# THE NEXUS BETWEEN INTERNAL AND EXTERNAL MACROECONOMIC IMBALANCES: EVIDENCE FROM EGYPT

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Working Paper No. 181
July 2015

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The authors would like to thank Soheir Abuleinein, Rania Al-Mashat and Hoda Selim for insightful and constructive comments. Thanks are also due to Aliaa Abdallah and Nadine Abdel Raouf (ECES Research Analysts) for competent research assistance.

**Abstract**

This paper examines the nexus between internal and external imbalances of the Egyptian economy by testing both the twin deficit hypothesis and the Feldstein-Horioka paradox. Using quarterly data (between 2002 and 2014) in order to capture the short term dynamics that might affect the Egyptian economy, a Granger causality test and an error-correction model are run in order to determine both the short term adjustment and the long run relationship between internal and external imbalances. Our main findings show that the twin deficit hypothesis is rejected and a reversed causality running from the current account to the budget deficit exists. This is chiefly attributed to the fact that Egypt relies more on domestic sources to finance its deficit rather than external sources. Moreover, the Feldstein-Horioka puzzle is partially rejected since Egypt, while not being perfectly integrated in the world capital market, has a high degree of capital mobility. Yet, it is still characterized by several restrictions that reduce capital mobility.

**ملخص**

تناقش هذه الدراسة العلاقة بين الاختلالات الداخلية والخارجية في الاقتصاد المصري، وذلك من خلال اختبار فرضية العجز المزدوج ومفارقة فيلدشتاين-هوريكا (Feldstein-Horioka). وباستخدام بيانات ربع سنوية للفترة بين ٢٠٠٢ و٢٠١٤ لرصد الديناميكيات قصيرة الأجل التي قد تؤثر على الاقتصاد المصري، تم إجراء اختبار جرانجر للسببية ونموذج تصحيح الخطأ وذلك لتحديد التعديل قصير الأجل والعلاقة طويلة الأجل بين الاختلالات الداخلية والخارجية. وتخلص النتائج الرئيسية للدراسة إلى رفض فرضية العجز المزدوج ووجود علاقة سببية معكوسة تتجه من الحساب الجاري إلى عجز الموازنة. ويرجع ذلك أساسا إلى تمويل العجز المالي في مصر بالاعتماد على المصادر المحلية أكثر من المصادر الخارجية. كما تم رفض مفارقة فيلدشتاين-هوريكا جزئيا نظرا لارتفاع درجة حرية حركة رأس المال في مصر رغم عدم اندماجها بصورة كاملة في سوق رأس المال العالمي ووجود بعض القيود التي تحد من حركة رأس المال.

**Keywords:** Egypt, twin deficits, budget deficit, current account deficit, Feldstein-Horioka puzzle, capital mobility.

**JEL classification:** E62, F21, F32, H6.

## 1. Introduction

Egypt's macroeconomic imbalances have increased in the wake of the 25th of January revolution 2011 at both the internal and the external levels. The country's current account showed a deterioration from a surplus of 4.3 percent of GDP in 2003/2004 to a deficit starting 2008/2009 with the financial crisis to reach 2.4 percent of GDP in 2012/2013. Furthermore, the budget deficit climbed to reach 13.7 percent in 2012/2013 up from 9.8 percent in 2010/2011.

Thus, this paper investigates whether Egypt's budget deficit has had any impact on the current account imbalances, examining the validity of the twin deficit hypothesis for Egypt. Moreover, since the twin deficit hypothesis is concerned with the source of financing the external deficit, we should test the relationship between the Feldstein-Horioka puzzle and the twin deficit hypothesis. According to Feldstein and Horioka (1980), in a world of perfect capital mobility, domestic investment must not be constrained by the amount of domestic saving, given that external financing is likely to satisfy domestic investment needs thanks to the availability of funds in the international fully integrated capital market. Consequently, if savings and investments are not highly correlated, the budget deficit and the current account deficit are expected to vary in the same direction, supporting the twin deficit hypothesis. Conversely, when savings and investments are strongly correlated, indicating a low level of international capital mobility, domestic investment is mainly financed from domestic saving and the budget deficit and the current account are expected to vary in different directions. The variation of the budget deficit and the current account deficit in different directions is labeled as the Feldstein-Horioka puzzle and does not support the twin deficit hypothesis.

The literature on this topic, while being abundant at the international level, is rather scant in Egypt. Indeed, for Egypt three main papers could be cited. Marinheiro (2006), using annual data between 1974 and 2002, showed that there is a weak long-run relationship between the budget deficit and the current account deficit. Yet, the twin-deficit hypothesis is rejected since a reverse Granger-causality running from the external deficit to the budget deficit was found. Moreover, it was shown that Egypt has a high degree of capital mobility, thus rejecting the Feldstein-Horioka paradox. *Second,* Nazier and Essam (2012), applying a structural vector auto-regressive model (SVAR) and using annual data between 1992 and 2010, found twin divergence instead of twin deficits, that is, when fiscal accounts worsen, the current account improves and exchange rate depreciates. They showed that the reason behind this result might be attributed to two main things: an investment crowding-out effect and sticky prices. *Third,* El-Baz (2014) tested the validity of the twin deficit hypothesis in Egypt, using annual time series data for the period 1990-2012. A "twin divergence" was found to exist between the two

deficits in the short run. Also the vector error correction model (VECM) proved the existence of a negative long run equilibrium relationship between both current account and government budget balances.

We build on these three studies in four ways. *First,* we use quarterly data in order to capture the short term dynamics that might affect the Egyptian economy. *Second,* we use a more updated dataset in order to examine the simultaneous impact of the financial crisis in 2008 and Egyptian revolution in 2011. *Third,* we run an error-correction model in order to determine both the short term adjustment and the long run relationship between internal and external imbalances. *Finally,* in the same line as Marinheiro (2006), we examine both the twin deficit puzzle and the Feldstein-Horioka puzzle. Our main findings show that the twin deficit hypothesis is rejected and a reversed causality that runs from the current account to the budget deficit emerges. Moreover, the Feldstein-Horioka puzzle is partially rejected since Egypt, while not being perfectly integrated in the world capital market, has a high degree of capital mobility.

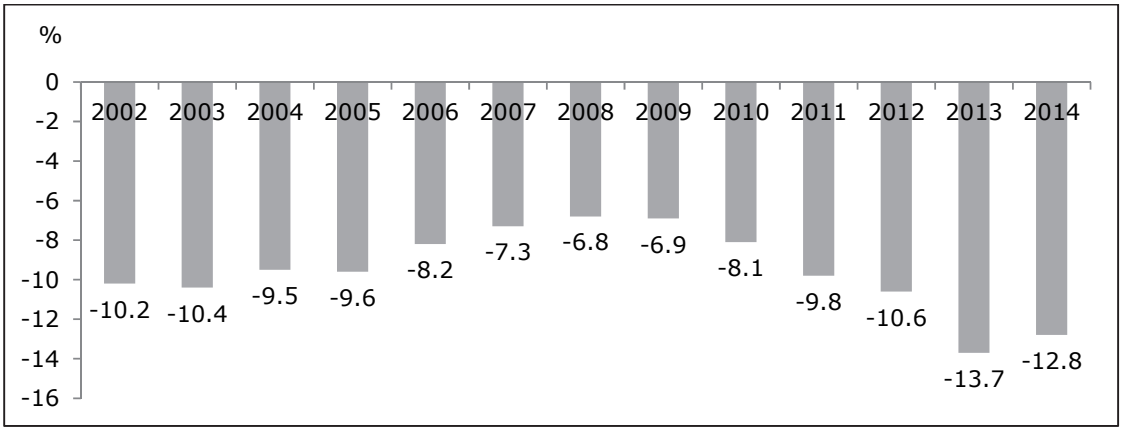
The structure of the paper is as follows. Section 2 highlights some stylized facts about the budget deficit and the current account in Egypt over the period 2002-2014. Section 3 provides a brief discussion of what the theory has to say about the relationship between the budget deficit and the current account deficit, then turns to the empirical evidence that explains the variations in the current account as a consequence of variations in the stance of fiscal policy. Section 4 outlines the methodology and data used in the econometric analysis to test for the validity of the twin deficit hypothesis and the Feldstein and Horioka puzzle, presents the empirical results for Egypt and tracks the possible explanations for our findings. Section 5 provides concluding remarks and some policy implications.

## 2. Stylized Facts: The Budget Deficit and the Current Account Deficit in Egypt

This section highlights some stylized facts about the budget deficit and the current account deficit in Egypt over the period 2002-2014.

Currently, Egypt is experiencing deficits in both the government budget and the current account balance. Over the period 2002-2014, Egypt's budget deficit has been always negative (Figure 1).

**Figure 1. Budget Deficit in Egypt (2002-2014, % of GDP)**




*Source:* Ministry of Finance*, The Financial Monthly Bulletin,* various issues*.*

The already double-digit budget deficit deteriorated to 13.7 percent of GDP in 2012/2013 (EGP 239 billion), with a mean value of 9.53 percent over the analyzed period (Table 1). Indeed, in the wake of the revolution, the widening budget deficit was attributed to two main factors. First, the significant increase in wages and salaries, which reached EGP 143 billion due to widespread societal-group demands (5232 protests in 2013). Second, the increase in subsidies and social benefits by 31 percent between 2011/2012 and 2012/2013, the rise in interest payments by 41 percent over the same period due to a higher domestic debt that reached 82.4 percent of GDP in 2012/2013.

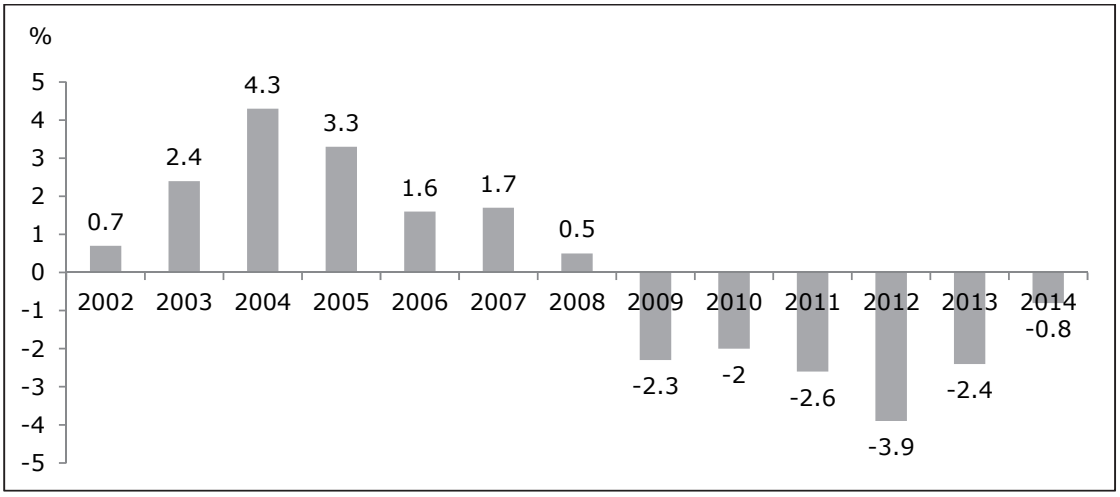
**Table 1. Descriptive Statistics of the Budget Deficit in Egypt (2002-2014, % of GDP)**

| Minimum | Maximum | Mean | Standard Deviation |
|---|---|---|---|
| 6.80 | 13.7 | 9.53 | 2.03 |

*Source*: Authors' calculations based on data from the Egyptian Ministry of Finance.

Egypt's current account shows a deterioration from a surplus of 4.3 percent of GDP in 2003/2004 to a deficit of 2.4 percent of GDP in 2012/2013 (Figure 2). Despite the increased trade deficit, the current account was in equilibrium or surplus before the financial crisis due to strong surpluses in the services and transfers accounts. Following the revolution, net services receipts declined due to a decline in tourism receipts. Since the trade deficit was greater than the surplus generated by services and transfers, the current account registered a deficit of 3.9 percent of GDP in 2011/2012.

**Figure 2. Current Account Balance in Egypt (2002-2014, % of GDP)**




*Source:* Central Bank of Egypt*, Monthly Statistical Bulletin,* various issues.

However, the mean value of the current account balance was 0.04 percent of GDP over the period 2002-2014 (Table 2).

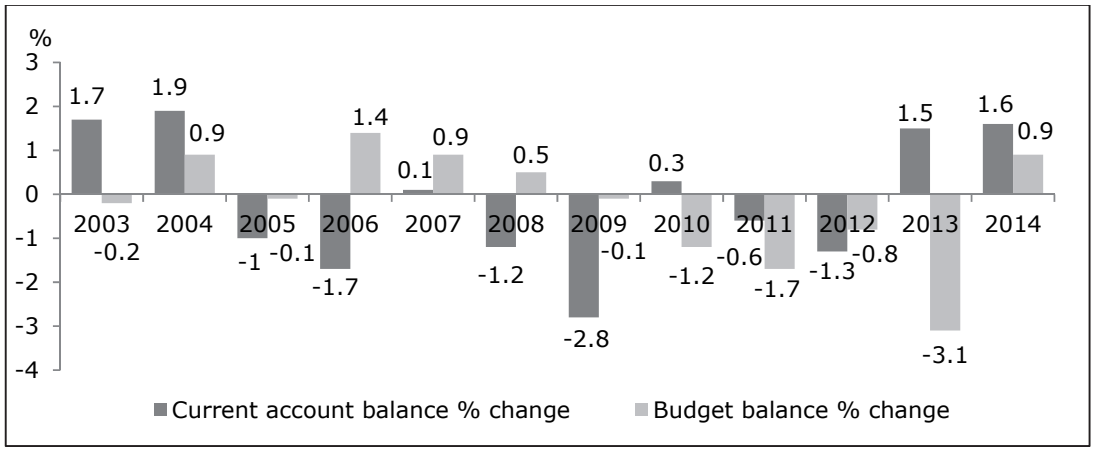
**Table 2. Descriptive Statistics of the Currrent Account Balance in Egypt (2002-2014, % of GDP)**

| Minimum | Maximum | Mean | Standard Deviation |
|---|---|---|---|
| -3.90 | 4.30 | 0.04 | 2.45 |

*Source:* Authors' calculations based on data from the Central Bank of Egypt.

Visual inspection of the *annual percentage change* in the budget deficit and the current account balance (Figure 3) does not help identify a clear causal relationship between the budget balance and the current account balance over the period 2002-2014. For example, the budget deficit and the current account balance have followed different paths in the years 2005/2006, 2006/2007, 2009/2010, 2011/2012 and 2012/2013. Hence, the relationship between the two accounts will be investigated empirically in the following sections of this paper.

**Figure 3. The Budget Deficit and the Current Account Balance in Egypt (2002-2014, Annual Percentage Change)**




*Source:* Central Bank of Egypt, *Monthly Statistical Bulletin* and Ministry of Finance, *The Financial Monthly Bulletin*, various issues.

## 3. The Twin Deficits: Theory and Evidence

This section provides a brief discussion of what the theory has to say about the relationship between the budget deficit and the current account deficit and then turns to the evidence.

### *3.1. Theoretical Framework*

The national accounting identity defines a clear relationship between the budget balance and the current account balance. The basic economic identity defines income, Y, as the sum of private and public consumption (C and G), investment (I), and net exports (X-M), which for simplicity, are identified with the current account below:

$$Y_t = C_t + I_t + G_t + X_t - M_t \quad (1)$$

By rearranging the variables, we obtain:

$$X_t - M_t = Y_t - C_t - G_t - I_t = S_t - I_t \quad (2)$$

Equation (2) means that the current account has to equal the difference of national savings (defined as income less private and public consumption) and investment. This relation implies that the current account is directly related to saving and investment in the economy. Policy measures reducing private or public consumption have a positive impact on the current account, because they increase national savings, while policies supporting investment have a negative impact on the current account.

Further insights are given by separating public from private savings. Public savings ($S_g$), which correspond to the fiscal budget position, are defined as the difference between tax income (T), and expenditures (G). Private savings ($S_p$) are defined as

disposable income, that is, income less taxes (Y-T) and private consumption (C). It follows that:

$$X_t - M_t = (Y_t - T_t - C_t) + (T_t - G_t) - I_t = S_{pt} + S_{gt} - I_t \qquad (3)$$

If private savings are roughly equal to investment, it is clear from equation (3) that the current account and public budget are directly interrelated, or twinned. The current account and the fiscal balance deficits, labeled the "twin deficits," have to move in the same direction by the same amount.

When an economy runs a current account deficit, this could be attributed to a decrease in private savings, increase in investment, and/or an increase in the budget deficit. If the current account deficit reflects an increase in investment, the country is then raising its capital stock more quickly and therefore raising its future output faster. However, if the current account deficit reflects lower private savings or a larger budget deficit, the country is borrowing abroad or running down its foreign assets to sustain or raise consumption (Fidrmuc 2003; Obstfeld and Rogoff 1996).

### *3.2. Empirical Evidence*

A review of available empirical studies reveals that the relation between the budget deficit and the current account deficit is ambiguous and differs across countries and time series. Four competing scenarios were identified: *First,* a positive and unidirectional Granger-causality running from the budget deficit to the current account deficit, known as *the twin deficit hypothesis*. *Second,* a negative and unidirectional causality that runs from the budget deficit to the current account deficit, causing *a twin divergence. Third,* a positive unidirectional causality running from the current account to the budget deficit. This *reversed causation* is designated in the terminology of Summers (1988) as current account targeting. *Finally, a bi-directional causality* between the two deficits may exist (Table 3).

**Table 3. The Nexus Between the Budget Deficit and the Current Account Deficit: Empirical Studies**

| **Studies supporting the twin deficit hypothesis (TDH)** |
|---|
| Enders and Lee (1990) estimated a VAR model for ***the US*** and found evidence supporting the twin deficit hypothesis. Also, Bachman (1992) supported the twin deficits hypothesis for ***the US***. |
| Khalid and Guan (1999) used the cointegration technique to investigate the twin deficit hypothesis for *five developed countries (**US, UK, France, Canada and Australia**) and five developing countries (**India, Indonesia, Pakistan, Egypt and Mexico**)*. The results suggest a higher statistically significant relationship between the two deficits in the long run for developing countries than is the case for developed countries. Furthermore, the direction of causality for developing countries was found to be mixed. |
| Using an overlapping generations model and focusing on the effect of the persistence of the budget deficit in ***Canada and the US*** over the period 1970-1993, Normandin (1999) found evidence in line with the twin deficits in the case of Canada but not for the US. |
| Akbostanci and Tunc (2002) tested the relationship between the budget deficit and trade deficit for ***Turkey*** between 1987-2001 and showed that there is a unidirectional causal relationship running from the budget deficit to the current account deficit both in the short run and in the long run. |
| Baharumshah, Ismail and Lau (2005) examined the causal relation between current account deficit, |

| Studies supporting the twin deficit hypothesis (TDH) |
|---|
| budget deficit and investments in ***ASEAN countries***. They concluded that a high proportion of domestic investment was financed from international sources, which suggested that Feldstein-Horioka puzzle was less important in these emerging economies. |
| Zubaidi, Lau and Khalid (2006) confirmed the twin deficit hypothesis for ***Thailand***. |
| Corsetti and Muller (2006) pointed out that the effect of fiscal shocks on the current account appears to be greater and longer lasting in more open economies (***Canada and the United Kingdom***) compared to less open economies (***US and Australia***). |
| For *selected* ***EU countries***, Beetsma, Giuliodori, and Klaassen (2007) found that a government spending innovation of 1 percentage point of GDP worsens the trade balance by 0.5 percentage point of GDP upon impact and by 0.8 after two years. The real effective exchange rate appreciates after a year, suggesting that the main short-term transmission channel upon impact is output, with the real exchange rate playing a greater role in the long-term. |
| Monacelli and Perotti (2007) found strong evidence in support of the twin deficit hypothesis in **the *United Kingdom, Australia and Canada***. However, for ***the US***, they showed that following an increase in real government consumption by 1 percentage point of GDP, the trade balance stays around trend initially, but improves by 0.5 percentage point after about 3 years. |
| Hakro (2009), Lau and Tang (2009), Neaime (2008) and Vamvoukas (1997 and 1999) used the cointegration technique to examine the twin deficit hypothesis in ***Cambodia, Pakistan, Lebanon and Greece***, respectively and found evidence in support of it. |
| Abbas et al. (2010) examined the relationship between fiscal policy and the current account, for a large sample of ***advanced and emerging economies*** using both panel regressions and VAR. The results suggest that changes in fiscal policy are coupled with changes in the current account, but the relationship is less than one-for-one. The results showed that on average, a strengthening in the fiscal balance by 1 percentage point of GDP is associated with a current account improvement of 0.3-0.4 percentage point of GDP. This relationship appears stronger in ***emerging and low-income countries***, where the exchange rate is flexible, when the economies are more open, when output is above potential or initial debt levels are above 90 percent of GDP. |
| Ratha (2011) used monthly data over 1998-2009 for ***the Indian economy*** and proved the existence of a unidirectional causality relationship running from the budget deficit to the current account deficit only in the short run. |
| Siddiqui (2010) investigated the twin deficits in the case of ***Pakistan*** and found a long run relationship between budget deficit and trade deficit. This paper investigated the relationship between the two deficits on petroleum economy where exports, government revenue, and income are closely linked with oil revenue. |
| Bagheri, Keshtkaran and Hazrati (2012) examined the relationship between the budget deficit and current account deficit in ***Iran*** using Engel-Granger and seemingly unrelated regressions during 1971-2007. The results indicated that there exists a long run equilibrium link between budget deficit and current account deficit. A one-way causality relationship from the budget deficit toward the current account deficit was found. Testing the validity of the Feldstein-Horioka puzzle indicated a low level of international capital mobility for Iran. |
| **Studies supporting the twin divergence** |
| Using *US* data, Muller (2004) and Kim and Roubini (2008) found that a rise in the budget deficit improves the current account balance, which is an evidence of a twin divergence instead of twin deficits. |
| Hashemzadeh and Wilson (2006) investigated the twin deficit hypothesis using data from the MENA region, mainly for Egypt, Iran, Jordan, Kuwait, Morocco, Oman, Syria, Turkey and Yemen. Results revealed that the twin deficit hypothesis is not universally supported. The incidence of twin deficits appears to be country specific. |
| Nazier and Essam (2012) investigated the impact and dynamic effects of government budget deficit shocks on the current account and the real exchange rate in Egypt during the period 1992-2010, using an exactly identified structural VAR model. Their empirical results revealed the existence of a twin divergence in the Egyptian case, that is, when fiscal accounts worsen, the current account improves and exchange rate depreciates. This was attributed to a combination of factors, including an investment crowding out effect caused by an increase in the real interest rate and a partial Ricardian movement in private savings. Moreover, sticky prices explained the result of real exchange rate depreciation. |
| El-Baz (2014) tested the validity of the twin deficit hypothesis (TDH) in Egypt, using annual time series data for the period 1990-2012. A "twin divergence" was found to exist between the two deficits in the short run. Also, the vector error correction model (VECM) proved the existence of a negative long run equilibrium relationship between both current account and government budget balances, with a relatively high speed of adjustment toward the equilibrium position; as it takes about one year and 4 months to restore the equilibrium position after divergence occurs. |

| Studies supporting the twin deficit hypothesis (TDH) |
|---|
| **Studies supporting the reversed causation between the two deficits** |
| Alkswani (2000) provided empirical evidence on reverse causation between the two deficits for ***Saudi Arabia.*** |
| Marinheiro (2008) used cointegration techniques to examine the validity of the twin deficit hypothesis for ***Egypt***. He found evidence in favor of a reverse Granger-causality running from the current account deficit to the budget deficit. Further, there was evidence in favor of a high degree of capital mobility (or financial integration). The author justified this by the reliance of Egyptian fiscal authorities on Suez Canal dues, which enter into government revenues; hence a decline in such dues can have a negative impact on the current account, whose negative impact will show in the budget deficit. Hence the deterioration in the external balance will be accompanied by a decrease in government's revenues and hence by a deterioration in the budget balance. |
| **Studies supporting the bi-directional causality between the two deficits** |
| For ***Brazil***, Islam (1998) estimated the relationship between budget deficits and trade deficits, using Granger causality test. The results revealed a bidirectional relationship between the two deficits, contradicting the conventional twin-deficit hypothesis. |
| Mehrara and Zamanzadeh (2011) examined the relationship between government current budget deficit and non-oil current account deficit for ***Iranian economy*** during the period 1959-2007 based on cointegration analysis and vector error correction model (VECM). They proved the existence of a positive relationship between government current budget deficit and non-oil current account deficit and Granger causality tests showed the existence of a bidirectional causal relationship between the two variables. |
| Lau and Baharumshah (2004) tested the validity of the twin deficit hypothesis for ***Malaysia***, using data for the period 1975-2000 and found a bi-directional causality between the two deficits. |
| Mukhtar, Zakaria, and Ahmed (2007) used the error correction model (ECM) and Granger causality tests to empirically test the twin deficit hypothesis in ***Pakistan*** using quarterly time-series data for the period 1975-2005 and confirmed the existence of long-run relationship between the two deficits and that there is a bi-directional causality between them. |

*Source:* Reviewed and compiled by the authors.

### *3.3. Twin Deficits or Twin Divergence: Possible Explanations*

Three competing views exist to explain variations in the current account as a consequence of variations in the stance of fiscal policy: The Mundell-Fleming framework; the Ricardian Equivalence Hypothesis and the Feldstein-Horioka puzzle.

#### *3.3.1. The Mundell-Fleming framework (MF)*

The Mundell Fleming Model supports the twin deficit hypothesis. An expansionary fiscal policy in an open economy with a flexible exchange rate system increases disposable income and domestic demand, resulting in a higher trade deficit for two reasons. First, higher consumption demand leads to higher imports, independently of price movements. Second, with flexible exchange rates, an increase in domestic demand increases the domestic price level, which will result in a real exchange rate appreciation, discouraging external demand and reducing exports. Together, these two channels may cause deterioration in the current account balance.

Moreover, an increase in the budget deficit induces an upward pressure on interest rates that, in turn, will cause capital inflows and an appreciation of the exchange rate, ultimately leading to an increase in the current account deficit.[1]

[1] However, the resulting external deficit may be eased if fiscal deficits also raise the interest rate, which results in a simultaneous fall in domestic investment (Nazier and Essam 2012; Abbas et al. 2010; Corsetti and Muller 2006).

*3.3.2. The Ricardian Equivalence hypothesis*

The Ricardian equivalence hypothesis (Barro 1974; 1989) argues that the budget and current account deficits are not correlated. It states that an increase in a budget deficit (lower public savings, through reduced taxes) will be offset by equal increases in private savings, insofar as the private sector fully realizes that the increase in government expenditure or a tax cut today means higher taxes in the future (Hashemzadeh and Wilson 2006). As private saving increases by the same amount as does the budget deficit, the national saving remains unaffected and the current account does not respond to the changes in government spending (Abbas et. al. 2010; Corsetti and Muller 2006; Barro 1989).

However, if an increase in the budget deficit is not offset by an equal increase in private saving, the result must be a decline in domestic investment, a rise in the current account deficit, or both.

*3.3.3. The Feldstein and Horioka puzzle*

In their seminal contribution, Feldstein and Horioka (1980, henceforth FH) showed that the causal link between the budget deficit and the current account deficit depends on the level of international capital mobility and the source of financing domestic investment.

If savings and investments are not correlated, reflecting a high level of international capital mobility, and Ricardian equivalence does not hold, the national account identity implies that the government deficit and the current account deficit move together in the same direction, originating a twin deficit. With high capital mobility, the financing of domestic investment is not constrained by the amount of domestic saving. Financing investment mainly from external sources is expected to worsen the current account.

When savings and investments are strongly correlated, indicating a low level of international capital mobility, domestic investment is mainly financed from domestic saving and the budget deficit and the current account are expected to vary in different directions. The variation of the budget deficit and the current account deficit in different directions is labeled as the Feldstein-Horioka puzzle and does not support the twin deficit hypothesis.

## 4. The Nexus Between the Budget Deficit and the Current Account Deficit in Egypt

To identify the causal link between the budget deficit and the current account deficit in Egypt over the period 2002-2014, we will empirically investigate the twin deficit hypothesis then test the FH puzzle.

### *4.1. Investigating the Twin Deficit Hypothesis*

Following Marinheiro (2006), we empirically investigate the twin deficit hypothesis by two mechanisms. *First*, we run a Granger causality test between the current account and the government budget balance. *Second*, we run an error correction model testing both the long run relationship and the short run dynamics between the budget deficit and the current account deficit. It is worth noting that we add the real GDP per capita to control for the macroeconomic conditions as follows:

$$\Delta CAB_t = \delta_0 + \delta_{1,i}\,\Delta BUD_{t-i} + \delta_{2,i}\,\Delta CAB_{t-i} + \delta_{3,i}\,\Delta GDP/cap_{t-i} + \beta_1\,ECM_{t-i} + \xi_t \qquad (4)$$

Equation (4) is split in two parts. The first one ($\delta s$) gives the short-term time dynamics and the second one ($\beta$) shows the long-run coefficients of the error correction model derived from the long-run equation. It is worth noting that in our empirical application we use data for the current account and not for the trade balance since it helps not to estimate an identity.

To estimate this model we use *quarterly* data from 2002 to 2014 on current account (% of GDP and level), budget deficit (% of GDP and level), and real quarterly GDP per capita. Government budget balance and the current account balance come from the Central Bank Monthly Statistical Bulletins, while the real GDP comes from the Ministry of Planning Macroeconomic Indicators of the Egyptian economy.

*To start with*, and since our variables are integrated of order 1, we ran a simple OLS model for the first-differenced variables where the current account deficit is the dependent variable and the budget deficit is the independent one (Table 4).[2] We found an insignificant coefficient showing that the budget deficit does not have an impact on the current account. Hence, the twin deficit hypothesis is rejected for Egypt during the period 2002-2014.

[2] Clearly, even if the financial crisis in 2008 and the Egyptian revolution in 2011 represent important evolutions at the economic level, we cannot run a separate regression for each sub-period given the limited number of observations. This is why we opted for introducing dummies that capture the effect of both the financial crisis and the revolution.

**Table 4. First Difference - OLS Results (1)**

| | ΔCAB/GDP | ΔCAB/GDP |
|---|---|---|
| **ΔBUD/GDP** | **0.106** | **0.0956** |
| | **(0.0677)** | **(0.0690)** |
| ΔLn(Real GDP/Cap) | -0.117 | -0.0627 |
| | (0.126) | (0.138) |
| Crisis | | -0.00163 |
| | | (0.0102) |
| Revolution | | -0.0285 |
| | | (0.0252) |
| Constant | 0.00208 | 0.00469 |
| | (0.00886) | (0.00942) |
| Quarter | YES | YES |
| Observations | 46 | 46 |
| R-squared | 0.245 | 0.270 |

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

*Second*, the findings of the Granger-causality test are similar. In fact, the null that the current account deficit does not Granger-cause the budget deficit is rejected by the data, implying that a reversed causality running from the current account deficit to the budget deficit exists. By contrast, the null that the budget deficit does not Granger cause the current account deficit is *not* rejected as well (Table 5). This is in line with what Marinheiro (2006) found for Egypt using annual data. Consequently, the twin deficit hypothesis according to which an increase in the budget deficit leads to an increase in the current account one is not valid in the Egyptian case.

**Table 5. Granger Causality Wald Tests (1)**

| Equation | Excluded | chi2 | Df | Prob>Chi2 |
|---|---|---|---|---|
| CAB/GDP | ΔBUD/GDP | 8.4347 | 4 | 0.077 |
| CAB/GDP | Ln(Real GDP/Cap) | 20.017 | 4 | 0.000 |
| **ΔBUD/GDP** | **CAB/GDP** | **5.0025** | **4** | **0.287** |
| ΔBUD/GDP | Ln(Real GDP/Cap) | 7.4949 | 4 | 0.112 |
| Ln(Real GDP/Cap) | CAB/GDP | 10.563 | 4 | 0.032 |
| Ln(Real GDP/Cap) | ΔBUD/GDP | 8.5148 | 4 | 0.074 |

*Third*, to run an Error Correction Model, we need to first test the stationarity of our variables. We found that while their levels are not stationary, their first difference is (Tables A.1 and A.2). We also implemented the lag selection criteria in order to determine the number of lags to be introduced in the model and found that four lags must be introduced in the model. Finally, we tested the presence of a co-integrating relationship using the Johansen co-integration tests and found that there is one co-integrating relationship between our variables of interest at the usual 5 percent significance level (Table 6).

**Table 6. Johansen Tests for Cointegration for ECM1**

| Max. Rank | Parms | LL | Eigenvalue | Trace stat. | 5% Critical value |
|---|---|---|---|---|---|
| 0 | 27 | 259.3276 | . | 64.3123 | 24.31 |
| 1 | 32 | 289.3113 | 0.74408 | 4.3449* | 12.53 |
| 2 | 35 | 291.4082 | 0.09091 | 0.151 | 3.84 |
| 3 | 36 | 291.4837 | 0.00343 | | |

*Source:* Constructed by the authors using STATA.

Running the error correction model (Table 7) shows that the budget deficit does not have a significant impact on the current account deficit in the short run given that the current account responds chiefly to its own changes. Furthermore, it is quite clear that, in the long run, the budget balance does not have a significant impact on the current account balance.

**Table 7. Error Correction Model (ECM1)**

| | ΔCAB/GDP |
|---|---|
| Alpha | -0.0192* |
| | (0.0111) |
| ΔCAB/GDP(-1) | -0.412*** |
| | (0.156) |
| ΔCAB/GDP(-2) | -0.367** |
| | (0.160) |
| ΔCAB/GDP(-3) | -0.256 |
| | (0.157) |
| **ΔBUD/GDP(-1)** | **-0.0108** |
| | **(0.0729)** |
| **ΔBUD/GDP(-2)** | **0.0329** |
| | **(0.0858)** |
| **ΔBUD/GDP(-3)** | **-0.134*** |
| | (0.0749) |
| ΔLnReal GDP/Cap)(-1) | -0.154** |
| | (0.0631) |
| ΔLn(Real GDP/Cap)(-2) | -0.0486 |
| | (0.0539) |
| ΔLn(Real GDP/Cap)(-3) | -0.143** |
| | (0.0645) |
| Observations | 44 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

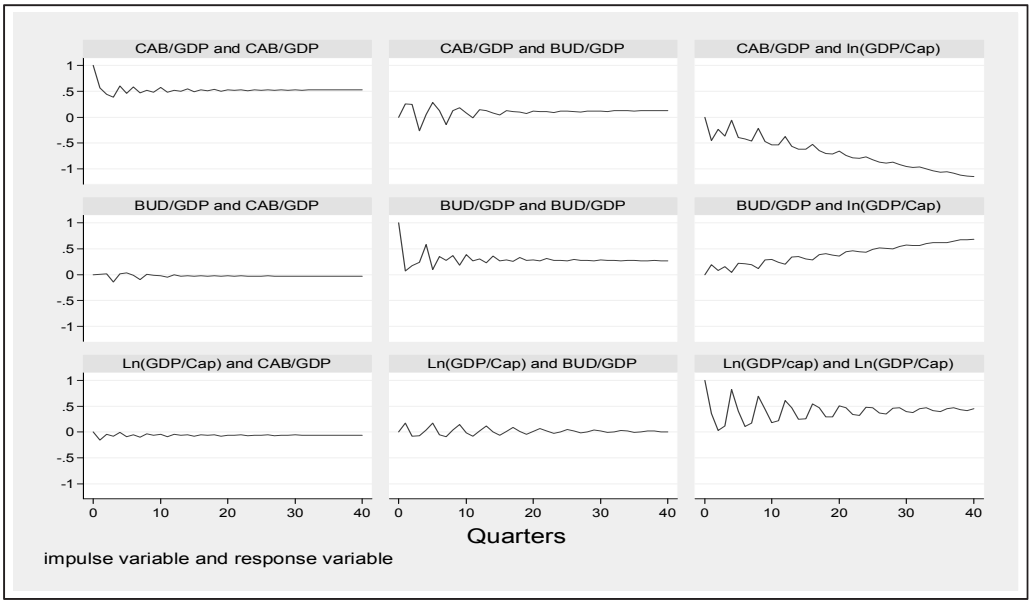
As per the speed of adjustment, the error correction term is 2 percent per quarter. Hence, the current account adjusts by 2 percent each quarter to reach long-term equilibrium. Moreover, it is important to note that while the budget deficit is not significant, real GDP/capita is significant in both the short and the long terms (equation 5).

**Long Run relationship:** CAB/GDP = 0.86 BUD/GDP + 0.09 Ln (Real GDP/Cap) (5)
(0.506) (0.000)

This confirms the fact that while the twin deficit hypothesis is not verified in the Egyptian case, the current account is primarily determined by income. This is in line with the findings of Herrera et al. (2010) who used a simple version of the Obstfeld and Rogoff (1996) intertemporal consumption smoothing model according to which the current account is determined by transitory deviations of income from its permanent level, by fluctuations of investment around their trend, and by transitory deviations of public spending. They argue that income and investment are statistically significant explanatory variables of the current account behavior in Egypt.

We use the output of the error correction model in order to examine how each variable responds to a change in the other variables (Figure 4).

**Figure 4. Impulse Response Function (1)**



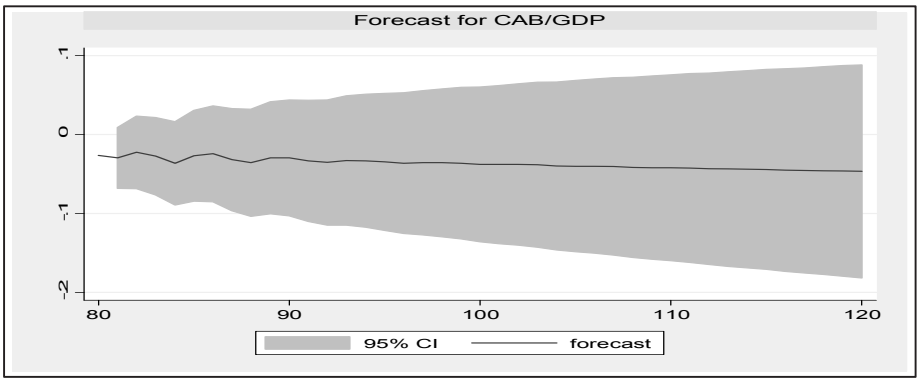

While the budget deficit explains 2 percent of the change in the current account deficit in the short run (see Table 8), the current account affects itself in a much more pronounced way (93 percent of the change in current account is explained by the current account itself). Finally, it is worthwhile to note that the GDP/capita explains around 5 percent of the current account variation (which is twice the effect of the budget deficit).

**Table 8. Variance Decomposition (1)**

| Quarter | **BUD/GDP** | Ln(GDP/cap) | CAB/GDP |
|---|---|---|---|
| 1 | 0.0% | 0.0% | 100.0% |
| 5 | 3.9% | 5.3% | 90.8% |
| 10 | 3.6% | 5.6% | 90.8% |
| 15 | 2.9% | 5.3% | 91.8% |
| 20 | 2.6% | 5.3% | 92.1% |
| 25 | 2.3% | 5.2% | 92.5% |
| 30 | 2.2% | 5.1% | 92.7% |
| 35 | 2.1% | 5.0% | 92.9% |
| 40 | **2.1%** | **5.0%** | **93.0%** |

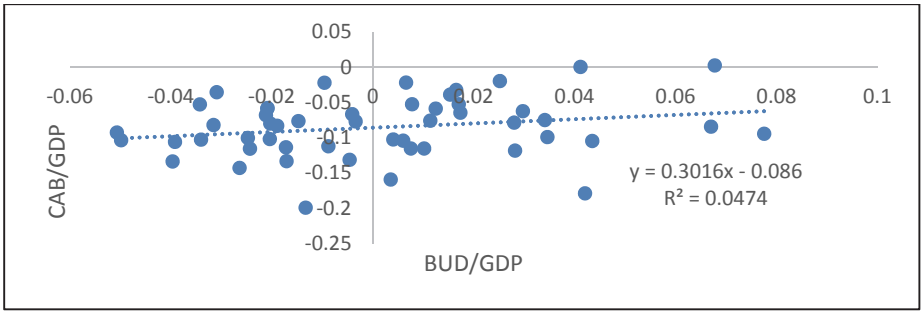
Since the current account responds to its own changes, its share to GDP remains constant over time as it is shown in Figure 5.

**Figure 5. Forecast of CAB/GDP (1)**




The weak relationship between the budget deficit and the current account deficit is confirmed by Figure 6 that shows a positive, yet weak, correlation between the share of the budget deficit to GDP and the current account deficit to GDP.

**Figure 6. Correlation Between the Budget Balance and the Current Account Balance**




*Source:* Constructed by the authors.

To sum up, our empirical findings reveal that the twin deficit hypothesis according to which an increase in the budget deficit leads to an increase in the current account

deficit, is rejected. A reversed causality running from the current account to the budget deficit exists in Egypt for the period 2002-2014.

*In the short run*, the budget deficit explains 2 percent of the change in the current account deficit, while 93 percent of the change in current account is explained by the current account itself. GDP per capita explains around 5 percent of the current account variation (which is twice the effect of the budget deficit). *In the long run*, the budget balance does not have a significant impact on the current account balance. The correlation between the shares of the budget deficit to GDP and the current account deficit to GDP is positive, yet weak.

### *4.2. Testing the Feldstein-Horioka Puzzle*

The causal link between the budget deficit and the current account deficit in Egypt depends on the country's level of international capital mobility and the source of financing its domestic investment. A weak correlation between savings and investments, reflecting high capital mobility and financing investment from external sources would support the twin deficit hypothesis. A strong correlation between savings and investments, indicating a low level of capital mobility and the financing of domestic investment mainly from domestic saving, would confirm the FH puzzle and would not support the twin deficit hypothesis (Feldstein and Horioka 1980; Georgopoulos and Hejazi 2009).

To test the FH puzzle, we first verify the significance of the correlation between savings and investment in Egypt using the following specification:

$$INV_t = \alpha_1 + \alpha_2 SAV + \varkappa_t \qquad (6)$$

where the share of investment to GDP is given by "INV", the share of savings to GDP is given by SAV and $\varkappa_t$ is the discrepancy term. The share of domestic investment to GDP comes from the Ministry of Planning Macroeconomic Indicators of the Egyptian economy. The Ministry of Finance Monthly Bulletin has been used to determine the share of domestic savings to GDP.

Moreover, we adopt Fidrmuc (2003)'s methodology who tests the following equation:

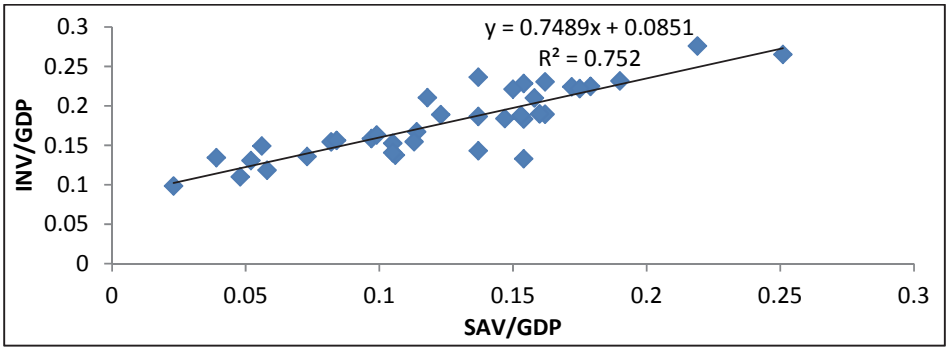
$$CAD_t = \gamma_1 + \gamma_2 BUD_t - \gamma_3 INV_t + \varepsilon_t \qquad (7)$$

where $\varepsilon_t$ is the discrepancy term.[3] Our main coefficient of interest is $\gamma_3$. If it is equal to 1, then Egypt is perfectly integrated in the world capital market. If the paradox of Feldstein-Horioka holds, then this coefficient should be less than unity.

[3] The model proposed by Fidrmuc (2003) has the advantage of providing in the same regression, a test for the twin deficit hypothesis together with an estimate for the degree of capital mobility (or financial integration).

Testing the validity of the FH puzzle indicates that Egypt is not perfectly integrated in the world capital market. This is confirmed by Figure 7 that shows a significant and positive correlation between the share of savings to GDP and that of investment.

**Figure 7. Correlation Between Domestic Savings and Domestic Investment**




*Source:* Constructed by the authors.

We can run a regression to investigate the long run relationship between the current account, the budget deficit and total investment. The real effective exchange rate is also added to examine the impact of exchange rate volatility on the current account (Aristovnik and Djuric 2010; Darvas 2014) as follows:

$$CAB/GDP_t = \alpha_0 + \alpha_1 BUD/GDP_t - \alpha_2 INV/GDP_t + \alpha_3 GDP/cap_t + \alpha_4 REER_t + \varepsilon_t \qquad (8)$$

Running a simple OLS model (Table 9), we found an insignificant coefficient of the budget deficit. Moreover, the effect of investment on the current account deficit seems to be insiginificant even when we control for the impact of the financial crisis in 2008/2009 and the impact of the Egyptian revolution in 2011/2012.

**Table 9. First Difference - OLS Results (2)**

| | ΔCAB/GDP | ΔCAB/GDP |
|---|---|---|
| **ΔBUD/GDP** | **0.121** | **0.102** |
| | **(0.0751)** | **(0.0790)** |
| ΔLn(Real GDP/Cap) | -0.111 | -0.0576 |
| | (0.130) | (0.144) |
| ΔINV/GDP | 0.115 | 0.0656 |
| | (0.149) | (0.162) |
| ΔLn(REER) | -0.0334 | -0.0398 |
| | (0.0768) | (0.0783) |
| Crisis | | -0.00193 |
| | | (0.0105) |
| Revolution | | -0.0260 |
| | | (0.0274) |
| Constant | 0.0112 | 0.00987 |
| | (0.0147) | (0.0154) |
| Quarter | YES | YES |
| Observations | 46 | 46 |
| R-squared | 0.260 | 0.278 |

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The findings of the Granger-causality test are similar. In fact, the null that the current account deficit does not Granger-cause the budget deficit is rejected by the data. Moreover, the null that the budget deficit does not Granger cause the current account deficit is not rejected as well (Table 10). In addition, there is no causality between domestic investment and the current account.

**Table 10. Granger Causality Wald Tests (2)**

| Equation | Excluded | chi2 | df | Prob>Chi2 |
|---|---|---|---|---|
| CAB/GDP | BUD/GDP | 8.8534 | 4 | 0.065 |
| CAB/GDP | Ln(GDP/Cap) | 7.8697 | 4 | 0.096 |
| CAB/GDP | INV/GDP | 1.6896 | 4 | 0.793 |
| CAB/GDP | Ln(REER) | 25.082 | 4 | 0.000 |
| **BUD/GDP** | **CAB/GDP** | **5.9779** | **4** | **0.201** |
| BUD/GDP | Ln(GDP/Cap) | 6.9258 | 4 | 0.140 |
| BUD/GDP | INV/GDP | 25.996 | 4 | 0.000 |
| BUD/GDP | Ln(REER) | 20.517 | 4 | 0.000 |
| Ln(GDP/Cap) | CAB/GDP | 2.2236 | 4 | 0.695 |
| Ln(GDP/Cap) | BUD/GDP | 6.362 | 4 | 0.174 |
| Ln(GDP/Cap) | INV/GDP | 18.45 | 4 | 0.001 |
| Ln(GDP/Cap) | Ln(REER) | 3.47 | 4 | 0.482 |
| INV/GDP | CAB/GDP | 4.1757 | 4 | 0.383 |
| INV/GDP | BUD/GDP | 11.145 | 4 | 0.025 |
| INV/GDP | Ln(GDP/Cap) | 9.4796 | 4 | 0.05 |
| INV/GDP | Ln(REER) | 0.13236 | 4 | 0.998 |
| Ln(REER) | CAB/GDP | 14.88 | 4 | 0.005 |
| Ln(REER) | BUD/GDP | 2.5728 | 4 | 0.632 |
| Ln(REER) | Ln(GDP/Cap) | 8.5711 | 4 | 0.073 |
| Ln(REER) | INV/GDP | 5.6901 | 4 | 0.224 |

To run the error correction model, we found that while the levels of our variables are not stationary, their first difference is (Tables A.1 and A.2). We also implemented the lag selection criteria in order to determine the number of lags to be introduced in the model and found that four lags must be introduced in the model. Finally, we tested the presence of a co-integrating relationship using the Johansen co-integration test and found that there are two co-integrating relationships between our variables of interest at the usual 5 percent significance level (Table 11).

**Table 11. Johansen Tests for Cointegration for ECM2**

| Rank | Parms | LL | Eigenvalue | Trace statistic | 5% critical value |
|---|---|---|---|---|---|
| 0 | 80 | 512.4028 | . | 75.3662 | 68.52 |
| 1 | 89 | 525.1365 | 0.43943 | 49.8987 | 47.21 |
| 2 | 96 | 537.2484 | 0.42336 | 25.6749* | 29.68 |
| 3 | 101 | 545.5415 | 0.31405 | 9.0888 | 15.41 |
| 4 | 104 | 549.4898 | 0.16429 | 1.1921 | 3.76 |
| 5 | 105 | 550.0859 | 0.02673 | | |

*Source*: Constructed by the authors using STATA.

If investment is financed by external resources, an increase in investment could lead to an increase in the external deficit. Indeed, we got insiginificant coefficients of the impact of investment on the current account deficit in the short term (Table 12).

**Table 12. Error Correction Model (ECM2)**

| | ΔCAB/GDP |
|---|---|
| alpha 1 | -0.364* |
| | (0.194) |
| alpha 2 | -0.269 |
| | (0.230) |
| ΔCAB/GDP(-1) | -0.353* |
| | (0.183) |
| ΔCAB/GDP(-2) | -0.384** |
| | (0.178) |
| ΔCAB/GDP(-3) | -0.198 |
| | (0.167) |
| **ΔBUD/GDP(-1)** | **0.161** |
| | **(0.185)** |
| **ΔBUD/GDP(-2)** | **0.157** |
| | **(0.141)** |
| **ΔBUD/GDP(-3)** | **-0.0386** |
| | (0.102) |
| ΔLnReal GDP/Cap)(-1) | -0.0513 |
| | (0.0803) |
| ΔLn(Real GDP/Cap)(-2) | 0.0492 |
| | (0.0720) |
| ΔLn(Real GDP/Cap)(-3) | -0.0733 |
| | (0.0924) |
| **ΔINV/GDP(-1)** | **0.0643** |
| | **(0.147)** |
| **ΔINV/GDP(-2)** | **0.0188** |
| | **(0.137)** |
| **ΔINV/GDP(-3)** | **-0.000538** |
| | **(0.110)** |
| ΔLn(REER)(-1) | -0.224*** |
| | (0.0802) |
| ΔLn(REER)(-2) | -0.0334 |
| | (0.104) |
| ΔLn(REER)(-3) | 0.132 |
| | (0.0811) |
| Constant | 0.0221** |
| | (0.0104) |
| Observations | 44 |

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

By contrast, we found that in the long run, there is a significant relationship between both, since the investment coefficient is negative and significant. Its value is quite close to the one obtained by Marinheiro (2006) who found a coefficient of -0.74. Ours is -0.72 showing that Egypt has a high level of capital mobility even if it is not perfectly integrated in the world capital market (equation 9). As foreign capital inflows are a source of financing Egypt's domestic investment, the so-called Feldstein-Horioka puzzle is less important in Egypt and it is *partially* rejected in the long run.

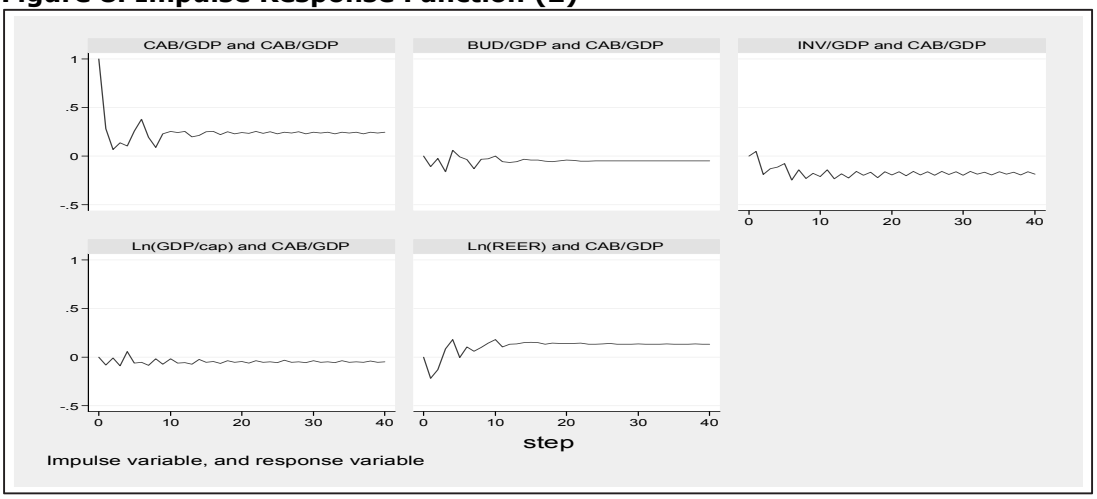
**Long run relationship:**

$$CAB/GDP = -0.08 \ln(GDP/Cap) \mathbf{- 0.72\ INV/GDP} + 0.09 \ln(REER) \quad (9)$$
$$(0.000) \qquad \mathbf{(0.014)} \qquad (0.117)$$

In the error correction model, the speed of adjustment is greater than the one previously obtained since it is 36 percent per quarter. This obviously shows that this model is better specified since it includes both investment and real GDP per capita, which are significant in the long run (similar to the findings of Herrera et al. 2010). Yet, in the short run, the most important determinants of the current account are the current account itself and the real effective exchange rate.

Finally, the results of the variance decomposition are in line with these findings since the change in the current account is chiefly due to the change in the current account itself (34 percent) followed by the change in investment (31 percent), then the change in the real effective exchange rate (18 percent) and the GDP per capita (12 percent). It is quite obvious that the change in the budget deficit has a minimal effect on the change in current account balance (4 percent) confirming the fact that the twin deficit hypothesis does not hold in the Egyptian case (see Figure 8 and Table 13).

**Figure 8. Impulse Response Function (2)**




*Source:* Constructed by the authors using STATA.

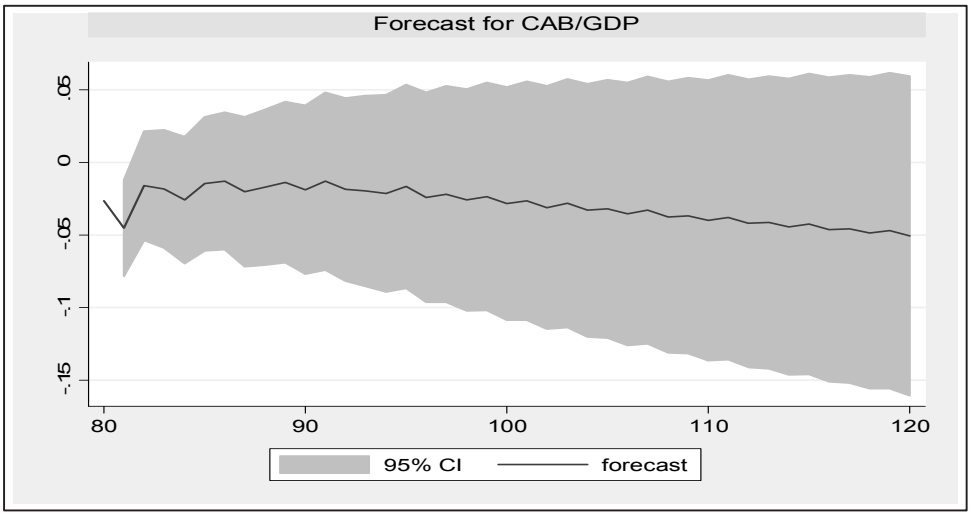
**Table 13. Variance Decomposition (2)**

| Quarter | CAB/GDP | **BUD/GDP** | **INV/GDP** | Ln(REER) | Ln(GDP/CAP) |
|---|---|---|---|---|---|
| 1 | 100% | **0%** | **0%** | 0% | 0% |
| 5 | 57% | **6%** | **26%** | 8% | 3% |
| 10 | 48% | **6%** | **23%** | 15% | 8% |
| 15 | 41% | **5%** | **27%** | 18% | 9% |
| 20 | 38% | **5%** | **29%** | 18% | 11% |
| 25 | 36% | **4%** | **30%** | 18% | 11% |
| 30 | 35% | **4%** | **30%** | 18% | 12% |
| 35 | 34% | **4%** | **31%** | 18% | 12% |
| 40 | 34% | **4%** | **31%** | 18% | 12% |

*Source:* Constructed by the authors using STATA.

Figure 9 shows that the current account deficit remains relatively stable between 2 percent and 5 percent to GDP if economic conditions do not change in the future.

**Figure 9. Forecast of CAB/GDP (2)**




In summary, testing the validity of the FH puzzle indicates that Egypt is not perfectly integrated in the world capital market. *In the short run,* a significant and positive correlation between the share of savings to GDP and that of investment provides evidence of the FH puzzle and does not support the twin deficit hypothesis.

However, *in the long run*, finding a significant negative relationship between investment and the current account deficit indicates that foreign capital inflows are a source of financing the country's domestic investment. Hence, the so-called FH puzzle is less important in Egypt and could be *partially* rejected.

Moreover, results of the FH puzzle test emphasize the reversed causality that runs from the current account to the budget deficit, and show that in *the short run*, the budget deficit has a minimal effect on the change in the current account balance, explaining 4 percent only of the change in the current account deficit. The change in the current account is chiefly due to the change in current account itself (34 percent), followed by the change in investment (31 percent), then the change in the real effective exchange rate (18 percent) and the GDP per capita (12 percent).

### *4.3. Empirical Findings for Egypt: Possible Explanations*

Our empirical findings reveal that the twin deficit hypothesis according to which an increase in the budget deficit leads to an increase in the current account deficit is rejected for Egypt during the period 2002-2014. A reversed causality running from the current account to the budget deficit exists, and the Feldstein-Horioka puzzle is partially rejected. The purpose of this sub-section is to track the possible explanations for our three main findings for Egypt.

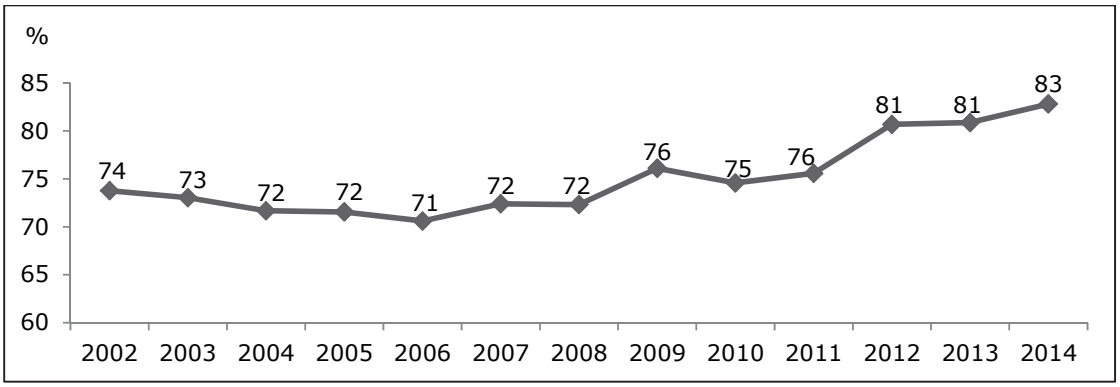
*4.3.1. Rejection of the twin deficit hypothesis for Egypt: Possible explanations*

The twin deficit hypothesis is not valid in Egypt for the period 2002-2014 for three main reasons. First, lower private savings. Second, appreciation of the overvalued real effective exchange rate. Finally, heavy "domestic" financing of the budget deficit.

*Lower private savings*

Rejection of the twin deficit hypothesis implies that Egypt's current account deficit could be mainly attributed to the decrease in private savings. Data available from Egypt's Ministry of Planning reveal that final private consumption as a share of GDP has been increasing since 2006, indicating a decrease in private savings (Figure 10).

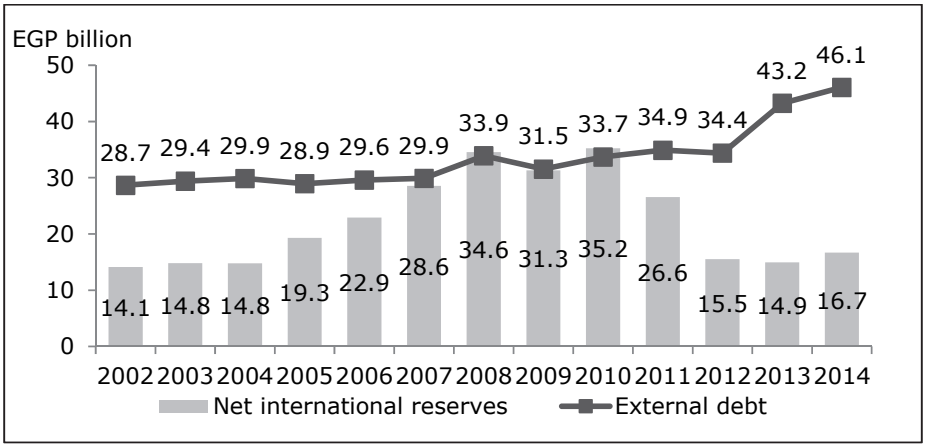
**Figure 10. Final Private Consumption in Egypt (2002-2014, % of GDP)**




*Source:* Ministry of Planning, *Macroeconomic Indicators*.

As Egypt's current account deficit reflects lower private savings, the country is borrowing abroad or running down its foreign assets to sustain or raise consumption. Figure 11 shows that Egypt's external financing gap has been associated with a significant drop in net international reserves post-2011 revolution and an increasing external debt.

**Figure 11. Egypt's Net International Reserves and External Debt (2002-2014, US$ billion)**



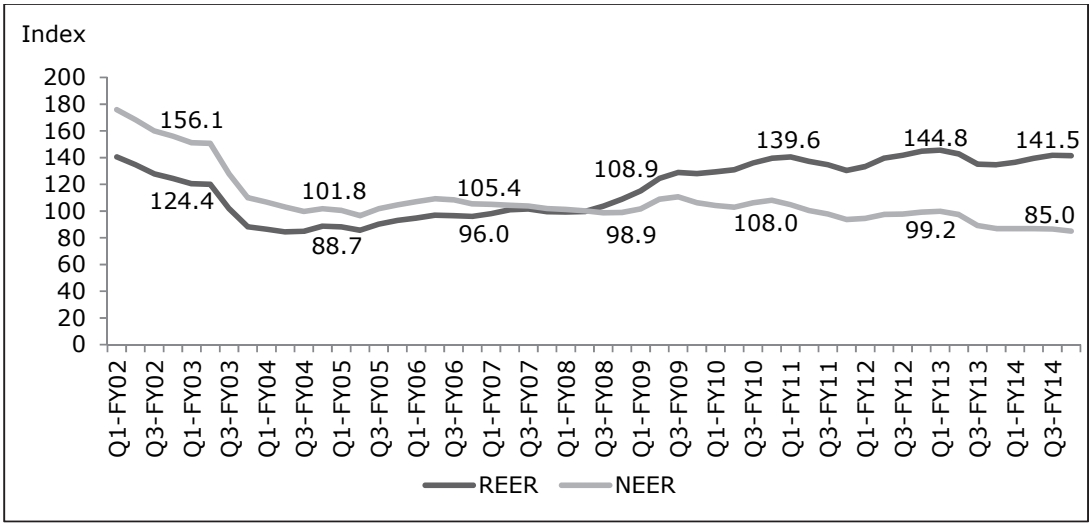

*Source:* The Central Bank of Egypt, *Monthly Statistical Bulletin*, various issues.

Policy measures enhancing private savings would have a positive impact on the current account. Also, Egypt would do well to encourage policies that boost foreign direct investment rather than continue relying on debt financing.

*Appreciation of Egypt's overvalued real effective exchange rate*

The International Monetary Fund has shown that Egypt's exchange rate is overvalued inducing current account deficit (IMF 2010; 2015). The country's real effective exchange rate (REER) index has been trending upward since 2004, showing real appreciation (Figure 12).[4] Greater exchange rate flexibility could enhance Egypt's competitiveness, strengthen external demand and increase exports, causing an improvement in the current account balance.

**Figure 12. Egypt's Nominal and Real Effective Exchange Rate Index (2007=100)**




*Note:* The exchange rate is measured in units of US$ per unit of EGP. A rise in the REER index entails appreciation, while a decline implies depreciation.

*Source:* Darvas (2014).

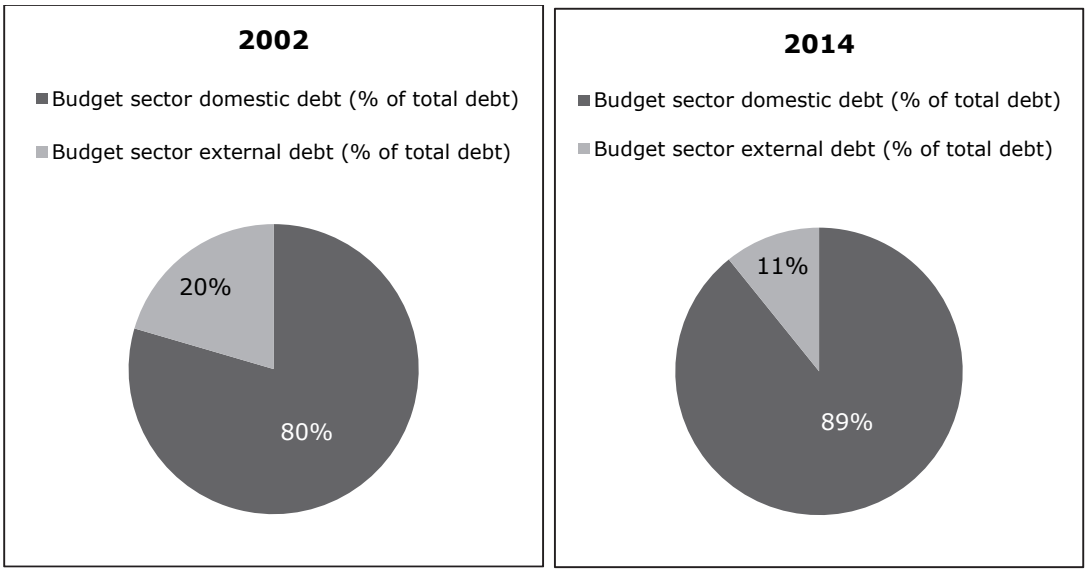
*Heavy domestic financing of the budget deficit*

Over the period 2002-2014, Egypt's budget deficit was mainly financed using domestic resources. Heavy domestic financing of the budget deficit implies a strong correlation between domestic saving and investment rates (the correlation coefficient = 0.75), and does not support the twin deficit hypothesis.

Figure 13 shows that the budget sector domestic debt as a share of total debt has increased from 80 percent in 2002 to 89 percent in 2014, while the external debt has substantially decreased from 20 percent in 2002 to 11 percent in 2014.

[4] Since July 2013, the Egyptian pound stabilized within a 2 percent band against the U.S. dollar. This trend continued through April 2014 (IMF 2015).

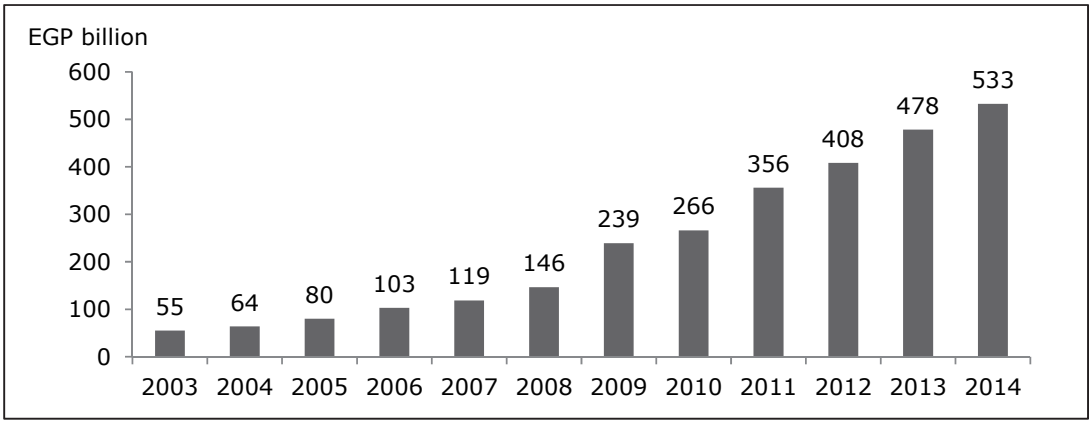
**Figure 13. Budget Sector's Domestic and External Debt (2002 and 2014, % of total debt)**




*Source:* Ministry of Finance, *the Financial Monthly*, various issues.

The outstanding stock of Treasury bills (TBs) has increased substantially over the period 2002/2003-2013/2014 as shown in Figure 14.

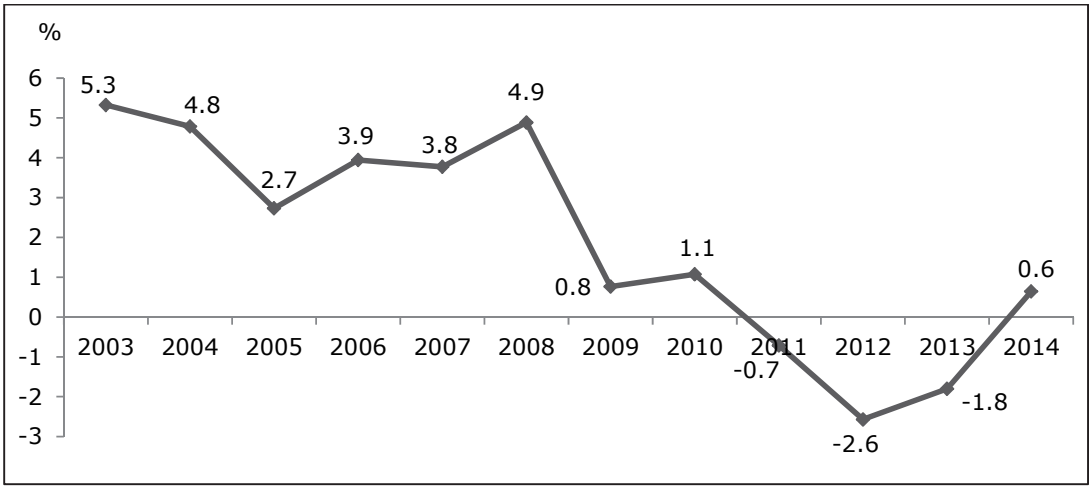
**Figure 14. Outstanding Stock of Treasury Bills (EGP billion)**




*Source:* Ministry of Finance, *the Financial Monthly*, various issues.

Moreover, the Treasury bills (TBs) interest rate has been increasing making TBs more attractive and leading to a decrease in the risk premium, as Figure 15 shows.

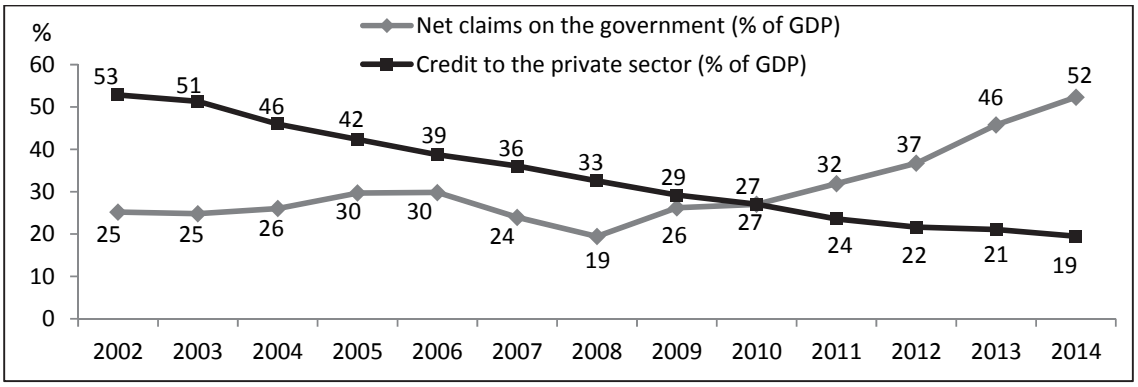
**Figure 15. Risk Premium (Real Lending Rate - Real Treasury Bills Rate, %)**




*Source:* Ministry of Finance, *the Financial Monthly*, various issues.

Large claims on the government have accumulated. The increase in net claims on the government was at the expense of credit to the private sector, in order to finance the increasing budget deficit (Figure 16).

**Figure 16. Net Claims on the Government are Crowding out Private Sector Credit**




*Source:* Ministry of Finance, *the Financial Monthly*, various issues.

The very high domestic debt ratio points to the need for adopting reforms to set the public debt to GDP ratio on a declining path and reduce the budget deficit. Lowering domestic financing of the budget deficit would crowd in private sector credit and support a deceleration of inflation.

*4.3.2. Reversed causality: Possible explanations*

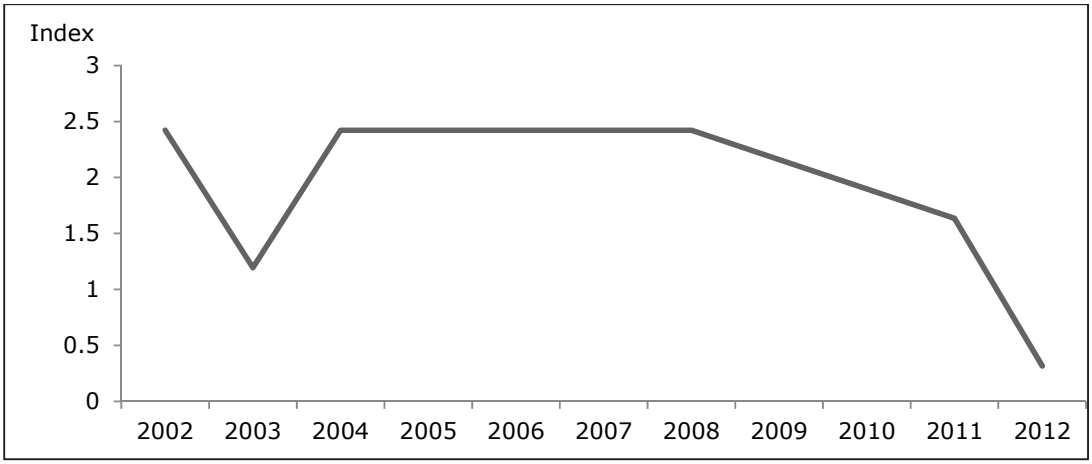
Evidence in favor of a reversed causality running from the current account deficit to the budget deficit implies that a deterioration in the external balance will be accompanied by an increase in government's expenditures and/or a decrease in government's revenues and hence by a deterioration in the budget balance. Three examples could be cited. First, an increase in the oil import bill as a result of rising global oil prices is expected to increase the petroleum products subsidy bill in the budget balance, decrease tax

revenues on profits from the Egyptian General Petroleum Corporation (EGPC) and lower non-tax revenues on dividends from the EGPC. Second, a decrease in non-oil merchandize imports can result in lower tax revenues on international trade, contributing to the increase in the budget deficit. Finally, a decline in Suez Canal dues can have a negative impact on the current account and will show in the budget deficit by lowering non-tax revenues on dividends from the Suez Canal Authority.

*4.3.3. Partial rejection of the FH puzzle: Possible explanations*

Partially rejecting the FH puzzle for Egypt implies that despite the strong correlation between domestic savings and investment, the country is open to foreign capital inflows to finance investments. However, Egypt's degree of capital account openness as measured by the index introduced by Chinn and Ito (2006),[5] has decreased severely in recent years indicating a slow pace of financial integration particularly in the wake of the 2011 revolution (Figure 17).

**Figure 17. The Evolution of the KAOPEN Index for Egypt (2002-2012)**

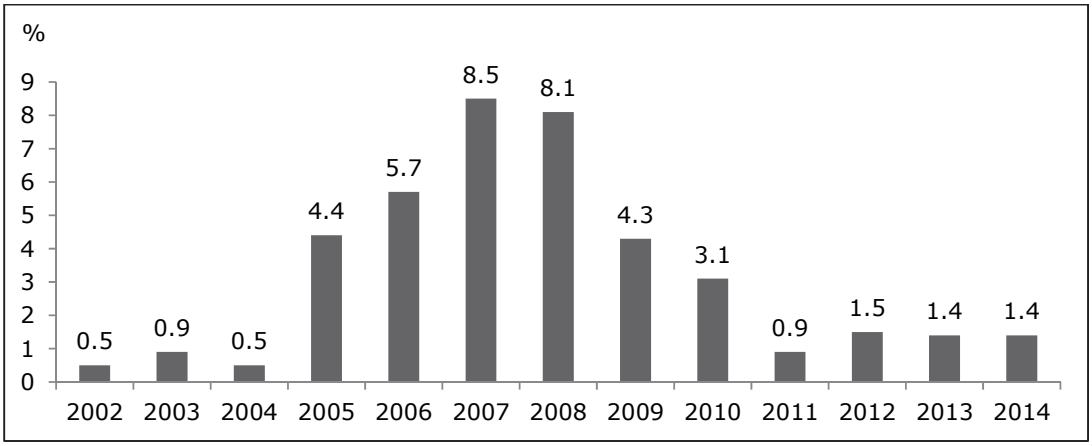



*Source:* Constructed by the authors using the KAOPEN index developed by Chinn and Ito (2006).

Since 2008/2009, inflows of foreign direct investment (FDI) have been declining (Figure 18).

[5] The Chinn-Ito index (KAOPEN) is an index measuring a country's degree of capital account openness. The index was initially introduced in Chinn and Ito (2006). KAOPEN is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). This index measures capital account liberalization using four variables: the presence of multiple exchange rates, restrictions on current account transactions, restrictions on capital account transactions and the degree of commercial openness. The higher the index, the weaker the restrictions on capital movements.

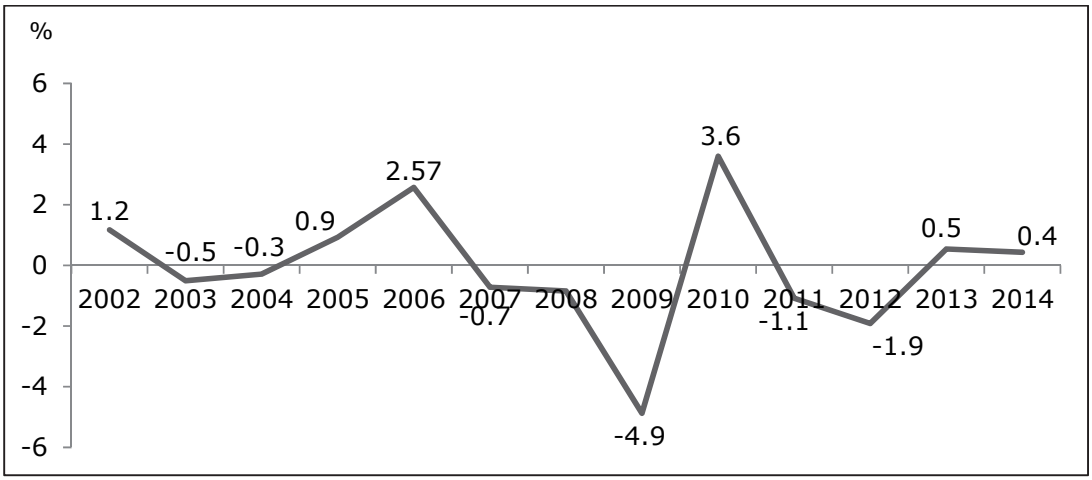
**Figure 18. Net Foreign Direct Investment in Egypt (2002-2014, % of GDP)**




*Source:* The Central Bank of Egypt, *Monthly Statistical Bulletin*, various issues.

In addition, net foreign portfolio investment has been highly volatile (Figure 19).

**Figure 19. Net Foreign Portfolio Investment in Egypt (2002-2014, % of GDP)**




*Source:* The Central Bank of Egypt, *Monthly Statistical Bulletin*, various issues.

## 5. Conclusion and Policy Implications

Our empirical findings reveal that the twin deficit hypothesis according to which an increase in the budget deficit leads to an increase in the current account is rejected for Egypt during the period 2002-2014. A reversed causality running from the current account to the budget deficit exists and the FH puzzle is partially rejected.

The twin deficit hypothesis is not valid in Egypt as a result of heavy "domestic" financing of the budget deficit. Domestic financing of the budget deficit accumulated large claims on the government at the expense of credit to the private sector. A substantial increase in the outstanding stock of Treasury bills pushed up their interest rate, making them more attractive and leading to a decrease in the risk premium.

The already very high domestic debt ratio points to the need for adopting reforms to set the public debt to GDP ratio on a declining path and reduce the budget deficit. Lowering domestic financing of the budget deficit would crowd in private sector credit and support a deceleration of inflation.

Egypt's current account deficit is mainly attributed to the decrease in private savings as a share of GDP and the appreciation of the country's overvalued real effective exchange rate. To sustain or raise consumption, Egypt borrowed abroad or ran down its foreign assets. Appreciation of the overvalued real effective exchange rate undermined Egypt's competitiveness, discouraged external demand and reduced exports, causing deterioration in the current account balance.

Policy measures to mobilize domestic private savings would have a positive impact on the current account. Identifying the main determinants of domestic private savings in Egypt (for example, per capita disposable income; expected inflation; nominal interest rate; access to private credit; demographics; financial education; income distribution, etc.) is an important area for future research.

Policies supporting investment would raise Egypt's capital stock more quickly and therefore raise the country's future output faster, even if increasing investment results in a current account deficit today.

Greater exchange rate flexibility could enhance Egypt's competitiveness, strengthen external demand and increase exports, causing an improvement in the current account balance. Also, more exchange rate flexibility would make the Egyptian economy less vulnerable to eventual speculative capital flows.

Evidence in favor of a reversed causality running from the current account deficit to the budget deficit implies that deterioration in the external balance will induce deterioration in the budget balance. Three examples are cited in this paper. First, an increase in the oil import bill as a result of rising global oil prices is expected to increase the petroleum products subsidy bill in the budget balance, decrease tax revenues on profits from the Egyptian General Petroleum Corporation (EGPC) and lower non-tax revenues on dividends from the EGPC. Second, a decrease in non-oil merchandize imports can result in lower tax revenues on international trade, contributing to the increase in the budget deficit. Finally, a decline in Suez Canal dues can have a negative impact on the current account and will show in the budget deficit by lowering non-tax revenues on dividends from the Suez Canal Authority.

This reversed causation indicates that the current account deficit is a good predictor of the budget deficit. Policy efforts should primarily target the components of the current account itself. Adopting a sound energy pricing mechanism would help mitigate the

impact of changes in the oil import bill on the petroleum products subsidy bill and the tax and non-tax revenues on profits and dividends from the Egyptian General Petroleum Corporation (EGPC). The current Suez Canal expansion project is expected to boost Suez Canal dues and hence increase dividends of the Suez Canal Authority as a share of government non-tax revenues. Also, it is necessary to resort to other policies like export promotion.

Although Egypt's domestic saving and investment rates are strongly correlated (the correlation coefficient = 0.75), capital mobility in Egypt is high and foreign capital inflows contribute to the finance of investments. This makes us *partially* reject the FH puzzle.

However, the capital account liberalization index for Egypt (KAOPEN) decreased severely in recent years indicating a slow pace of financial integration in the wake of the 2011 revolution, the inflows of foreign direct investment (FDI) have been declining since 2008/2009 and net foreign portfolio investment has been highly volatile.

Policies to attract foreign direct investment to Egypt might help reduce the cost of external borrowing for the government and can also increase tax revenues due to the increase in domestic production of certain commodities of backward and forward industries.

**Appendix 1**

**Table A.1. Unit Root Tests for Levels**

| | | | | |
|---|---|---|---|---|
| | **CAB/GDP** | | | |
| | Test stat. | 1% critical value | 5% critical value | 10% critical value |
| Trend and constant | -4.479 | -4.15 | -3.5 | -3.18 |
| Constant | -3.048 | -3.58 | -2.93 | -2.6 |
| No trend no const. | -3.078 | -2.62 | -1.95 | -1.61 |
| | **BUD/GDP** | | | |
| | Test stat. | 1% critical value | 5% critical value | 10% critical value |
| Trend and constant | -8.239 | -4.15 | -3.5 | -3.18 |
| Constant | -7.028 | -3.58 | -2.93 | -2.6 |
| No trend no const. | -2.28 | -2.62 | -1.95 | -1.61 |
| | **INV/GDP** | | | |
| | Test stat. | 1% critical value | 5% critical value | 10% critical value |
| Trend and constant | -6.044 | -4.15 | -3.5 | -3.18 |
| Constant | -5.835 | -3.58 | -2.93 | -2.6 |
| No trend no const. | -1.089 | -2.62 | -1.95 | -1.61 |
| | **Ln(Real GDP/Cap)** | | | |
| | Test stat. | 1% critical value | 5% critical value | 10% critical value |
| Trend and constant | -5.611 | -4.178 | -3.512 | -3.187 |
| Constant | -0.254 | -3.6 | -2.938 | -2.604 |
| No trend no const. | -2.821 | -2.625 | -1.95 | -1.609 |
| | **Ln(REER)** | | | |
| | Test stat. | 1% critical value | 5% critical value | 10% critical value |
| Trend and constant | -1.017 | -4.077 | -3.467 | -3.16 |
| Constant | -0.674 | -3.534 | -2.904 | -2.587 |
| No trend no const. | -0.982 | -2.607 | -1.95 | -1.61 |

**Table A.2. Unit Root Tests for First Differences**

| | ΔCAB/GDP | | | |
|---|---|---|---|---|
| | Test stat. | 1% critical value | 5% critical value | 10% critical value |
| Trend and constant | -11.411 | -4.159 | -3.504 | -3.182 |
| Constant | -11.532 | -3.587 | -2.933 | -2.601 |
| No trend no const. | -11.657 | -2.622 | -1.95 | -1.61 |
| | **ΔBUD/GDP** | | | |
| | Test stat. | 1% critical value | 5% critical value | 10% critical value |
| Trend and constant | -12.624 | -4.159 | -3.504 | -3.182 |
| Constant | -12.756 | -3.587 | -2.933 | -2.601 |
| No trend no const. | -12.89 | -2.622 | -1.95 | -1.61 |
| | **ΔINV/GDP** | | | |
| | Test stat. | 1% critical value | 5% critical value | 10% critical value |
| Trend and constant | -13.361 | -4.159 | -3.504 | -3.182 |
| Constant | -13.464 | -3.587 | -2.933 | -2.601 |
| No trend no const. | 13.6 | -2.622 | -1.95 | -1.61 |
| | **ΔLnReal GDP/Cap)** | | | |
| | Test stat. | 1% critical value | 5% critical value | 10% critical value |
| Trend and constant | -8.505 | -4.187 | -3.516 | -3.19 |
| Constant | -8.608 | -3.607 | -2.941 | -2.605 |
| No trend no const. | -7.073 | -2.626 | -1.95 | -1.608 |
| | **ΔLn(REER)** | | | |
| | Test stat. | 1% critical value | 5% critical value | 10% critical value |
| Trend and constant | -5.554 | -4.08 | -3.468 | -3.161 |
| Constant | -5.588 | -3.535 | -2.904 | -2.587 |
| No trend no const. | -5.577 | -2.607 | -1.95 | -1.61 |

**Table A.3. Vector Auto-Regressive Model (1)**

| | ΔCAB/GDP | ΔBUD/GDP | ΔLnReal GDP/Cap) |
|---|---|---|---|
| CAB/GDP(-1) | 0.288* | -0.0694 | 0.0849 |
| | (0.151) | (0.314) | (0.286) |
| CAB/GDP(-2) | -0.0838 | 0.183 | 0.336 |
| | (0.146) | (0.303) | (0.276) |
| CAB/GDP(-3) | -0.0291 | -0.644** | -0.0471 |
| | (0.150) | (0.311) | (0.283) |
| CAB/GDP(-4) | 0.122 | 0.0268 | 0.644** |
| | (0.132) | (0.274) | (0.250) |
| BUD/GDP(-1) | -0.0385 | -0.125 | 0.325** |
| | (0.0679) | (0.141) | (0.128) |
| BUD/GDP(-2) | 0.00736 | -0.116 | 0.128 |
| | (0.0755) | (0.157) | (0.143) |
| BUD/GDP(-3) | -0.178** | 0.0253 | 0.214 |
| | (0.0706) | (0.147) | (0.134) |
| BUD/GDP(-4) | 0.0684 | 0.291* | 0.0261 |
| | (0.0775) | (0.161) | (0.146) |
| LnReal GDP/Cap)(-1) | -0.123** | 0.231** | 0.289*** |
| | (0.0517) | (0.107) | (0.0977) |
| Ln(Real GDP/Cap)(-2) | 0.0800 | -0.171 | -0.142 |
| | (0.0577) | (0.120) | (0.109) |
| Ln(Real GDP/Cap)(-3) | -0.0854 | 0.0127 | 0.174 |
| | (0.0576) | (0.120) | (0.109) |
| Ln(Real GDP/Cap)(-4) | 0.0803 | -0.131 | 0.756*** |
| | (0.0550) | (0.114) | (0.104) |
| Constant | -0.290*** | -0.443** | 0.609*** |
| | (0.0993) | (0.206) | (0.188) |
| Observations | 44 | 44 | 44 |

**Table A.4. Vector Auto-Regressive Model (2)**

| | ΔCAB/GDP | ΔBUD/GDP | ΔLn(GDP/Cap) | ΔINV/GDP | ΔLn(REER)\ |
|---|---|---|---|---|---|
| CAB/GDP(-1) | 0.104 | 0.258 | 0.116 | -0.0116 | -0.443 |
| | (0.160) | (0.315) | (0.324) | (0.244) | (0.352) |
| CAB/GDP(-2) | -0.267 | -0.499 | -0.413 | 0.0578 | 0.905** |
| | (0.183) | (0.361) | (0.371) | (0.279) | (0.403) |
| CAB/GDP(-3) | 0.0238 | -0.336 | 0.0173 | 0.454* | 0.434 |
| | (0.161) | (0.316) | (0.325) | (0.245) | (0.354) |
| CAB/GDP(-4) | 0.0432 | -0.569* | 0.0529 | 0.0669 | -0.273 |
| | (0.172) | (0.339) | (0.348) | (0.262) | (0.378) |
| BUD/GDP(-1) | -0.0868 | -0.302** | 0.311** | 0.0953 | 0.0144 |
| | (0.0641) | (0.126) | (0.130) | (0.0975) | (0.141) |
| BUD/GDP(-2) | 0.0519 | -0.169 | 0.209 | 0.0321 | -0.227 |
| | (0.0802) | (0.158) | (0.162) | (0.122) | (0.176) |
| BUD/GDP(-3) | -0.163** | -0.352** | 0.0634 | -0.272** | -0.181 |
| | (0.0750) | (0.148) | (0.152) | (0.114) | (0.165) |
| BUD/GDP(-4) | 0.0370 | 0.299* | 0.0912 | -0.175 | -0.0605 |
| | (0.0801) | (0.158) | (0.162) | (0.122) | (0.176) |
| Ln(Real GDP/Cap)(-1) | -0.0999* | -0.00576 | 0.303** | 0.103 | 0.314** |
| | (0.0588) | (0.116) | (0.119) | (0.0894) | (0.129) |
| Ln(Real GDP/Cap)(-2) | 0.115 | 0.110 | 0.0213 | 0.109 | -0.319** |
| | (0.0728) | (0.143) | (0.147) | (0.111) | (0.160) |
| Ln(Real GDP/Cap)(-3) | -0.137* | -0.313* | -0.00579 | -0.0308 | 0.0205 |
| | (0.0824) | (0.162) | (0.167) | (0.125) | (0.181) |
| Ln(Real GDP/Cap)(-4) | 0.0412 | 0.103 | 0.672*** | -0.166 | 0.0239 |
| | (0.0674) | (0.133) | (0.136) | (0.103) | (0.148) |
| INV/GDP(-1) | 0.0422 | 0.413*** | 0.531*** | 0.246** | 0.303* |
| | (0.0768) | (0.151) | (0.155) | (0.117) | (0.169) |
| INV/GDP(-2) | -0.0179 | 0.424** | 0.154 | 0.238* | -0.388* |
| | (0.0919) | (0.181) | (0.186) | (0.140) | (0.202) |
| INV/GDP(-3) | -0.0483 | 0.0394 | -0.191 | -0.189 | -0.159 |
| | (0.0940) | (0.185) | (0.190) | (0.143) | (0.207) |
| INV/GDP(-4) | -0.0679 | 0.221 | -0.266 | 0.529*** | 0.184 |
| | (0.0861) | (0.169) | (0.174) | (0.131) | (0.189) |
| Ln(REER)(-1) | -0.254*** | -0.344*** | -0.203 | 0.0104 | 1.348*** |
| | (0.0629) | (0.124) | (0.127) | (0.0958) | (0.138) |
| Ln(REER)(-2) | 0.147 | 0.632*** | 0.186 | -0.0292 | -0.670*** |
| | (0.113) | (0.223) | (0.230) | (0.173) | (0.249) |
| Ln(REER)(-3) | 0.137 | -0.848*** | -0.166 | 0.0517 | 0.586** |
| | (0.113) | (0.222) | (0.228) | (0.171) | (0.248) |
| Ln(REER)(-4) | -0.104* | 0.480*** | 0.0589 | -0.0149 | -0.335** |
| | (0.0616) | (0.121) | (0.125) | (0.0938) | (0.136) |
| Constant | -0.130 | -0.587*** | 0.622*** | 0.000703 | 0.519** |
| | (0.107) | (0.210) | (0.216) | (0.163) | (0.235) |
| Observations | 44 | 44 | 44 | 44 | 44 |

**Table A.5. Selection-Order Criteria for ECM1**

| Lag | LL | LR | df | P | FPE | AIC | HQIC | SBIC |
|---|---|---|---|---|---|---|---|---|
| 0 | 167.482 | | | | 1.10E-07 | -7.47644 | -7.43133 | -7.35479 |
| 1 | 252.449 | 169.93 | 9 | 0 | 3.60E-09 | -10.9295 | -10.749 | -10.4429 |
| 2 | 257.593 | 10.288 | 9 | 0.328 | 4.30E-09 | -10.7542 | -10.4384 | -9.90267 |
| 3 | 278.147 | 41.108 | 9 | 0 | 2.60E-09 | -11.2794 | -10.8283 | -10.0629 |
| 4 | 303.81 | 51.327* | 9 | 0 | 1.3e-09* | -12.0368* | -11.4504* | -10.4554* |

**Table A.6. Johansen Co-integration Rank Test for ECM1**

| Rank | Parms | LL | Eigenvalue | Trace statistic | 5% critical value |
|---|---|---|---|---|---|
| 0 | 27 | 259.3276 | . | 64.3123 | 24.31 |
| 1 | 32 | 289.3113 | 0.74408 | 4.3449* | 12.53 |
| 2 | 35 | 291.4082 | 0.09091 | 0.151 | 3.84 |
| 3 | 36 | 291.4837 | 0.00343 | | |

**Table A.7. Selection-Order Criteria for ECM2**

| Lag | LL | LR | df | p | FPE | AIC | HQIC | SBIC |
|---|---|---|---|---|---|---|---|---|
| 0 | 296.709 | | 1.20E-12 | -13.2595 | -13.1843 | -13.0567 | | |
| 1 | 438.737 | 284.06 | 25 | 0 | 5.90E-15 | -18.5789 | -18.1278 | -17.3625* |
| 2 | 474.039 | 70.604 | 25 | 0 | 3.90E-15 | -19.0472 | -18.2201 | -16.817 |
| 3 | 504.415 | 60.751 | 25 | 0 | 3.40E-15 | -19.2916 | -18.0885 | -16.0476 |
| 4 | 550.086 | 91.343* | 25 | 0 | 1.7e-15* | -20.2312* | -18.6522* | -15.9735 |

**Table A.8. Johansen Tests for Cointegration for ECM2**

| Rank | Parms | LL | Eigenvalue | Trace statistic | 5% critical value |
|---|---|---|---|---|---|
| 0 | 80 | 512.4028 | . | 75.3662 | 68.52 |
| 1 | 89 | 525.1365 | 0.43943 | 49.8987 | 47.21 |
| 2 | 96 | 537.2484 | 0.42336 | 25.6749* | 29.68 |
| 3 | 101 | 545.5415 | 0.31405 | 9.0888 | 15.41 |
| 4 | 104 | 549.4898 | 0.16429 | 1.1921 | 3.76 |
| 5 | 105 | 550.0859 | 0.02673 | | |

**References**


Abbas, S. M. Ali, Jacques Bouhga-Hagbe, Antonio J. Fatas, Paolo Mauro, and Ricardo Velloso. 2010. "Fiscal Policy and the Current Account." IMF Working Paper no. 10/121. Washington, D.C.: International Monetary Fund.

Akbostanci, E., and G. Tunc. 2002. "Turkish Twin Deficits: An Error Correction Model of Trade Balance." Economic Research Center (ERC) Working Papers in Economics 01/06.

Alkswani, M. 2000. "The Twin Deficits Phenomenon in Petroleum Economy: Evidence from Saudi Arabia." Paper presented at the seventh annual conference of the Economic Research Forum (ERF).

Aristovnik, Aleksander, and Sandra Djuric. 2010. "Twin Deficits and the Feldstein-Horioka Puzzle: A Comparison of the EU Member States and Candidate Countries." Munich Personal RePEc Archive-MPRA Paper No. 24149, University of Ljubljana, Faculty of Administration, Slovenia, July. Online at http://mpra.ub.uni-muenchen.de/24149.

Bachman, D. D. 1992. "Why is the US Current Account Deficit So Large? Evidence from Vector Auto-regressions." *Southern Economic Journal* 59 (2): 232- 240.

Bagheri, Farzane, Salma Keshtkaran, and Fatemeh Daroghe Hazrati. 2012. "Twin Deficits and Feldstein-Horioka Puzzle in the Case of Iran." *Journal of Social and Development Sciences* 3 (5): 167- 171, May.

Baharumshah, Ismail, and Lau. 2005. "Twin Deficit Hypothesis and Capital Mobility: The ASEAN-5 Perspective." *Journal Pengurusan* 29: 15-32.

Barro, R. J. 1974. "Are Government Bonds Net Wealth?" Journal of Political Economy, 82 (6), 1095-1117.

———. 1989. "The Ricardian Approach to Budget Deficits." *Journal of Economic Perspectives* 3 (2): 37-52.

Beetsma, R. M. Giuliodori, and F. Klaassen. 2007. "The Effects of Public Spending Shocks on Trade Balances and Budget Deficits in the European Union." *Journal of the European Economic Association* 6 (2-3): 414-23.

Chinn, Menzie D., and Hiro Ito. 2006. "What Matters for Financial Development? Capital Controls, Institutions, and Interactions." *Journal of Development Economics* 81 (1): 163-192.

Corsetti, G., G. Muller. 2006. "Twin deficits: Squaring Theory, Evidence and Common Sense." *Economic Policy* 48: 597- 638.

Darvas, Zsolt. 2014. "Real Effective Exchange Rates for 178 Countries: A New Database." Bruegel.

El-Baz, Osama. 2014. "Empirical Investigation of the Twin Deficits Hypothesis: The Egyptian Case (1990-2012)." MPRA Paper No. 53428, Munich Personal RePEc Archive, 5 February.

Enders, W., and B. Lee. 1990. "Current Account and Budget Deficits: Twins or Distant Cousins?" *Review of Economics and Statistics* 72 (3): 373-81.

Feldstein, M., and C. Horioka 1980. "Domestic Saving and International Flows." *Economic Journal* 90 (358): 314- 329.

Fidrmuc, Jarko. 2003. "The Feldstein-Horioka Puzzle and Twin Deficits in Selected Economies." *Economics of Planning* 36 (2): 135-152.

Georgopoulos, George, and Walid Hejazi. 2009. "The Feldstein-Horioka Puzzle Revisited: Is the Home-Bias Much Less?" *International Review of Economics and Finance* 18: 341-350.

Hakro, A. N. 2009. "Twin Deficits Causality Link-Evidence from Pakistan." *International Research Journal of Finance and Economics* 24: 54-70.

Hashemzadeh, N., and L. Wilson. 2006. "The Dynamics of Current Account and Budget Deficits in Selected Countries in the Middle East and North Africa." *International Research Journal of Finance and Economics* 5: 113- 129.

Herrera, S., H. Selim, H. Youssef, and C. Zaki. 2010. "Egypt Beyond the Crisis - Medium Term Challenges for Sustained Growth.'' World Bank Policy Research Working Paper 5451, October. Washington, D.C.: World Bank.

IMF (International Monetary Fund). 2010. "Arab Republic of Egypt: 2010 Article IV Consultation - Staff Report." April, 2010. Washington, D.C.: IMF.

———. 2015. "Arab Republic of Egypt: 2014 Article IV Consultation-Staff Report." February, 2015. Washington, D.C.: IMF.

Islam, M. 1998. "Brazil's Twin Deficits: An Empirical Examination." *Atlantic Economic Journal* 26 (2): 121- 129.

Khalid, A. M., and W. T. Guan. 1999. "Causality Tests of Budget and Current Account Deficits: Cross-Country Comparisons." *Empirical Economics* 24: 389-402.

Kim, S., and N. Roubini. 2008. "Twin Deficit or Twin Divergence? Fiscal Policy, Current Account, and Real Exchange Rate in the U.S." *Journal of International Economics* 74: 362- 383.

Lau, Evan, and Ahmad Zubaidi Baharumshah. 2004. "On the Twin Deficits Hypothesis: Is Malaysia Different?" Pertanika Journal of Social Sciences and Humanities, 12 (2): 87-100.

Lau, E., and T. C. Tang. 2009. "Twin Deficits in Cambodia: Are there Reasons for Concern? An Empirical Study." Discussion Paper 11/09, Monash University, Department of Economics.

Marinheiro, C. F. 2006. "Ricardian Equivalence, Twin Deficits and the Feldstein-Horioka Puzzle in Egypt." ESTUDOS DO GEMF No. 7, Faculdade de Economia da Universidade de Coimbra, Portugal, May.

Marinheiro, C.F. 2008. "Ricardian Equivalence, Twin Deficits and the Feldstein-Horioka Puzzle in Egypt." *Journal of Policy Modeling*, 30, 1041-1056.

Mehrara, M., and A. Zamanzadeh. 2011. "Testing Twin Deficits Hypothesis in Iran." *Interdisciplinary Journal of Research in Business* 1 (9): 7-11.

Monacelli, T., and R. Perotti. 2007. "Fiscal Policy, the Trade Balance and the Real Exchange Rate: Implications for International Risk Sharing." Universita Bocconi, Milan, Italy.

Mukhtar, Tahir, Muhammad Zakaria, and Mehboob Ahmed. 2007. "An Empirical Investigation for the Twin Deficits Hypothesis in Pakistan." *Journal of Economic Cooperation* 28 (4): 63-80.

Muller, G. J. 2004. "Understanding the Dynamic Effects of Government Spending on Foreign Trade." Working Paper 2004/27, European University Institute.

Nazier, Hanan, and Mona Essam. 2012. "Empirical Investigation of Twin Deficits Hypothesis in Egypt (1992-2010)." *Middle Eastern Finance and Economics*, no. 17: 45-58.

Neaime, S. 2008. "Twin Deficits in Lebanon: A Time Series Analysis." Lecture and Working Paper Series, No. 2, Institute of Financial Economics, American University of Beirut.

Normandin, M. 1999. "Budget Deficit Persistence and the Twin Deficits Hypothesis." *Journal of International Economics* 49: 171-193.

Obstfeld, M. and Rogoff, K. 1996. *Foundations of International Macroeconomics.* Cambridge, MA: MIT Press. 832p. ISBN-13: 978-0262150477.

Ratha, A. 2011. "Twin Deficits or Distant Cousins? Evidence from India." St. Cloud State University, Economics Faculty Working Papers, available at: http://repository.stcloudstate.edu/egi/viewcontent.cgi?article=1004&context=econ_wps

Roubini, N. 1988. "Current Account and Budget Deficits in an Intertemporal Model of Consumption and Taxation Smoothing. A Solution to the Feldstein-Horioka Puzzle?" NBER Working Paper, No. 2773.

Siddiqui, M. 2010. "Twin Deficits: An Empirical Analysis in the Case Pakistan", World Applied Sciences Journal, 8 (11), 1398-1400.

Summers, L. 1988. "Tax policy and international competitiveness." In Frenkel, J. A. (ed.), International Aspects of Fiscal Policies, NBER Conference Report, Chicago: University of Chicago Press, 349-375.

Vamvoukas, G.A. 1997. "A Note on Budget Deficits and Interest Rates: Evidence from a Small Open Economy." *Southern Economic Journal* 63: 803-11.

_____. 1999. "The Twin Deficits Phenomenon: Evidence from Greece." *Applied Economics* 31 (9): 1093- 1100.

Zubaidi, Lau and Khalid. 2006. "Testing Twin Deficits Hypothesis using VARs and Variance Decomposition." *Journal of the Asia Pacific Economy* 11 (3), 331-354.