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Twin Deficits and the Feldstein-Horioka Hypothesis in the MENA Region: New Evidence Using Panel VAR Analysis

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ABSTRACT

This study empirically investigates the dynamic effect of fiscal balance (FB) and investment on the current account balance (CAB) of 20 the Middle East and North African (MENA) countries over the 1990-2016 period. We employ the recently proposed panel VAR approach using the generalized method of moments (GMM)-style estimators. The findings emphasize that the twin deficits hypothesis (TDH) for the entire sample of the MENA region exists in the mid-term and gradually dissipates over time, supporting the Keynesians' conventional viewpoint that fiscal deficits have a negative effect on the CAB. By splitting the full sample, rising fiscal deficits lead to reducing the CAB in oil countries only. The results are consistent with the widespread view that expansion of government spending crowds out private investment, further denying the existence of the Feldstein-Horioka hypothesis in the MENA region. Importantly, to improve the CAB, MENA governments must reduce internal interest rates in a timely manner, while raising the private savings interest rate is necessary to avoid the undesired consequences for their economies of chronic fiscal deficits and current account downturns.

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INTRODUCTION

The short-term effects of fiscal deficits on current account balances (CABs) have begun to place even more strain on policymakers to curb the impacts of internal and external imbalances on a country's economy. Importantly, policymakers should recognize the influence and magnitude of fiscal deficits and related variables on current account deficits to establish effective fiscal policy. The relationship between the two variables became important for sustaining economic growth and fiscal consolidation in countries. A great scope of the empirical and theoretical literature has studied the long-term relationship between fiscal deficits and current account deterioration to disentangle the twin deficit hypothesis (TDH) and identify the strong foundations of this hypothesis to prove its existence in both developed (Fidrmuc, 2003; Cavallo, 2005; Bagnai, 2006; Kim and Roubini, 2008) and developing countries (Parikh and Rao, 2006; Calderon *et al.*, 2007; Marinheiro, 2008; Akbaş *et al*., 2014). Going forward, the issues surrounding these two variables have had a paramount influence on an economy's performance. The twin deficits can negatively affect economic growth by reducing the wellbeing of a nation due to a decline in output.

A chronic fiscal deficit requires governments to borrow from internal or external sources to finance the deficit. As is well known, national savings include both private and public savings. If a country has diminishing national savings, interest rates can increase if public savings grow at a negative rate. Thus, capital inflows from foreign capital markets will increase, leading to an upsurge in the appreciation of the exchange rate[1]. As a consequence, the demand for imports will increase; hence, the gap in the trade balance will become larger, and this gap is considered the main variable in current account deficit variability. Hence, there is a clear linkage with the Feldstein and Horioka hypothesis, which asserts that the investment-savings correlation measures the level of international capital mobility. In the case of perfect capital mobility, the domestic capital markets are integrated, and national investment can be funded by overseas savings, indicating that there is a low correlation between the two variables, implying the validity of the Feldstein and Horioka hypothesis. Arguably, the domestic savings in each country would respond to the international prospects for investment because investment in any country would be funded by the global capital markets. Hence, the existence of the TDH can be correlated with the mobility level of global capital markets. As noted by Marinheiro (2008), there is a positive linkage between the twin deficits of fiscal balance and CAB if savings and investment are weakly linked, indicating high capital mobility. In summary, the MENA countries are characterized by different economic development levels, exchange rate regimes, and economic resource endowments, raising serious concerns about the existence of the F-H hypothesis.

In the 1980s, many countries in the Middle East and North Africa (MENA) region undertook reforms in the financial sector; these reforms were part of the structural adjustment programs (SAPs) adopted by the International Monetary Fund (IMF) and the World Bank (WB), particularly in low-income countries[2]. The main goal of SAPs is the convergence of these developing economies to long-term economic growth by decreasing borrowing in a country's fiscal imbalances in both the short and medium terms. These reforms led to considerable improvement in economic growth by the late 1990s. Nonetheless, the MENA region still faces economic challenges, such as a fiscal deficit[3], a current account deficit, and a high rate of debt accumulation (Samadi, 2006; Saeed and Somaye, 2012; Asghari *et al*., 2014). There is a widespread view among researchers studying the MENA region that relates these economic challenges to the widespread government interventions and low-quality fiscal policies adopted by MENA governments, such as a large government size compared to other developing regions. As a developing region, the MENA region is highly interdependent on the rest of the world regarding trade; for example, this region exports petroleum products, textiles, and clothing to many global partners. Currently, the economic discussions about the nature of the association between fiscal deficits and the current account deficit in the MENA region have been powered by a steady underperforming and fluctuated deficit in current accounts greater than those in other developing regions, such as the ASEAN-5 and Sub-Saharan Africa. The MENA region's current account balance is an average of approximately 0.11% as a percentage of GDP, which is 0.9% less than that of the ASEAN-5 and 4.09% less

[1] The appreciation in the exchange rate with a fixed exchange rate renders monetary policy ineffective. Therefore, central banks address this issue by buying foreign currency in exchange for national currency. As a consequence, the money supply will increase, and the interest rate will be under-controlled.

[2] These countries include Jordan, Morocco and Tunisia.

[3] From 2000 to 2016, the MENA region had a 0.32% surplus in its fiscal balance as a percentage of GDP, while both the ASEAN-5 and Sub-Saharan Africa had deficits that were -1.08% and -0.73% on average, respectively.

than that of Sub-Saharan Africa[4]. Conversely, the MENA region's investment has been on average approximately 24.37% as a share of GDP over the last three decades or so, which is 4.95% higher than that of the ASEAN-5 and 4.99% higher than that of Sub-Saharan Africa. As a consequence, the current account fluctuation is increasing in MENA countries, and the fluctuation of each MENA country is increasing at a different rate.

As shown in Figure 1, the overall picture is quite clear; the CAB and FB are moving together in parallel for most of the period, indicating that the two variables are correlated positively in oil countries. The CAB has reached a surplus on average at approximately 5.77% of GDP over the last three decades or so. During the 1990-1991 period, both the FB and CAB fell sharply, and the CAB recorded a deficit, with more than 25% of the GDP due to the II Gulf War shock in 1990[5]. Then, the two variables moved in the same pattern until 1996. Over the 1998-2008 period, the two variables fluctuated and had no clear pattern. During the financial crisis of 2008-2009, both variables decreased and had the same pattern. Then, both variables experienced an upsurge between 2009 and 2012; the positive growth in the two variables was driven by a boost in international crude oil prices. Subsequently, the CAB and FB were depressed again until 2016. Alternatively, investment flow is considered an advantage to the MENA region in different aspects. Investments can serve as a source of financing and contribute positively to creating job opportunities for a country while, investment had no clear correlation with the CAB of oil countries, as shown in Figure 2. During the period from 1990 to 1992, investments increased significantly in oil countries following the invasion of Iraq, leading to an accumulation of significant amounts of dollars in these countries. During the 2006-2008 period, oil courtiers witnessed a surge in investment flow in response to important monetary assistance by the major central banks of these countries, and it decreased sharply in 2009 as a result of the financial crisis. Then, investment flows began to increase starting in 2011 and further expanded over the period from 2013 to 2015 because of the sharply increase in oil prices and new investment and trade agreements with new partners.

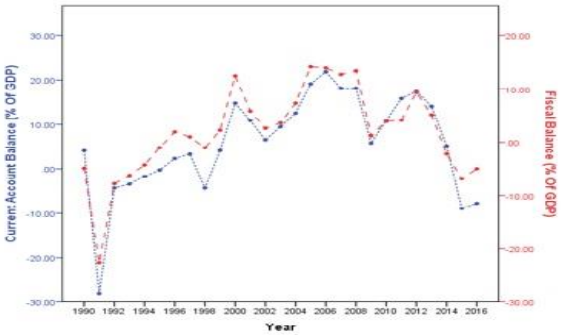

Figure 1 The Trend in CABs and FB in Oil Countries (% GDP)

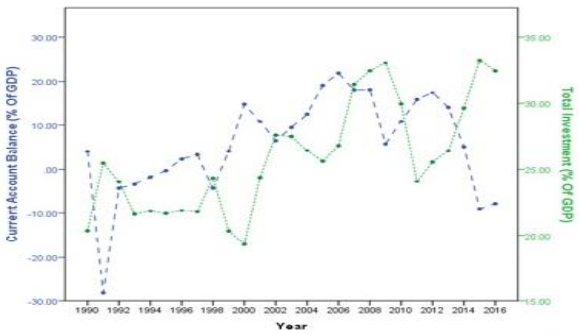

Figure 2 The trend in CABs and investment in oil countries (% GDP)

[4] Source: World Bank

[5] In late 1990, the Iraqi army overran and occupied Kuwait, which led to the imposing of economic sanctions on Iraq. Kuwait and Saudi Arabia paid approximately US$32 billion of the total cost, which was US$60 billion.

In contrast, as shown in Figure 3, the CAB and FB moved in opposite directions over most of the period, indicating that the two variables had no clear pattern in non-oil countries. These countries suffered from chronic deficits in their FB and CABs over the entire period. The CABs recorded a deficit of approximately 5.53% of GDP over the last three decades or so. As clearly shown in Figure 3, the two variables moved together in some periods, such as 1992-1993 and 2011-2016, indicating that they had a temporarily positive relationship. At the other extreme, in non-oil counterparts, investment had no clear association with the current account balance, as shown in Figure 4. Despite the reduction in investments over the period from 1990 to 1991, non-oil countries experienced an upswing in capital mobility over the period from 1992 to 1995, reflecting the financial reforms in 1990s, such as trade barrier removal. Then, investment flows began to decrease, starting in 1995 and further expanded over the period from 2002 to 2008. As the world economy collapsed into a financial crisis in 2008, the investments decreased during the crisis and fluctuated until 2016.

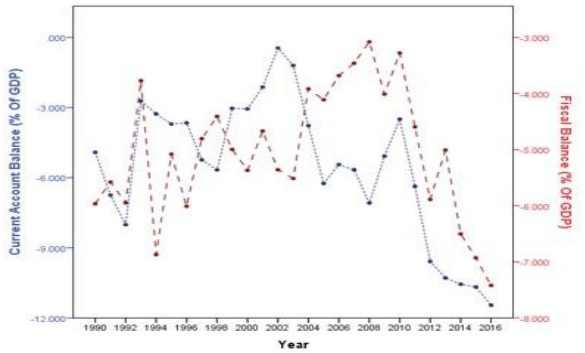

Figure 3 The trend in CABs and FB in non-oil countires (% GDP)

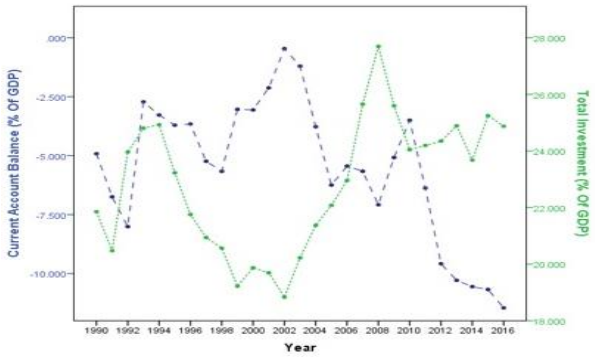

Figure 4 The trend in CABs and investement in non-oil countires (% GDP)

These stylized facts regarding the FB, investment, and CAB raise serious concerns about the heterogeneous manner in which fiscal deficits and investment affect CABs across the MENA region. Against this background, this study aims to address this issue. Therefore, understanding whether twin deficits exist for a country is significant for policymakers to establish effective policies. Overall, if the fiscal deficit and investment have real effects on the CAB, they could be highly important variables for demonstrating variations in the external sector of the MENA economies.

Many MENA countries undertook reforms in the institutional and financial sector and attained economic growth through the gradual removal of trade barriers, leading to strengthened trade partners. Hence, this study aims to investigate the dynamic impacts of fiscal balance and investment on current account balances across the MENA region. Data from only 20 MENA countries during the period from 1990 to 2016 are included because the data are bounded. This study contributes to the previous empirical literature in the following ways. First, the MENA region is selected because these countries are linked geographically, by language, and at the level of economic development. Conversely, they vary in the level of the influence of oil revenues on their fiscal balances. Consequently, the present study is novel because it augments a new aspect of the literature in terms of the sample and explicitly compares oil- and non-oil-producing countries in the MENA region. To the best of our knowledge, no prior attempts have been undertaken to investigate the

relationship between FBs and CABs with reference to the F-H hypothesis for the MENA region. The present study aims to address this issue by providing empirical evidence. The present study undertakes the first attempt in this direction to reveal the effect of heterogeneity across MENA countries. Second, unlike previous studies of the influence of budget deficits on current account deterioration (Samadi, 2006; Eldemerdash *et al*., 2014 and Belguith, 2016), the present study extends and improve the previous literature by examining a sample of 20 MENA countries and employs an advanced econometric model, namely a panel vector autoregressive (PVAR) approach under generalized method of moments (GMM) style estimators at the macro level. Compared with the earlier research, this paper improves the literature, especially in terms of dynamic methods. Third, in terms of the policy, this study could directly help fiscal policymakers in the MENA region by helping them to determine whether the fiscal policy (expansion) and investment adversely affect the CAB because the potential growth of the CBA in the future also depends on the effect of the FB on the CAB. This study evaluates the implications of the internal imbalance on the external balance in the MENA region. Finally, to ensure the robustness of the findings, we split the full sample for the MENA region into two different groups of countries (oil versus non-oil); the estimation results provide interesting insights and better reflect the dynamic effects of the FB and investment on CABs.

The study is structured in five sections. The second section reviews the related literature concerning the effect of fiscal deficits on CABs. The third section discusses the methodology used and the data description. The fourth section is devoted to discussing the empirical results. Finally, the last section lays out a summary of the findings and the conclusion.

LITERATURE REVIEW

The Theory of Twin Deficits

There are two main competing strands in the theoretical literature on the association between the twin deficits of internal and external balances. First, the Keynesian hypothesis proposes that the internal and external imbalances move together. Consequently, if a government's fiscal balance has a deficit, the government will borrow from different sources to finance the deficit. As is known, national savings include public and private savings, and if a country experiences a decline in national savings, then the interest rates can increase if public savings are growing at a negative rate. As pointed out by Dornbusch (1976), the relationship between CAB and FB is related to two factors: capital mobility level and interest rates. When capital mobility is perfect, international capital will move worldwide to take advantage of the higher interest rate (see Eldemerdash et al., 2014). Thus, capital inflows from foreign capital markets will increase over time, tending to cause an increase in the appreciation of the exchange rate. Due to a lack of perfect foresight, private savings will grow by a smaller rate compared to the national savings. Hence, the trade balance, which is considered the main variable in the current account balance, will continue to deteriorate. Notably, there is a closer link between twin deficits and the savings-investment balance. Consequently, the deficit of the trade balance will increase in a given country, particularly if the country relies on foreign capital to finance its fiscal deficit.

Second, the other strand of the literature against the Keynesian hypothesis is the Ricardian equivalence hypothesis (REH), which argues that the association between fiscal deficits and current account deficits does not exist. Furthermore, this hypothesis also claims that national savings are far away from fiscal deficit influences because they are usually a result of decreasing tax revenues, which decrease public savings. However, the fiscal deficit arises from a drop in public savings. The REH argues that tax reductions have no direct effects on CAB. If they have perfect foresight, consumers will rationally assume that a tax reduction will need to be paid in the future, and they will boost their savings to reduce the burden in the future. Therefore, private savings will grow by the same level at which national savings grow; thus, domestic savings will not be affected. If this phenomenon is absolutely true, then the fiscal deficit will have no influence on CABs.

Twin deficits show how a government can finance a fiscal deficit using internal and external sources. Consequently, the chronic budgetary deficit and current account fluctuation tend to motivate international capital to move around the world to take advantage of the higher interest rate, which will lead to a surge in the appreciation of the exchange rate. Due to a lack of perfect foresight, private savings will grow by a smaller amount than national savings. Hence, the trade balance, which is considered the primary variable in the

current account deficit, will deteriorate. According to Feldstein and Horioka (1980), F-H hereafter, the association between investment and savings depicts a country's level of integration with international financial markets. Thus, if the nation's capital markets are integrated, then national investment could be funded by foreign savings, indicating a weak association between investment and savings; otherwise, there will be a closer linkage between investment and savings. The twin deficits problem has followed a new horizon related to the degree of capital mobility, which is the nexus between domestic savings and investment and is known as the F-H hypothesis. Furthermore, the consequences of fiscal deficits on the current account deterioration with the inference of the F-H hypothesis were well documented by Fidrmuc (2003), who incorporated a model that includes both hypotheses, where the F-H hypothesis is concerned with capital mobility. These competing theories have been empirically examined for many developed and developing countries over the last decades. The following section includes some examples of these studies.

Review of the Empirical Literature

In both developed and developing countries, a number of macroeconomic studies have investigated the association between fiscal imbalance and current account deterioration. Theoretically, there is no general agreement on the impact of fiscal imbalance on the current account downturn. By and large, the theoretical literature is centered on two main views. First, many earlier studies, such as Abell, (1990), Andersen, (1990), Rosensweig and Tallman, (1993), and Vamvoukas, (1999), have emphasized the Keynesian view, also called the TDH. Conversely, many earlier studies, such as Evans, (1990), Dewald and Ulan, (1990), Haug, (1990), Enders and Lee, (1990), and Winner, (1993) supported the REH. Most previous studies focused on the causal association between fiscal deficits and current account deficits. These studies can be categorized into two main groups. First, the traditional Keynesian hypothesis claims that fiscal imbalance and current account deterioration are moving together, and fiscal deficits Granger cause current account deficits. This hypothesis is supported by Mohammadi (2004), who emphasized that a 1% increase in the surplus fiscal balance enhances the CAB by approximately 0.2% for the sample of developed countries and 0.3% for the sample of developing countries.

Moreover, Pattichis (2004) emphasized that the downturn in the current account balance arises from a fiscal deficit in Lebanon. Similarly, Saleh *et al*. (2005) investigated the twin deficits in Sri Lanka; they confirmed that the current account deficit and fiscal deficit move together. In the same vein, Parikh and Rao (2006) emphasized that fiscal deficit Granger causes the current account deficit in India. Similarly, Baharumshah and Lau (2009) noted that the fiscal deficit and current account deficit are positively correlated in Indonesia, South Korea, the Philippines, and Thailand. For 33 European countries, Forte and Magazzino (2013) pointed out that a permanent and robust fiscal deficit causes a trade deficit, where a 1% decrease in the fiscal balance (surplus/GDP) tends to worsen the current account balance by 0.37%. More recently, Ahmad and Aworinde (2015) confirmed that fiscal deficits drive the current account deficits for eight of twelve African countries, while the remaining four countries support the REH.

Second, the REH states that there are no real direct effects of fiscal deficits on the current account deficit. For instance, Kim (1995) pointed out that there is no association between the current account deficits and fiscal deficits in the U.S. Kiran (2011) emphasized the relationship between current account balances and fiscal balances consistent with the REH. Mohammadi and Moshrefi (2012) concluded that the REH is valid for South Korea, Malaysia, Singapore and Thailand. Moreover, Merza *et al.* (2012) confirmed that there is no association between fiscal deficits and current account deficits for Kuwait. Tosun *et al.* (2014) emphasized the REH for Latvia, Lithuania, Poland, Romania, Serbia and Slovenia. A study by Ogbonna (2014) concluded the existence of the REH for South Africa. For OECD countries, the main finding that Xie and Chen (2014) drew from their empirical analysis is that the REH exists in two of eleven OECD countries. However, in a major break with the existing macroeconomic literature, Cavallo (2005) suggested that the relationship between fiscal imbalance and the current account balance might be fairly tenuous and that the fiscal imbalance actually has a positive influence on the current account balance in the U.S. Likewise, Anas (2013) noted that current account deficits Granger cause fiscal deficits in Morocco. For Egypt, the situation is ambiguous. Nazier and Essam (2012) emphasized that fiscal deficits tend to improve the CABs.

Because current account deficits are strongly linked to savings balances and investment, few studies have analyzed the relationship between fiscal deficits and current account deficits by considering the role of investment in shaping the problem. The studies, concerned with twin deficits and the F-H hypothesis, have

reported varied results. For example, Fidrmuc (2003) investigated the existence of the TDH and the F-H hypothesis in OECD countries. He noted that fiscal deficits and current account deficits move together among several EU countries. Conversely, the F-H hypothesis is not valid in some EU countries. Similarly, Calderon *et al.* (2007) pointed out that expansion in government size has a real effect on the current account deficits in African countries.

One of the main findings and Bagnai (2006) drew from empirical analysis that FB, investment and CAB have a long-term linkage. Furthermore, the results showed that financial integration is increasing in most OECD countries. In contrast, Marinheiro (2008) indicated that there was no full REH in Egypt and confirmed that the F-H hypothesis is less significant. Similarly, Aristovnik and Djuric (2010) emphasized that there is a higher level of capital mobility, especially in new member states and candidate countries of the EU, and they rejected the TDH. Furthermore, Altintas and Taban (2011) and Lam (2012) noted both the TDH and the F-H hypothesis for Turkey and Vietnam, respectively.

Because we investigate the dynamic effects of the FBs and investment on the CABs for the MENA region, it is necessary to review previous studies of the MENA region. While the number of empirical studies of developed countries has increased, there have been few empirical attempts to examine the association between FBs and investment on CABs in the MENA region. For example, a study by Samadi (2006) analyzed the linkage between fiscal deficits and current account deficits in some MENA countries. The outcomes of the analysis supported the REH for Iran, Jordan, Kuwait, Morocco, Oman, and Tunisia. Conversely, the outcomes for Egypt, Bahrain, and Turkey supported the Keynesian hypothesis. In contrast to the findings of Samadi (2006), a study by Belguith (2016) investigated the association between fiscal deficits and current account deficits in eight MENA countries. The outcomes emphasized an inverse relationship between fiscal deficits and current account deficits for Kuwait and Egypt, whereas the results for Saudi Arabia supported the TDH. The findings also indicated that the other countries supported the REH. Furthermore, Eldemerdash *et al.* (2014) investigated the associations among fiscal deficits and current account deficits for developing countries in the Arab world (eleven countries). The findings revealed that the TDH is valid for oil countries but not for non-oil countries.

Moreover, Ozmen (2007) examined the validity of the F-H hypothesis for 10 countries in the MENA region. The author concluded that, when considering financial intermediation levels and exchange rate regimes, the F-H hypothesis is less puzzling in the MENA region. A study by Kaplan and Kalyoncu (2011) examined the degree of capital mobility for 12 MENA countries. The results confirmed that the capital mobility level is lower, implying that the F-H hypothesis is not valid. Considering the results of the above studies (Samadi, 2006; Eldemerdash *et al*., 2014; Belguith, 2016) for the MENA region, it appears that the results are contradictory, motivating us to implement a study from a different perspective to better understand the linkage among fiscal deficits and current account deficits in the MENA region. In this regard, this study aimed to investigate the association between these two variables and the inference of the F-H hypothesis to determine whether the twin deficit phenomenon occurs in the MENA region.

RESEARCH METHODOLOGY

Empirical Model

The starting point of our theoretical analysis is based on the Keynesian national income identity. To express the TDH in an equation, first, the macroeconomic balance should be defined for an open economy. The twin deficit concept indicates the related balance of fiscal deficits and current deficits, which are two of the most important macroeconomic growth indicators for an economy. The condition of the balance in macroeconomic terms is shown in Equation (1):

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

In Equation (1), national income (Y) is calculated as the sum of consumption (C), investment (I), government expenditures (G), and net exports$(X - M)$. Fidrmuc (2003) identified net exports using the current account as follows:

$$(X - M) = Y - C - G - I = S - I \tag{2}$$

According to Equation (2), the trade balance is calculated as the difference between national savings and investment. Arguably, the trade balance is strongly linked to savings and investment balances. Fidrmuc (2003) classified national savings as public and private. Therefore, the identity can be written as:

$$(X - M) = (Y - T - C) + (T - G) - I = S_g + S_p - I \quad (3)$$

Here, S_g denotes public savings and is defined as the difference in tax income (T) and public expenditures (G). Similarly, S_p denotes private savings and is calculated by subtracting private consumption expenditures (C) and taxes (T) from disposable income (Y). (X-M) is net exports, representing the current account, and (T-G) is a proxy for the FB. Finally, (S-I) is the savings-investment balance. Following Fidrmuc (2003) and Bagnai (2006), the regression model with the three variables that are expressed as a share of GDP can be written in a linear form:

$$CAB_{i,t} = \beta_1 + \beta_2 FB_{i,t} - \beta_3 INV_{i,t} + \mu_{i,t} \quad (4)$$

where $CAB_{i,t}$ is the current account balance, which denotes $(X - M)$ in Equation (3). $FB_{i,t}$ is the fiscal balance, which represents $(T - G)$. Finally, $INV_{i,t}$ is the gross investment, which depicts $(T - G) - I$. Furthermore, $\mu_{i,t}$ is the error term. It is anticipated that the effect of the fiscal balance is positive ($\beta_2 > 0$), where a negative coefficient of β_2 indicates that TDH is rejected. Alternatively, a negative sign is anticipated for investment ($\beta_3 < 0$) where a positive coefficient of β_3 indicates that the Feldstein-Horioka's hypothesis is not valid. This model has a good theoretical foundation and is inspired by many researchers (Bagnai, 2006; Marinheiro, 2008; Baharumshah, 2009; Aristovnik and Djuric, 2010; Altintas and Taban, 2011; Bagheri et al., 2012; Saeed and Khan, 2012; and Lam, 2012).

Moreover, this study splits the full sample of countries into two groups according to their characteristics (oil and non-oil countries) because oil-producing countries surpass the non-oil countries in terms of heavily exporting oil and gas to their global partners. Hence, oil countries are assumed to have a surplus in their fiscal balances and current account balances.

Data and Variable Description

In this paper, balanced panel data from 20 MENA countries from 1990 to 2016 are adopted to estimate Equation (4). According to the World Bank country classification, the following countries are classified as oil countries: Algeria, Bahrain, Egypt, Iran, Kuwait, Libya, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. In contrast, the non-oil countries are Comoros, Djibouti, Ethiopia, Jordan, Turkey, Lebanon, Morocco, Syria, Tunisia and Yemen. For each country, the CAB data include the annual growth in current account balance as a percentage of the GDP. The variable for FB is the annual growth in the fiscal balance as a percentage of GDP, and investment (INV) is the annual growth of gross investment as a percentage of GDP. All of the variables are obtained from World Economic Outlook (WEO) databases except the data for Syria over the 2010-2016 period, which were obtained from the central bank of Syria and the central bureau of statistics.

Methodology Selection

This study used the homogeneous panel VAR model proposed by Abrigo and Love (2015) using GMM-style estimators. The focal point of this present study is to investigate the dynamic effect of the fiscal balance and investment on the current account balance by considering how relevant the F-H hypothesis is in the MENA region. Furthermore, PVAR has numerous functional advantages that make it a more appropriate method to investigate dynamic macroeconomic relations. First, PVAR can investigate how the current account balances respond to the shocks of the fiscal deficit and investment and how long the shocks remain in the system. Second, in the PVAR, all of the explanatory variables are treated interdependently. In the standard VAR model, the dynamic effect of the variables in the system can be explained through Granger causality, impulse response function (IRF) and factor error variance decomposition (FEVD). However, in this study, the dynamic effect of the variables is captured through impulse response function (IRF) and forecast error variance decomposition (FEVD). According to Lutkepohl (1993), IRFs are significant for examining the relations among variables in a vector autoregressive framework because IRFs represent the responses of the variables to

shocks affecting the system. In contrast, FEVD reports the percentage disparity in one variable caused by other variables; this process splits the disparity and shows it in different steps ahead in time. Specifically, forecast error variance decomposition presents the relative contribution of each variable by calculating the forecast error variance of the targeted variable. Finally, PVAR has clear realistic significance as a feasible technique for investigating the influence of the fiscal balance and investment on current account balances in the MENA region countries and for establishing strategic recommendations.

The panel VAR specifications take the following reduced form equation as follows:

$$Y_{i,t} = A_1 Y_{i,t-1} + A_2 Y_{i,t-1} + \cdots + A_P Y_{i,t-p} + X_{i,t}\,\beta + \mu_i + e_{i,t} \tag{5}$$

where $Y_{i,t}$ is a (3×1) vector of dependent variables, $Y_{i,t} = (CAB_{i,t}, FB_{i,t}, INV_{i,t})$, $A_p = (A_1, 2, \ldots A_p)$ are parameter matrices, μ_i is the vector of country-specific effect, and $e_{i,t}$ is a $(n \times 1)$ vector of unobservable remainder error terms. $X_{i,t}$ is a $(1 \times l)$ vector of exogenous covariates (if present). The $(n \times l)$ β matrix includes the parameters to be estimated. In addition, we employ a panel VAR to estimate the impulse response functions (IRFs). This method was chosen because it has proved to be consistent, particularly when T is fixed, and N is large. We include the three variables in the specification as: $Y_{i,t} = (CAB_{i,t}, FB_{i,t}, INV_{i,t})$. According to Hamilton (1994) and Lutkepohl (2005), if all of the moduli of the matrix $\overline{\boldsymbol{A}}$ are less than one, it indicates that the panel VAR model is stable and invertible and has infinite order of the vector's moving average. Hence, the estimations of IRFs ϕ_i and FEVD are obtained. The $\overline{\boldsymbol{A}}$ matrix can be defined as the following:

$$\overline{\boldsymbol{A}} = \begin{bmatrix} A_1 & A_2 & \ldots & A_p & A_{P-1} \\ I_K & 0_K & \ldots & 0_K & 0_K \\ 0_k & I_K & \ldots & 0_k & 0_k \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ 0_k & 0_k & \ldots & I_K & 0_k \end{bmatrix} \tag{6}$$

Furthermore, rewriting the model as an infinite vector moving average, ϕ_i can be computed as:

$$\phi_i = \begin{cases} I_K & i = 0 \\ \sum_{j=1}^{i} \phi_{t-j}\, \boldsymbol{A_j} & i = 1,2, \ldots \end{cases} \tag{7}$$

Hence, since it is assumed that the $e_{i,t}$ are synchronized correlated, a shock on one variable is linked to the shocks on other variables. Adopting the recursive order assumptions, we impose the following recursive ordering of the variables, $Y_{i,t} = (CAB_{i,t}, FB_{i,t}, INV_{i,t})$. We assume that CAB responds to contemporaneous FB and INV shocks according to standard economic theory, which deploys orthogonalized shocks. Moreover, to compute the FEVD, it is assumed that the shocks are orthogonalized using the matrix P to separate each variable's contribution to the forecast error variance. The orthogonalized shocks $e_{it} P^{-1}$have a covariance matrix I_k, which allows for a direct decomposition of the forecast error variance. Hence, the h-step ahead forecast error can be written as:

$$Y_{it+h} - E[Y_{it+h}] = \sum_{i=0}^{h-1} e_{i(t=h-i)}\, \Phi i \tag{8}$$

where Y_{it+h} denotes the specific vector at time $t + h$, and $E[Y_{it+h}]$ is the h-step ahead predicted vector made at time t.

Panel Cointegration Test

The existence of a long-term equilibrium association between variables is contingent on whether the null hypothesis of no cointegration in the test will be rejected or not. To test the effects of FB and INV on CAB in the MENA region, this study uses Westerlund and Edgerton (2008) panel cointegration test based on the error correction model to examine the cointegrated associations among variables. The test allowed for heteroskedastic and serially correlated errors, cross-sectional dependence and structural breaks in both the intercept and slope. The Westerlund and Edgerton (2008) panel cointegration test is expressed as:

$$\Delta y_{it} = \grave{\emptyset}_i d_t + \alpha_i y_{it-1} + \grave{\varphi} x_{it-1} + \sum_{j=1}^{p} \alpha_{ij}\, \Delta y_{it-j} + \sum_{j=0}^{p} \theta_{ij} \Delta x_{it-j} + \varepsilon_{it} \quad (9)$$

The term $\grave{\emptyset}_i d_t$, where $\emptyset_i = (\emptyset_{0i},\ \emptyset_{1i})'$, $d_t = (1, t)'$, indexes the individual specific term and the trend term. p_i is the lag ḃrder, and φ_i is the M-dimensional vector of coefficients of independent variables. α_i is called the error correction parameter; indicating the presence of long-term cointegration association between variables. The Westerlund panel cointegration test includes four statistics, namely P_t,P_a, , G_t and G_a. The null hypothesis for the first two (P_t and P_a) is H_0: $\alpha_i = 0$ for all i, and the corresponding alternative hypothesis is H_1: $\alpha_i = \alpha < 0$ for all i. $P_t$and P_a show that the entire panel is cointegrated if the null hypothesis is rejected. The alternative hypothesis for the last two (G_t and G_a) is the difference from the first two statistics, indicating that H_1: $\alpha_i < 0$ for at least one i. G_t and G_a show that the equilibrium association between variables is confirmed for at least one cross-section if the null hypothesis is rejected.

EMPIRICAL RESULTS

As shown in Table 1, the descriptive statistics for each variable employed in this model are quite free from any extreme values, which could affect the significance of the estimated results by examining the mean, standard deviation, minimum, and maximum of each variable for the entire sample. Because this paper uses panel analysis, it is essential to check the cross-sectional dependence among MENA countries. This study utilizes two tests to address the problem of cross-sectional dependence. First, Breusch and Pagan (1980) the test was used to estimate whether the time series in the panel are cross-sectionally independent. Second, we implement the test proposed by Pesaran (2006), which is commonly used in panel studies. Table 2 shows the findings of the tests based on these associations. The results show that all of the variables are highly dependent on the MENA region and both groups (oil and non-oil) of countries.

Table 1 Descriptive and Summary Statistics for 20 MENA Countries, 1990-2016

Variables	Unit of Measurement	Mean	Std. Dev.	Minimum	Maximum
CAB	% of GDP	-.0375	17.17709	-242.188	51.112
FB	% of GDP	-1.588441	12.95084	-151.309	43.303
INV	% of GDP	24.27993	8.283965	6.917	51.788

Table 2 Cross-Sectional Dependency Test for 20 MENA Countries, 1990-2016

	MENA Region		Non-oil Countries		Oil Countries	
Variables	Pesaran's CD Test	Breush-Pagan (LM) Test	Pesaran's CD Test	Breush-Pagan (LM) Test	Pesaran's CD Test	Breush-Pagan (LM) Test
CAB_{it}	8.47* (0.000)	783.31* (0.000)	1.59 (0.110)	191.88* (0.000)	13.29* (0.000)	317.04* (0.000)
FB_{it}	7.38* (0.000)	620.06* (0.000)	-0.78 (0.435)	119.11* (0.000)	12.11* (0.000)	274.22* (0.000)
INV_{it}	6.85* (0.000)	778.21* (0.000)	1.00 (0.32)	210.34* (0.000)	9.56* (0.000)	172.43* (0.000)

Note: 1) * represent significance at 10 % level. 2) p-values appear in parentheses.

The cross-sectional dependence (CD) will result in size distortion and render the first-generation panel unit root tests inefficient. The second-generation panel unit root tests do not hold the assumption of cross-sectional independence and will be more reliable if cross-sectional dependence is detected. This paper uses the cross-sectional augmented Im, Pesaran and Smith (CIPS) test to test the statistics of the second-generation panel unit root test. Table 3 reports the results of the second-generation panel unit root test for all three variables. Testing statistics both with the constant only and with the constant and trend term accepts the null hypothesis of a unit root for variables in level and rejects the null hypothesis for variables in first difference. To conduct the panel cointegration test, the lag length should be specified. This paper relies on Hannan-Quin (HQ) to choose the optimal lag length of two[6]. After specifying the order of stationarity for the three variables, we perform Westerlund and Edgerton's (2008) error-correction-based tests to test the long-term relationship among FB, INV, and CAB. The principal advantage of using this procedure is that we can examine the comovement of the variables without any concerns about endogeneity.

[6] The results of the lag length test are not reported to conserve space. However, the results are reported in Table A2 of the Appendix.

The outcomes of the second-generation panel cointegration test are shown in Table A1 of the Appendix. For the MENA region, when held constant, three of four statistics accept the alternative hypothesis of cointegration, but when held constant and considering the trend, only one of four statistics accepts the alternative hypothesis. In the non-oil countries, when held constant, three of four statistics accept the alternative hypothesis of cointegration, but when held constant and considering the trend, only one of four statistics accepts the alternative hypothesis. Conversely, for the oil countries, when the variables are held constant and the trend is considered, two of four statistics accept the alternative hypothesis of cointegration. Overall, the results indicate that there are long-term linkages among FB, INV, and CAB when they are held constant and when a trend is considered in the MENA region for both the non-oil and oil countries.

Table 3 Second-generation Panel Unit Root Test

	MENA Countries		Oil Countries		Non-oil Countries	
Variables	Constant	Constant and Trend	Constant	Constant and Trend	Constant	Constant and Trend
$\mathbf{CAB_{i,t}}$	-2.274	-2.718	-2.341	-3.012	-2.531	-2.766
$\mathbf{\Delta\ CAB_{i,t}}$	-5.283***	-5.336***	-5.530***	-5.606**	-5.270***	-5.283**
$\mathbf{FB_{i,t}}$	-2.032	-2.674	-2.508	-3.172	-2.554	-3.036
$\mathbf{\Delta\ FB_{i,t}}$	-5.649***	-5.785**	-5.822***	-5.983***	-5.273***	-5.463***
$\mathbf{INV_{i,t}}$	-2.216	-2.698	-2.489	-2.515	-2.397	-2.688
$\mathbf{\Delta\ INV_{i,t}}$	-5.205***	-5.334**	-4.907***	-4.838***	-5.150***	-5.543**

Note: 1) Automatic lag length selection is based on HQIC. 2) ***, and ** represent significance at 1% and 5% , respectively.

Estimating the Panel VAR

For the MENA region, most of the signs of the coefficients are in line with the theoretical expectations. As shown in Table 4, the coefficient for an FB (surplus/deficit) shock to the CAB (surplus/deficit) reaction function enters positively. However, unexpectedly, INV (negative/positive) has a negative sign, indicating that it has a negative relationship with CAB. Similarly, for oil countries, the coefficient for an FB (surplus/deficit) shock to the CAB (surplus/deficit) reaction function is positive, and the coefficient for the effect of INV (negative/positive) on CAB is negative. For the non-oil countries, when there is a shock in the FB, the CAB deteriorates, while INV does not have a real effect on CAB. However, as mentioned earlier, the aim of the panel VAR analysis is not the parameter estimations but determining the dynamic responses of the variables because the estimated coefficient has restricted significance, so the inference should be based on the dynamic interactions of the variables. Therefore, the dynamic responses are captured through IRF and are presented in the following section.

Table 4 Panel Vector Autoregression (VAR) under GMM Estimation

MENA Region (Full Sample)			**Oil-producing Countries**			**Non-oil-producing Countries**		
CAB	FB	INV	CAB	FB	INV	CAB	FB	INV
	0.479**	1.098**		0.636***	1.080**		0.606**	0.027

Note: ***, and ** represent significance at 1% and 5% , respectively.

IRFs of Fiscal Balance and Investment with Current Account Shocks

The IRFs explain the response of the endogenous variables to a shock and describe the evaluation of the variable of interest for a specific time horizon after a shock has occurred in a given period. It is an essential tool that policymakers and economists can use to conduct effective analyses. The following figures show the impulse response of CAB to FB and investment shock of the full sample of MENA, the oil countries and the non-oil countries[7]. Figure 5 clearly shows that CAB responds immediately to the shock of FB, estimates of which statistically confirm TDH for MENA countries in the mid-term and gradually dissipate. A 1% upsurge in fiscal balance (deficit) as a percentage of GDP tends to dampen the CAB as a percentage of GDP by 0.49%; this result is in line with Mohammadi (2004).

[7] To implement the robustness check, the model is tested with different lag lengths, and the findings confirm that IRFs generated with lag lengths of 2 are stable.

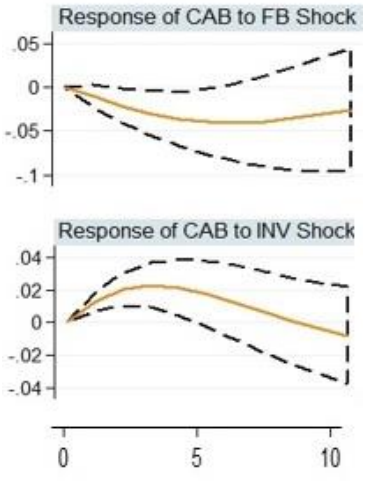

Figure 5 IRFs for the MENA Region

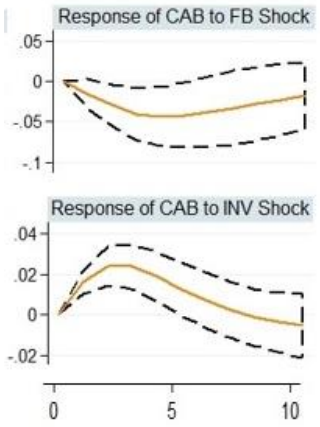

Figure 6 IRFs for Oil Countries

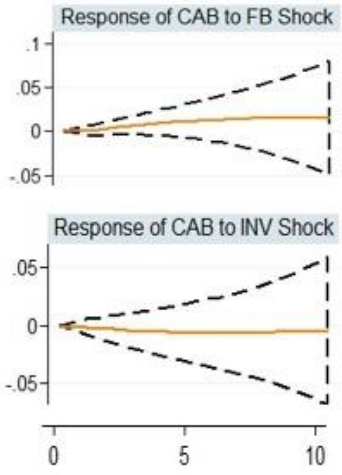

Figure 7 IRFs for Non-oil Countries

In contrast, the response of CAB to investment shock is positive but becomes negative in the subsequent period. An upsurge of 1% in investment as a share of GDP will improve CAB as a percentage of the GDP by 0.21% in the MENA region in the mid-term and gradually dissipate. Therefore, capital inflows from foreign capital markets have a crowding-in effect due to rising interest rates, which will ultimately lead to a rise in the appreciation of the exchange rate. If citizens had perfect foresight, private savings would grow at a lower rate than national savings. Consequently, the deterioration in the trade balance would decrease,

which is considered the main variable in the current account deficit variability. Thus, the MENA region as a whole does not depend on foreign capital to fund domestic investment. This result is inconsistent with the outcomes reported by Khedhiri and Hebiri (2005). Arguably, we can conclude that the F-H hypothesis is not valid for the MENA region.

The next figures illustrate the comparison between oil and non-oil countries. For oil countries, the estimates statistically confirm the TDH in the mid-term and gradually dissipate, as shown in Figure 6. Moreover, the initial impact of FB shock accounts for 0.47% of the deterioration in the CAB. This finding agrees with Eldemerdash *et al*. (2014) and Morsy (2009), who emphasized that a 1% upsurge in the government FB tends toward an approximately 0.50% surge in the CAB deficit as a share of GDP for oil-exporting countries. It is plausible that oil countries suffer from TDH because these countries did not consider the implications of the CAB for short- and medium-term fiscal deficits, while a 1% upsurge in investment as a share of the GDP will improve CAB as a share of GDP by 0.23% in the mid-term and gradually dissipate. This result implies that oil countries did not depend on international capital markets to finance their national investment.

As shown in Figure 7, the estimates statistically show that THD does not exist for the non-oil countries, supporting the REH. Furthermore, a 1% increase in government FB deficit (surplus) as a percentage of GDP will expand CAB as a share of GDP by 0.03% in the short term and gradually dissipate. This result agrees with the findings of Eldemerdash *et al*. (2014) for non-oil Arab countries. In contrast to oil countries, there is no real influence of investment on current account deficits in non-oil countries. This result implies that, when investment surges, the response of the CAB is not different from zero. Furthermore, this finding shows that non-oil countries are well integrated into international capital markets.

Arguably, we emphasize that the F-H hypothesis is not valid for non-oil countries. Overall, the response of the CAB to FB shocks is consistent with the TDH, in which any fluctuations in the FB have a real direct effect on the CAB. Moreover, a negative fiscal deficit shock worsens the CAB in the full sample of the MENA region as a whole and oil countries only.

Additionally, the results provided in Table 5 indicate that the estimated panel VAR model with a lag length of 2 fulfills the stability condition in which all of the moduli are strictly less than one. Furthermore, the stability condition suggests that the estimated panel VAR is invertible and has an infinite-order vector moving-average representation, providing an acknowledged explanation of estimated IRFs and FEVD. Thus, this study concludes that the eigenvalues of the system lie within the unit circle, indicating that the VAR system is stable and subsequently produces a stable estimated impulse response function.

Table 5 Stability of the Panel VAR Model

MENA Region	Modulus	0.895	0.895	0.711	0.204	0.160	0.123
		0.872	0.872	0.711	-	0.106	-
	Modulus				0.204		0.123
Oil		0.873	0.873	0.490	0.490	0.289	0.090
Countries	Modulus	0.860	0.860	0.410	0.410	-	-
						0.289	0.090
Non-oil		0.945	0.945	0.832	0.235	0.122	0.122
Countries		0.937	0.937	0.832	0.235	-	-
						0.025	0.025

Note: All roots lie inside the unit circle.

Forecast Error Variance Decomposition (FEVD)

The main function of FEVD is to report the percentage disparity in one variable caused by other variables; this process splits the disparity and shows it at different steps ahead in time. Specifically, FEVD presents the relative contribution of each variable by calculating the FEV of the targeted variable in the system. Table 6 provides the FEVD of the CABs and their related variables, i.e., FB and INV[8].

[8] To conserve space, we report only the FEVD of the CAB.

Table 6 FEVD of CAB

MENA Region				Oil Countries			Non-oil Countries		
Steps	FB	INV	CAB	FB	INV	CAB	FB	INV	CAB
0	0	0	0	0	0	0	0	0	0
1	0.572	0.490	0.378	0.666	0.001	0.329	0.148	0.120	0.730
2	0.566	0.199	0.233	0.693	0.104	0.202	0.294	0.095	0.609
3	0.517	0.307	0.174	0.714	0.130	0.155	0.305	0.092	0.601
4	0.452	0.382	0.165	0.713	0.139	0.146	0.296	0.102	0.600
5	0.393	0.428	0.178	0.705	0.141	0.164	0.281	0.118	0.599
6	0.374	0.453	0.198	0.693	0.141	0.164	0.266	0.135	0.598
7	0.317	0.464	0.217	0.681	0.142	0.175	0.252	0.152	0.595
8	0.300	0.466	0.232	0.670	0.143	0.185	0.240	0.167	0.591
9	0.294	0.463	0.241	0.662	0.144	0.193	0.232	0.180	0.586
10	0.296	0.457	0.246	0.655	0.144	0.200	0.227	0.190	0.581

For the MENA region, it is quite clear that FB explains approximately 57% of the disparity in the CAB in the first period, and this figure gradually decreases to 29% in the last period. However, the contribution of INV explains approximately 49% of the disparity in the same period; INV is considered to be a significant variable in demonstrating the disparity in current account deficits in the MENA region. Another interesting finding is that FB is an important variable for explaining the fluctuations in CAB in the oil countries; FB explains approximately 66% of the current account fluctuations in the first period, and this figure decreases to 65% in the last period. Therefore, FB shocks demonstrate a large part of the fluctuations in the CBA for all horizons in the oil countries. INV is found to be the second most important variable in explaining the fluctuation in CAB in the oil countries; INV explains approximately 1% of these fluctuations in the first period, and this figure gradually increases to 14% in the last period. It is worth noting that, in the non-oil countries, the FB shocks demonstrate a small proportion of the current account fluctuations compared to that for the oil countries. The FB shocks demonstrate less than 15% of the current account fluctuations in the first period, and this figure gradually increases to 22% in the last period. However, for the non-oil countries, the contribution of INV to the fluctuation in the CAB is relatively higher than that for the oil countries. The contribution of INV accounts for approximately 12% of the fluctuations in the CAB in the first period and reaches 19% in the last period. Overall, the findings from the FEVD indicate that the FB exerts an essential influence on the fluctuations in the CAB in both oil and non-oil countries in the MENA region. This finding is in line with that obtained from the IRFs.

Robustness Checks

To evaluate the robustness of the findings, this study conducted two different robustness checks, including dividing the full sample into two groups (oil and non-oil) of countries, and it is anticipated that the estimation findings will deliver interesting insights and more precise results regarding the associations among current account deficits, fiscal deficits and investment because the oil-producing countries surpass the non-oil producing countries by the effect of oil revenues on their fiscal balances. Furthermore, this study adds additional CAB explanatory variables, such as the real effective exchange rate (REER), in which appreciation of the REER increases the demand for foreign imported goods. The appreciation of the REER tends to increase the desire for consumption, finally leading to a decrease in savings. Hence, an appreciation in REER is anticipated to have an adverse influence on the CAB. The REER index is the consumer price index (CPI)-deflated real effective exchange rate collected from the World Bank. The second variable included is a dummy variable that captures the crisis period of 2008, which equals one if the year is 2008 and zero otherwise. Figure 8 depicts the response of CAB to the shock of the financial crisis and REER. The CAB responds negatively to the crisis, but the negative response is not significant and bottoms out in the long term.

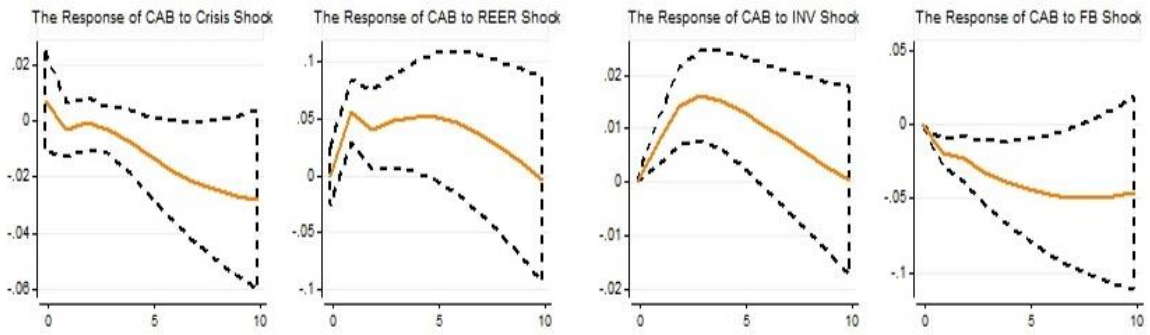

Figure 8 IRFs for the Entire Sample of the MENA Region

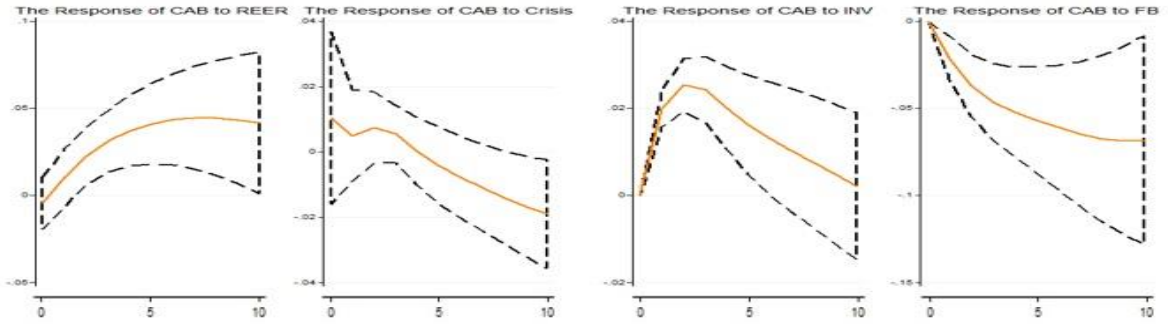

Figure 9 IRFs for the Entire Sample of the Oil Countries

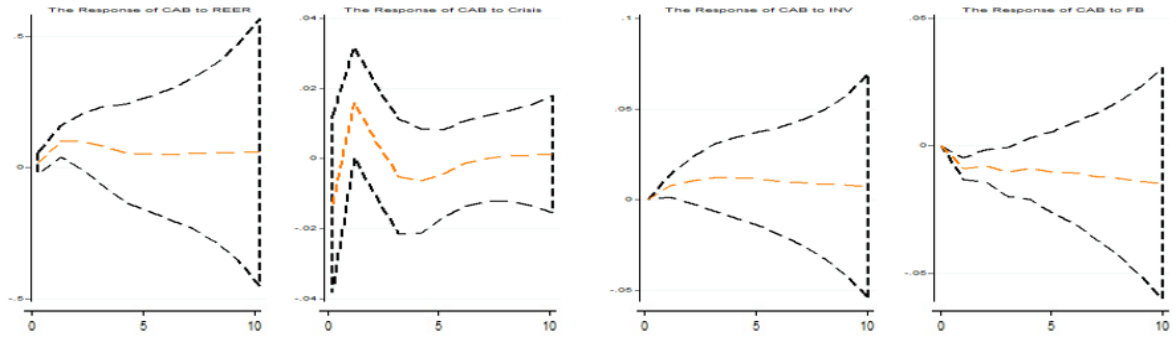

Figure 10 IRFs for the Entire Sample of the Non-oil Countries

Moreover, the positive response of the CAB to the shock of REER in the short term is decreased over time in the mid and long terms, indicating that REER and the financial crisis in 2008 have no real consequences for the CAB for the entire sample of the MENA region. Conversely, Figures 9 and 10 show the response of CAB to FB, INV, REER and the crisis for oil and non-oil countries. Therefore, based on the above robustness check results of IRFs, this study confirms that the qualitative findings are robust. As shown in Table 7, the proportion of the forecast error in CAB is largely explained by FB in the first period with 61%, implying that the FB is an important variable for the CAB fluctuation. The investment contribution is 37% in the same period, while the contributions of the crisis and REER are zero. In the mid-term, the contribution of REER is relatively lower than FB and INV, which account for only 13%. It is worth noting that the REER and financial crisis in 2008 (Crisis) explain a small proportion of the current account fluctuations compared to FB and investment (INV).

Table 7 FEVD of CAB after Adding Explanatory Variables for the Entire Sample of MENA

MENA Region				
Steps	FB	INV	REER	Crisis
	0	0	0	0
0	0.619	0.370	0	0
1	0.607	0.193	0.029	0
2	0.557	0.259	0.067	0.002
3	0.495	0.297	0.106	0.003
4	0.435	0.327	0.139	0.004
5	0.381	0.354	0.165	0.005
6	0.334	0.381	0.183	0.005
7	0.294	0.405	0.197	0.006
8	0.262	0.425	0.205	0.006
9	0.238	0.442	0.211	0.007
10				

SUMMARY AND CONCLUSION

This study investigates the dynamic effects of FB and INV on CAB in the MENA region by employing the recently proposed panel VAR approach using GMM-style estimators developed by Abrigo and Love (2015). The results of the study can be summarized in three points. First, we found that the entire MENA region suffers from THD in the mid-term but that this phenomenon gradually dissipates over time, indicating that fiscal deficits place a high level of strain on CAB. Second, the results showed the absence of any significant negative influence of the F-H hypothesis on CABs in the MENA region. Third, the outcomes of IRFs for oil and non-oil countries confirmed that the response of CAB to FB shock is positive, implying that the TDH is valid for oil countries only. Additionally, the response of CAB to INV is positive, indicating that the F-H hypothesis is not valid for either oil or non-oil countries. FEVD analysis showed that FB is a potent variable explaining the CAB variation, while INV slightly describes the variation in CAB in the MENA region. In summary, this analysis shows that, on average, across the full sample of MENA countries, FB, investment, and CAB have long-term correlations, indicating that potential CAB growth in the future basically depends on the effect of FB on CAB.

Enhancing current account balances by controlling the fiscal deficit is one of the most important challenges for MENA countries. Understanding well the twin deficit phenomena tends to establish new policies and strategies. From a policy perspective, the existence of the TDH has important policy prescriptions. Therefore, policymakers should concentrate their efforts on the twin deficit phenomenon by managing the fiscal deficit to enhance the current account balance. One reason for this approach is to establish an effective policy to minimize the gap in the fiscal balance by fiscal consolidation and reducing spending on unproductive projects because current account balance downturns can deter economic growth. Second, the term of trade promotion growth is another choice for policymakers to curb the consequences of the deterioration of the current account balance on economic growth, particularly in non-oil countries, because oil countries surpass non-oil countries in terms of heavily exporting oil and gas to global partners. From a macroeconomic view, the MENA region must use timely austerity measures to control the undesired influences of fiscal imbalances and current account deficits on the MENA economies.

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APPENDICES

Table A1 Panel Heterogeneous Cointegration Test Results, 1990-2016.

Test Type		Constant		With Trend		Constant		With Trend		Constant		With Trend	
		Dependent Variable: $CAB_{i,t}$											
		MENA Region				Non-oil Countries				Oil Countries			
		Statistic Value	*p*-value	Value	*p*-value	Value	*p*-value	Value	*p*-value	Value	*p*-value	Value	*p*-value
Westerlund	G_t	-2.41**	0.033	-2.68	0.214	-2.50***	0.054	-2.35	0.751	-2.32	0.160	-3.01**	0.036
	G_a	-6.84	0.949	-8.37	0.999	-7.42	0.805	-7.54	0.966	-6.26	0.926	-9.19	0.972
	P_t	-16.15*	0.000	-17.56*	0.000	-11.19*	0.000	-3.84*	0.000	-11.6*	0.000	-14.03*	0.000
	P_α	-9.25*	0.003	-10.65	0.457	-8.50***	0.068	-8.53	0.820	-9.83**	0.012	-12.86	0.134

Note: 1. Automatic lag length selection is based on HQIC. 2. *** p<0.01; ** p<0.05; * p<0.1. 3. Intercept and trend are included.

Table A2 Optimal Lag Length

Akaike Info Criterion	**Final Prediction Error**	**Hannan-Quinn Criterion**	**Schwarz Criterion**
4	4	2	1

Note: Endogenous variables include CAB, FB and INV. Deterministic variable: Constant and searched up to 8 lags.