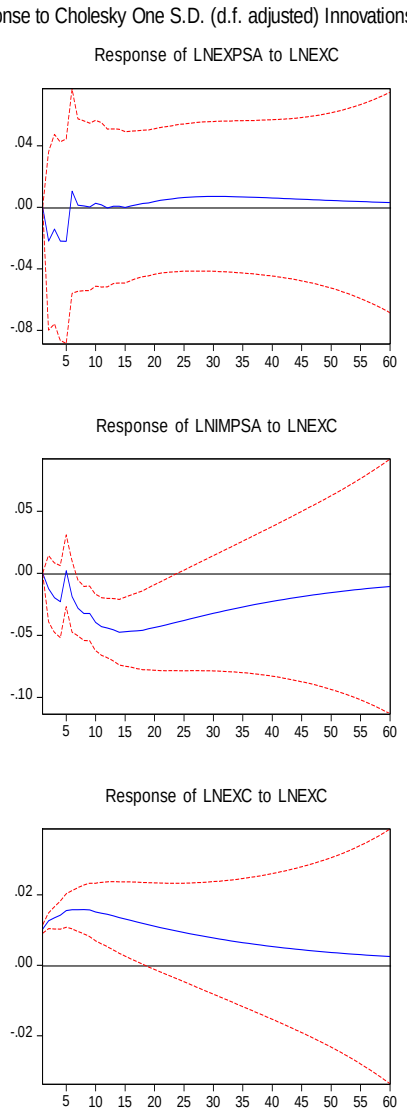

Figure 3.9. *Robustness check, the effect of exchange rate shock on export and import using 6 lags instead of 2 lags*

Curriculum Vitae

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