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Egypt**

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Ricardian Equivalence, Twin Deficits, and the Feldstein-Horioka puzzle in Egypt

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Abstract

Egypt has presented important budget imbalances. This paper tries to evaluate whether Egypt's public deficit has had any impact on current account imbalances, examining the validity of the twin deficit hypothesis for Egypt. We conclude for the presence of a (weak) long-run relationship between the budget deficit and the current account deficit. Yet, we reject the twin-deficit hypothesis: we found evidence in favour of a reverse Granger-causality running from the external deficit to the budget deficit. Further, we conclude against the validity of full Ricardian equivalence in Egypt and present evidence in favour of a high degree of capital mobility.

JEL classification: F32, E62, H6, O55

Keywords: Twin deficits; current account deficit; Feldstein-Horioka puzzle; Egypt; Fiscal policy.

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1. Introduction

The purpose of this paper is to determine whether the budget deficit leads to an external deficit in Egypt, i.e. whether there is evidence in favour of a twin deficit.

In the 1980's both the US external deficit and the budget deficit increased significantly. As a result of this co-movement, several economists attributed a significant portion of the deterioration in the external balance to the emergence of record budget deficits. This causal relationship is known as the twin deficits hypothesis. As current account imbalances may hinder economic growth, this is a relevant topic for developing countries like Egypt.

If the twin deficit hypothesis is correct, the correct policy prescription would be a reduction in the budget deficit via a tax increase. The fiscal consolidation would directly decrease the budget deficit, and would indirectly reduce the external deficit, due to the reduction of the consumption of imported goods induced by the decline of private after-tax incomes (see Normandin (1999)).

There are some traditional theoretical explanations for the relation between the budget deficit (BDEF) and the current account deficit (CAD). Firstly, and according to the Mundell-Fleming framework, an increase in the BDEF 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 CAD [see for example Kouassi, Mougoué *et al.* (2004)]. Secondly, according to the Keynesian absorption theory, an increase in the BDEF would induce domestic absorption (an expansion of aggregated demand) and hence, an increase in imports, causing an increase or a worsening of the CAD. Furthermore, the twin deficit issue is also related to the degree of international capital mobility and to the Feldstein and Horioka (1980) puzzle. If in fact savings and investments not are highly correlated, reflecting high capital mobility, then the BDEF and the CAD are expected to move together.

This traditional view is however challenged by the Ricardian equivalence hypothesis of Barro (1974) and Barro (1989). Ricardian equivalence states that, for a given expenditure

path, the substitution of debt for taxes has no effect on aggregate demand nor on interest rates. As a result, it implies that a tax increase would reduce the budget deficit but would not alter the external deficit, since altering the means that the government uses to finance its expenditures does not affect private spending nor national saving.

Yet, when Ricardian equivalence does not hold, there is scope for a causality relationship between the current account deficit and the budget deficit. And, besides the already discussed twin deficit hypothesis –that implies a positive and unidirectional Granger-causality running from the budget deficit to the current account deficit-, there are two other possibilities. Firstly, it is also possible to find a unidirectional causality running from the current account to the budget deficit. This *reverse causation* is designated in the terminology of Summers (1988) by current account targeting. This is the case when a deterioration in the current account results into diminished economic growth, and subsequently leads to a deterioration in the budget balance. Secondly, a *bi-directional causality* might emerge between the two deficits. Secondly, a *bi-directional causality* might emerge between the two deficits. In this case, it does not suffice to cut the budget deficit to eliminate an external deficit. Attention should be devoted as well to the exchange rate policy, to the determination of interest rates and to export promotion policies.

The structure of the paper is as follows. Section 2 outlines the methodology to test for the validity of the Ricardian equivalence and the twin deficit hypotheses. The link with the Feldstein-Horioka puzzle is also examined. Section 3 presents the empirical results for Egypt. Section 4 concludes.

2. Ricardian equivalence, twin deficits, and the Feldstein-Horioka puzzle

This section presents the methodology we will use to test for the validity of both the Ricardian equivalence (RE) hypothesis and the twin deficit hypothesis. It starts by briefly reviewing empirical literature on the RE relevant to the case of a developing country like Egypt.

2.a. *Ricardian equivalence*

Barro (1974) seminal paper has originated a huge amount of theoretical and empirical literature on the Ricardian equivalence issue. Here we will focus on testing the equivalence hypothesis using a reduced form consumption function. For more extended surveys see Seater (1993), Bernheim (1987), and Marinheiro (2003).

The Ricardian equivalence theory questions the ability of government financing decisions to affect the level of aggregate demand, and consequently the current account. It states that, for a given expenditure path, the substitution of debt for taxes has no effect on aggregate demand nor in interest rates. The reasoning of this theory is as follows. The government's inter-temporal budget constraint implies that, for an unaltered level of government outlays, a tax cut now implies a tax increase in the future. Therefore, as government borrowing only postpones taxes into the future, consumers, who are simultaneously taxpayers, fully anticipating the increase in future taxes, do not consider the current tax cut, and the consequent increase in disposable income, as being permanent. Hence, consumers' inter-temporal budget restriction is left unchanged by the government financing decisions, and as a result, the consumption path is also unaffected: the increase in disposable income, resulting from the tax cut, is entirely saved.

Under Ricardian equivalence, consumers react to the tax cut by increasing their savings. This increase in private saving is used to buy the newly issued government bonds, enabling

consumers to have the resources to pay for the increase in future taxes.¹ Therefore, as private saving increases by the same amount as does the budget deficit, the national saving remains unaffected; this in turn leaves the interest rate unaltered. Moreover, in an open economy, the deficit has no effect on the current account balance because the increase in private saving it originates is enough to avoid the need of (additional) external financing. Consequently, the deficit does not crowd out capital, nor deteriorates the current account balance. This way, the public debt does not affect private sector wealth, or in other words, consumers do not consider government bonds as net wealth. Therefore, and for a given expenditure path, it is equivalent financing the public outlays by debt or by taxation: the timing of taxes has no effect on the private consumption.

The empirical literature on the RE hypothesis is vast and ever increasing. Most studies centre their attention on the reaction of private consumption to government financing decisions. Such studies usually estimate reduced-form consumption functions or Euler equations. Due to reduced Egyptian data-availability, we will just use two reduced forms consumption functions. The first comes from Bernheim (1987). It is in the author's own words the "second most used consumption equation":

$$C_t = \beta_0 + \beta_1 Y_t + \beta_2 (TX_t - G_t - r_t GB_{t-1}) + \beta_3 G_t + \beta_4 GB_t + \beta_5 W_t + X_t \bar{\beta} + \varepsilon_t \quad (1)$$

Where C denotes real consumption per capita, TX are tax revenues, G public consumption, GB is end of period government debt, W is private wealth, X is a vector of other exogenous variables and r is the interest rate. As $TX_t - G_t - r_t GB_{t-1}$ is the government budget surplus, equation (1) could be rewritten as:

$$C_t = \beta_0 + \beta_1 Y_t - \beta_2 BDEF_t + \beta_3 G_t + \beta_4 GB_t + \beta_5 W_t + X_t \bar{\beta} + \varepsilon_t \quad (2)$$

where $BDEF_t$ is the government budget deficit, i.e. the symmetric of the budget surplus. The advantage of this specification over other possibilities is the fact that it requires less information relatively to the public accounts: it just requires the value of the budget deficit

¹ Future taxes have to increase because the government needs the revenue to service this newly issued government debt.

and public consumption. Other specifications require the knowledge of direct tax revenues and public transfers.

The pure Keynesian view implies $\beta_2 = -\beta_1$, while the Ricardian view implies $\beta_2 = 0$. Which implies that β_2 measures the effect on current consumption of a \$1 tax-for-debt-swap. By testing those restrictions it is possible to accept (or reject) these two competitive theories.

Another simple specification is the one proposed by Perelman and Pestieau (1993). The authors estimate the following consumption function:

$$C_t = \alpha_0 + \alpha_1(Y_t - TX_t) + \alpha_2 BDEF_t + \alpha_3 W_t + \alpha_4 GB_t + \varepsilon_t \quad (3)$$

where as before, C is consumption, $Y - TX$ is disposable income, $BDEF$ is the government budget deficit, W is private wealth and GB is government debt. In this formulation, the sum $(\alpha_1 + \alpha_2)$ gives the effect on current consumption of a tax-for-deficit substitution, holding public expenditure unaltered. Hence, the Ricardian equivalence hypothesis is interpreted as implying $\alpha_1 + \alpha_2 = 0$ and $\alpha_4 = 0$, meaning that a \$1 tax for debt swap has no effect on current consumption. On the contrary, the pure Keynesian view implies that $\alpha_2 = 0$, i.e. that a tax-for-deficit swap has a strong impact on consumption.

2.b. Twin deficits

Most literature has focused on testing for causality between the budget deficit (BDEF) and the current account deficit (CAD).² Recent examples are those of Kouassi *et al.* (2004), and Fidrmuc (2003). The purpose of the empirical studies is in general to determine how is the CAD financed- by domestic or international capital markets- and to evaluate whether there is a causal link between the CAD and BDEF. If such a link exists, the next step is to find out whether the BDEF is a good predictor of the CAD, that is, does it Granger causes the CAD? Or is the other way round?³

The starting point is to study the time series properties of both the CAD and the BDEF. If both are integrated (non-stationary) it is appropriate to test for cointegration between them. If such a long run equilibrium relationship exists, the tests must be done using an Error Correction Model (ECM). If there is no cointegration the model reduces to a first difference model.⁴

According to Engle and Granger (1987), cointegrated variables have an ECM representation. Such a model has the advantage of incorporating in the same regression both the short-run dynamics and the departures from the long run relationship between the variables. If BDEF and CAD are cointegrated, it is possible to estimate the following ECM:

$$\Delta BDEF_t = \alpha_0 + \sum_{i=1}^p \alpha_{1,i} \Delta BDEF_{t-i} + \sum_{i=1}^q \alpha_{2,i} \Delta CAD_{t-i} + \beta_1 ECM_{t-1} + \xi_{1t} \quad (4)$$

² Most studies are potentially subject to problem of testing reduced forms: the correlations found cannot be interpreted in terms of causality in the economic sense, but just in the “Granger causality” sense. See Normandin (1999) for an interesting model based approach.

³ A related issue, which we will not address in this paper, is the *sustainability of the current account*. The sustainability of the current account implies the existence of a cointegration relationship between the exports and the imports of goods and services plus net interest payments and net transfer payments. In our view, this is conceptually equivalent to test for stationarity of the current account. A recent example is the paper by Wu, Chen *et al.* (2001) that tests for the sustainability of the current account in a panel cointegration framework for the G7 economies, using the methodology developed by Hakkio and Rush (1991). See also a similar approach in Baharumshah, Lau *et al.* (2003) applied to four ASEAN countries.

⁴ As it is well known, Granger-causality tests require the use of stationary, I(0), variables. If the variables in levels are not stationary, then first differences should be used.

$$\Delta CAD_t = \delta_0 + \sum_{i=1}^p \delta_{1,i} \Delta BDEF_{t-i} + \sum_{i=1}^q \delta_{2,i} \Delta CAD_{t-i} + \beta_2 ECM_{t-1} + \xi_{2t} \quad (5)$$

where Δ is the difference operator, α 's and δ 's are the short-term time invariant coefficients, β 's are the long-run coefficients of the lagged error-correction terms (ECM) derived from the long-run equation. The error terms ξ 's are serially uncorrelated white noise error terms. According to Kouassi *et al.* (2004: 506-507), the relevant testing hypothesis are:⁵

- H_1 : BDEF does not Granger cause CAD- if and only if $\delta_1 = 0$, for all i and $\beta_2 = 0$
- H_2 : CAD does not Granger cause BDEF- if and only if $\alpha_2 = 0$, for all i and $\beta_1 = 0$
- H_3 : there is no feedback between CAD and BDEF- if and only if $\alpha_2 = \delta_1 = 0$, for all i and $\beta_1 = \beta_2 = 0$.⁶

⁵ The hypothesis testing could be done performing either an LR test, a Wald test or an LM test. See further details in Kouassi *et al.* (2004: 508-509). In our empirical application we have used an LR test.

⁶ We should have in mind that when there is cointegration, at least one of the two long-run coefficients, β_1 or β_2 , must be statistically significant and negative.

2.c. *Twin deficit and the Feldstein-Horioka puzzle*

Since the twin deficit hypothesis is concerned with the source of financing of the external deficit, there is a clear link with the so-called Feldstein-Horioka puzzle. According to Feldstein and Horioka (1980), hereafter FH, in a world of perfect capital mobility domestic investment is not constrained by the amount of domestic saving, but only by the availability of funds in the international fully integrated capital market: saving in each country should respond to the worldwide opportunities for investment while investment in that country should be financed by the worldwide pool of capital.⁷ Hence, the validity of the twin-deficit hypothesis could be linked to the degree of international capital mobility. If Ricardian equivalence does not hold, an increase in the government borrowing requirements (an increase in the budget deficit) leads to a decrease in national saving. For a given amount of investment, this decrease in national saving leads in turn to an increase in the current account deficit if there is capital mobility. Hence, in a non-Ricardian world, perfect capital mobility results into a twin deficit. On the reverse, if the FH puzzle is present there is no twin deficit.

The paper Fidrmuc (2003) has the advantage of presenting a regression model that encompasses both the twin deficit hypothesis and the Feldstein-Horioka puzzle. The point of departure is the national accounting identity:

$$Y_t = C_t + G_t + I_t + X_t - M_t \quad (6)$$

where Y is the GDP, C is private consumption, G is public consumption, I is investment or gross capital formation (private and public), and $X-M$ is net exports. For simplicity, Fidrmuc (2003) identifies net exports with the current account. Rearranging, one obtains:

$$X_t - M_t = Y_t - (C_t + G_t) - I_t = S_t - I_t \quad (7)$$

This identity means that the trade balance must equal the difference between national savings (defined as output less total consumption) and investment (gross capital

⁷ The authors estimated a cross-section regression between investment and saving for developed countries. Perfect capital mobility would imply a null coefficient between both variables. The non-empirical validation of this hypothesis for the advanced economies leads to the well-known “Feldstein-Horioka puzzle”.

formation). It could be interpreted as providing a link between the external balance, and saving and investment decisions. Hence, an increase in investment has *ceteris paribus* a negative impact on the external trade balance. On the other hand, policies that reduce (public or private) consumption are expected to have a positive impact in the external balance via increased national savings.

Fidrmuc (2003: 137) goes further and subdivides savings into private (S^p) and public savings (S^g), the latter is assumed to correspond to the budget balance, and is defined as the difference between tax income (T) and expenditures (G). Private savings are defined as disposable income (Y-T) less private consumption. This results into:

$$X_t - M_t = (Y_t - T_t - C_t) + (T_t - G_t) - I_t = S_t^p + S_t^g - I_t \quad (8)$$

This identity motivates the testing of a long run relationship among the current account (proxied by X-M), the budget deficit and total investment. *The regression model proposed by Fidrmuc (2003)* is, with variables (in small caps) expressed as a share of GDP:

$$x_t - m_t = \gamma_1 + \gamma_2 (t_t - g_t) - \gamma_3 \text{inv}_t + \varepsilon_t \quad (9)$$

where (x-m) is interpreted as the current account, and (t-g) as the government budget balance. Investment share is given by “inv”. As follows from the discussion of the above identity (7), a positive coefficient is expected for the budget balance ($\gamma_2 > 0$), and a negative coefficient is expected for the coefficient on investment ($\gamma_3 > 0$). Hence, both a budget deficit and high investment are expected to worsen the current account. Moreover, the coefficients of both variables should equal the unity if countries are perfectly integrated into the world economy, and both the budget deficit and investment are financed on the world capital market. However, if the Feldstein-Horioka puzzle is present, the γ_3 coefficient is significantly lower than one. In this framework, a negative γ_2 coefficient leads to the rejection of the twin deficit hypothesis.

Due however to some simplifications made by Fidrmuc (2003), in our opinion, this regression is less well suited to test for the twin deficit hypothesis than to test for the FH puzzle. Let us consider an increase in public investment, while maintaining the other budget

variables unchanged. Expanding the total investment in (8) into public (I^g) and private investment (I^p) we can write:

$$X_t - M_t = (Y_t - T_t - C_t) + (T_t - G_t) - (I_t^p + I_t^g) = S_t^p + S_t^g - (I_t^p + I_t^g) \quad (10)$$

In a *ceteris paribus* situation, with perfect capital mobility, the increase in the public investment leads to a deterioration in the external balance, and deteriorates the budget balance, resulting into an effective twin deficit. However, this twin deficit is not captured by regression (9). The increase in the public investment leaves the amount of public saving ($S^g = T - G$) unchanged, since $(T - G)$ is just by definition government gross saving (also known as current budget balance).⁸ Hence, the deterioration of the trade balance must be captured entirely by the coefficient γ_3 . As a result, if the government gross saving is properly measured, this equation is unable to capture the deterioration of the trade balance that is due to an increase in the public investment: γ_2 will be nil in this episode. It is possible to mitigate this problem by using the government budget balance instead of $(T - G)$ in the estimation of equation (9).⁹

Another simplification made by Fidrmuc (2003) in his empirical application concerns the definition of the current account. The author identifies $X - M$ as being the current account. Although the trade balance ($X - M$) is the main component of the current account, the latter includes also net transfers. Hence, the proposed simplification is equivalent to assume that net transfers are nil, which is a strong assumption. Hence, in our empirical application we have used data for the current account and not for the trade balance. Besides being more adequate, the use of the current account enables also us not to estimate an identity.¹⁰ Notwithstanding these shortcomings, this is a very useful specification that enables to test two inter-related hypothesis.

⁸ Government gross saving does not equal the overall budget balance, since it ignores public investment (I^g) and public transfer payments. Government gross saving is simply the difference between total taxes and current public expenditures.

⁹ In fact, Fidrmuc (2003) uses in his empirical application the overall government budget balance, but does not provide any reason to his choice besides inaccurately stating that $(G - T)$ is the overall budget deficit. The use of the budget balance has however the advantage of allowing a departure from identity (7).

¹⁰ If in estimation of equation (9) we were using the trade balance ratio, along with the government gross saving instead of the budget balance, the constant term would be equal to average private saving, and the other coefficients would be biased to the unity, since we would be “estimating” an identity just omitting the private saving variable.

3. Empirical results for Egypt

This section presents the empirical results for Egypt. It starts by presenting the data. It then shows the results of testing for the Ricardian equivalence hypothesis, and for the twin deficit hypothesis.

3.a. *The data*

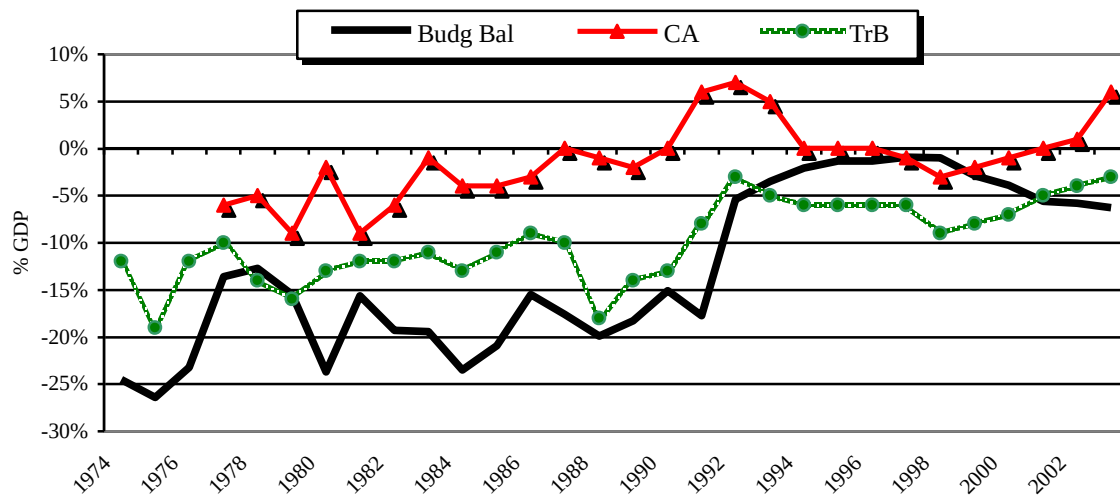
One major obstacle in this study is the lack of a reliable and long dataset for Egypt. The main data source is the International Financial Statistics (IFS) of the International Monetary Fund (IMF), complemented with other sources. The current account (CA) data is from the IFS. As the CA data is in USD, and GDP is only available in national currency, we have converted the latter into USD using the market exchange rate, in order to calculate the GDP ratios. Trade balance (TrB) data comes also from the IFS database and is expressed in national currency units. Due to several inconsistencies we have not used the IFS data on Egypt's budget balance.¹¹ Instead we have used the same series as in Marinheiro (2004). From 1974 to 1989 the source of deficit data is Mohammed Omran's dataset.¹² From 1990 onwards, we resorted to national data sources.¹³ More specifically we used data from several publications of the Ministry of Foreign Trade available at <http://www.moft.gov.eg>. Figure 1 shows the data in GDP ratios form.

¹¹ Egypt has signed in 1991 an IMF lead stabilisation programme to correct several of its macroeconomic imbalances, namely a large government budget deficit. However, such a large deficit is not reflected in IFS data. According to the IFS database, the deficit in the two years immediately before the stabilization programme was around 5.5% of GDP. If this figure were true, no stabilisation programme would be needed in 1991. Moreover, not even the IMF appears to believe that the IFS statistics are correct. In an IMF working paper, written by Subramanian (1997), the author presents an average deficit of 15% of GDP in the 3 years before the signing of the agreement, which is in clear contradiction with the IFS data. The source of data used in Subramanian (1997) is national data and IMF staff estimates. However, such data is not available from the IMF.

¹² Mohammed Omran is presently an economist at the Arab Monetary Fund (<http://www.amf.org.ae>) in Dubai. He is also the author of some papers regarding the Egypt's economy, such as Omran (2002).

¹³ See also <http://www.businesstodayegypt.com/printerfriendly.aspx?ArticleID=1431> on the difficulty of finding accurate statistics for Egypt.

Figure 1- External and internal balance for Egypt (%GDP)



Source of data: Budget balance- Marinheiro (2004); Current Account (in USD)- IFS; Trade Balance (in national currency)- IFS.

Visual inspection of the data reveals that both the trade balance and the government budget balance have been always negative. The same is not true for the current account: the current account deficit is smaller than the trade balance deficit, reflecting positive current transfers, mostly from Egyptians emigrants. The data shows also an improvement in both the budget balance and in the current account over the 1990s. This reflects the successful IMF stabilisation programme of 1991. Before the start of the programme, inflation was running above 20%, the budget deficit was above 15% of GDP, the real exchange rate depreciated by almost 30% between 1986/87 and 1990/91.¹⁴ Furthermore, the external debt amounted to more than 100% of GDP, and Egypt was not being able to maintain the external debt service, which consumed almost half the amount of foreign currency it received. Four years after the stabilisation programme the deficit was drastically reduced to 1.3% of GDP, with the bulk of the adjustment made during the first year.

In contrast with the 1990s, since 2000 the budget deficit and the current account have followed different paths: the budget balance has deteriorated while at the same time there is an improvement in the current account.¹⁵

¹⁴ Since mid 1980's, Egypt's fiscal year ends in June. We will take the information on the year $t/t+1$, as regarding the year $t+1$. For example, a deficit of 6.3% in the period 2002/2003 will be recorded by us as a deficit in 2003 of 6.3%.

¹⁵ Egypt is very much dependent on three sources of foreign reserves: tourism, remittances from Egyptians working abroad, and Suez Canal dues. Another, less important source of external revenues is oil exports, which are not as large nowadays as they were in 1970s/80s.

3.b. Unit root tests

We will start the formal testing procedure by analysing the unit-root properties of the relevant variables. For the testing of Ricardian equivalence we will need the variables expressed in real per capita values, while for the testing of the twin deficit hypothesis we will use GDP ratios. Table 3-1 shows both the T and Z variants of the ADF test, for the variables in levels and in first differences.

Test results point uniformly to the presence of a unit root in the data, meaning that just the first difference of the series is stationary. The only problematic variable is wealth. Since for Egypt there is no published statistic for wealth we have used as a proxy the sum of money plus quasi-money (data from the IFS database). The ADF T-test is unable to reject the null of a unit root for the first difference of this variable, while the ADF Z-test rejects this null at the 10% significance level. Thus, the variable could be I(2). In order to check the robustness of this finding we run a KPSS test for the first difference of our proxy for wealth. This test of Kwiatowski, Phillips *et al.* (1992) has the advantage of inverting the null for the stationarity test. The test results were unable to reject the null of stationarity. Hence, it can be safely concluded that the proxy for wealth is in fact an I(1) variable.

Table 3-1- The ADF test

Variable	Levels			First differences		
	No. lags	ADF T-test	ADF Z-test	No. lags	ADF T-test	ADF Z-test
<i>Real per capita values</i>						
External debt	0	-1.84	-3.84	0	-4.16	-22.5
Budget deficit	0	-1.41	-4.01	0	-6.01	-32.5
Consumption	0	-1.22	-1.73	0	-5.37	-29.4
Public consumption		-0.84	-1.71	0	-3.99	-21.7
GDP	0	-1.77	-2.72	0	-4.64	-25.5
Disposable Income	0	-0.84	-1.29	0	-5.37	-28.9
Wealth ^a	1	-0.63	-1.83	0	-2.20	-11.58 ^b
<i>GDP ratios</i>						
Current account	0	-1.97	-8.13	0	-6.19	-32.3
Trade balance	0	-1.89	-8.00	0	-5.29	-50.8
Budget deficit	0	-1.61	-4.21	0	-5.85	-31.7
Investment	0	-1.51	-4.65	0	-6.52	-29.5

Notes: The critical values at the 5% significance level of Hamilton (1994) are -2.93 and -13.3 for the ADF-T and ADF-Z tests, respectively. All tests were made considering a constant. The number of lags was selected by adding lags until a Lagrange-Multiplier test fails to reject the null of no first order serial correlation in the residuals. ^a The KPSS test is unable to reject the null of stationarity for the first difference of wealth for every lag window. ^b The null is rejected at the 10% level. Source of data: IFS, except for the budget deficit. The real per capita values were obtained using the population and CPI from IFS.

3.c. Ricardian equivalence

We start our tests for Egypt with the testing of the Ricardian equivalence hypothesis, using the above quoted Bernheim (1987)'s specification. As the variables are integrated, we have to test for cointegration. We used the the maximum likelihood cointegration test of Johansen (1988). This method relies on a Vector Autoregressive model (VAR) representation to make use of the information incorporated in the dynamic structure among the variables considered. Since we have very few observations, and quite a considerable number of variables, we restricted the number of lags in the VAR in first differences to just a single one. This could potential lead to problems of serial autocorrelation. In spite of this, the LM test for first order serial autocorrelation is unable to reject the null of no autocorrelation: the Chi-squared with 36 degrees of freedom is 45.781, with a p-value of 0.13. The test results are shown in Table 3-2.

Table 3-2- Johansen's maximum likelihood tests for cointegration for Bernheim's (1987) consumption function

Trace					λ max			
Eigenvalue	H ₀	H ₁	Trace	5% Critical Value	H ₀	H ₁	λ max	5% Critical Value
0.7522	$r = 0$	$r > 0$	106.57	94.15	$r = 0$	$r = 1$	40.46	39.37
0.5515	$r \leq 1$	$r > 1$	66.11	68.52	$r = 1$	$r = 2$	23.25	33.46
0.4011	$r \leq 2$	$r > 2$	42.86	47.21	$r = 2$	$r = 3$	14.87	27.07
0.3697	$r \leq 3$	$r > 3$	28.00	29.68	$r = 3$	$r = 4$	13.38	20.97
0.3349	$r \leq 4$	$r > 4$	14.61	15.41	$r = 4$	$r = 5$	11.83	14.07
0.0915	$r \leq 5$	$r > 5$	2.78	3.76	$r = 5$	$r = 6$	2.78	3.76

Notes: A lag length of one is used on the VAR ($p=1$). Critical values for the trace and maximum likelihood tests are from Osterwald-Lenum (1992). The estimations were obtained assuming a linear trend in the levels of the data, and only an intercept in the cointegration equations. Data are in real per capita values.

At the 5% significance level, both the trace and the maximum likelihood test indicate the presence of a single cointegrating vector. The estimated vector is shown in Table 3-3. Both the budget deficit and the public consumption variables present negative coefficients. However, the latter coefficient appears to be excessively high (although the variables are not in logs, but in real per capita values). On the other hand, the coefficients on both the government debt and wealth variables are adequately small and positive. A positive coefficient on debt means that it is regarded by the individuals as net wealth. However, the fact that its coefficient is around half the coefficient (for the proxy) of wealth, means also that individuals are partially aware of the future taxes implied by debt.¹⁶

Table 3-3- Cointegration vector and restrictions on the long-run coefficients

	Y_t	$BDEF_t$	G_t	GB_t	W_t	Restriction	LR test
Basis regression	0.654	-0.426	-1.381	0.022	0.043	-	
Keynesian restrictions	0.578	-0.578	-1.216	0.045	0.077	$DEF_t = Y_t$	0.25 (0.62)
Equivalence restrictions	0.824	-	-2.072	-0.033	-0.027	$BDEF_t=0$	4.27 (0.04)

Notes: absolute t-statistics in parenthesis. Test results are shown in the last column. Under the null the test statistic follows a Chi-squared distribution with one degree of freedom. P-values are in parenthesis. Y is GDP; BDEF is the government budget deficit; G is government consumption; GB is government debt; and, W is private wealth.

Next, we formally tested for the validity of the Ricardian equivalence hypothesis. The restrictions imposed by the pure Keynesian view and the pure equivalence view are

¹⁶ If the results for the proxy of wealth were not reasonable, it would be possible to estimate the consumption function excluding both wealth and government debt from the list of independent variables.

shown in the last two rows of the same table. The results of an LR test are shown in the last column of Table 3-3. The test results point to the non rejection of the Keynesian claim that the deficit and GDP present the same coefficient (the null has a p-value of 62%). Conversely, the pure Ricardian view, implying the irrelevance of the method of financing of public expenditures, implying a nil coefficient for the deficit, is clearly rejected by the data at the usual significance levels (the p-value is just 4%). However, this does not mean that there is not *partial equivalence*, which occurs when consumers partially offset the effects of government financing decisions. In the estimated model, the impact of a tax-for-debt-swap is captured by the coefficient on the budget deficit (β_2). The estimation results imply that an extra pound of (real) deficit per capita (for a given expenditure path) has a positive impact on Egyptian current consumption of 0.43 pounds.

Subsequently, we tested the specification proposed by Perelman and Pestieau (1993). The Johansen's cointegration tests are shown in Table 3-4. As before, the test is done considering a single lag in the VAR due to reduced data availability. Still, there are no autocorrelation problems: the Chi-squared with 25 degrees of freedom is 27.9, with a p-value of 0.31. Both the trace and the maximum likelihood test statistics point to a single cointegration vector at the 5% significance level.

Table 3-4- Johansen's maximum likelihood tests for cointegration for Perelman and Pestieau (1993) consumption function

Eigenvalue	Trace				λ max			
	H_0	H_1	Trace	5% Critical Value	H_0	H_1	λ max	5% Critical Value
0.7315	$r = 0$	$r > 0$	72.89	68.52	$r = 0$	$r = 1$	37.00	33.46
0.5521	$r \leq 1$	$r > 1$	35.89	47.21	$r = 1$	$r = 2$	20.08	27.07
0.4322	$r \leq 2$	$r > 2$	15.81	29.68	$r = 2$	$r = 3$	9.95	20.97
0.2381	$r \leq 3$	$r > 3$	5.86	15.41	$r = 3$	$r = 4$	5.84	14.07
0.0079	$r \leq 4$	$r > 4$	0.02	3.76	$r = 4$	$r = 5$	0.02	3.76

Notes: A lag length of one is used on the VAR ($p=1$). Critical values for the trace and maximum likelihood tests are from Osterwald-Lenum (1992). The estimations were obtained assuming a linear trend in the levels of the data, and only an intercept in the cointegration equations.

With regard to the estimation results shown in Table 3-5, the estimated coefficient for the budget deficit is implausibly high (-1.192). The same is true for the debt variable, which casts doubts on the adequacy of the model to the Egyptian economy.

With reference to the formal testing of the Keynesian hypothesis ($BDEF_t = 0$), its restrictions are rejected by the data. Moreover, the restricted equation shows an implausibly high negative coefficient for the debt (which could be acting as a proxy for the deficit) and a high propensity to consume out of wealth.

The data also rejects the equivalence restrictions: the hypothesis that $BDEF_t = (Y_t - TX_t)$ and $GB_t = 0$ presents a zero p-value. Notwithstanding this clear rejection of the pure equivalence hypothesis, we decide to test a less demanding equivalence restriction, dropping the requirement of a null debt coefficient. Yet, the conclusion remained unaltered.

Table 3-5- Cointegration vector and restrictions on the long-run coefficients for Perelman and Pestieau's (1993) consumption function

	$Y_t - TX_t$	$BDEF_t$	GB_t	W_t	Restriction	LR test
Basis regression	0.499	-1.192	0.194	0.046	-	
Equivalence restrictions	0.447	-0.447	-	0.16	$BDEF_t = (Y_t - TX_t) \& GB_t = 0$	11.21 (0.0)
Equivalence restrictions*	0.764	-0.764	0.152	-0.078	$BDEF_t = (Y_t - TX_t)$	6.98 (0.01)
Keynesian restrictions	0.289	-	-0.262	0.64	$BDEF_t = 0$	16.27 (0.0)

Notes: *Less demanding Ricardian equivalence restrictions, dropping the requirement of a nil coefficient for the debt variable. Absolute t-statistics are in parenthesis. Test results are shown in the last column, with p-values in parenthesis. Under the null the test statistic follows a Chi-squared distribution with one degree of freedom. Data are in real per capita values. BDEF is the government budget deficit; Y-TX is disposable income; and, GB is government debt.

In short, this specification does not fit Egyptian data well. The estimated vector presents implausibly high coefficient estimates, and rejects both the Keynesian restrictions and Ricardian restrictions (even milder ones). Hence, this model is inconclusive for our purposes.

All in all, the data does not point to the validity of Ricardian equivalence for Egypt, meaning that an increase in the deficit, for a given expenditure path, is not fully compensated for by an increase in private saving. As a result an increase in the budget deficit could motivate the need of increased external financing, leading to a twin deficit phenomenon. We will formally test this hypothesis in the next sub-section.

3.d. Twin deficits: causality tests

We will now address the twin deficit issue for Egypt. Since both the current account and the budget deficit (in percentage of GDP) are integrated variables, the first step is to examine whether there is a cointegration relationship between the two variables. The Johansen test results are shown in Table 3-6. The estimation was done as before using a lag length of one.¹⁷

Table 3-6- Johansen's maximum likelihood tests for cointegration between the budget deficit and the Current account (%GDP) 1977-2003

Eigenvalue	H ₀	H ₁	Trace			λ max				
			Trace	5% Critical Value	10% Critical Value	H ₀	H ₁	λ max	5% Critical Value	10% Critical Value
0.4174	r = 0	r > 0	15.23	15.41	13.33	r = 0	r = 1	14.05	14.07	12.07
0.0445	r ≤ 1	r > 1	1.18	3.76	2.69	r = 1	r = 2	1.18	3.76	2.69

Notes: A lag length of one is used on the VAR (p=1). Critical values for the trace and maximum likelihood tests are from Osterwald-Lenum (1992). The estimations were obtained assuming a linear trend in the levels of the data, and only an intercept in the cointegration equations.

At the usual 5% significance level the null of no cointegration is not rejected by none of the two test statistics. However, at the 10% significance level one vector is retained. The estimated long-run equation is:

$$CAD_t = 0.308 * BDEF_t$$

If in fact this is a cointegration vector, it shows a positive correlation between the budget deficit and the current account deficit. However, the finding of a positive correlation does not indicate from where the causality runs from: it could be the budget deficit that causes the external deficit, or the other way round. In order to determine the direction of the (possible) causality relationship it is necessary to estimate the vector error correction model (VECM).

Despite the weak evidence towards the existence of cointegration, we decided to continue and estimate the VECM. Its estimation would also allow to cross-check the

¹⁷ The LM test for serial correlation does not detect first order serial correlation in the estimated residuals. The Chi-squared statistic with 4 degrees of freedom is 3.28, with a p-value of 0.51.

conclusion regarding the existence of a cointegration relationship. The estimated VECM results are shown in Table 3-7.¹⁸ There we present the regression estimates (by OLS) together with F-exclusion tests for the relevant variables, i.e. for coefficients $\alpha_{2,1}$ and $\delta_{1,1}$ of equations (4) and (5), respectively.

Table 3-7- Causality in the VECM between the budget deficit and the current account deficit (%GDP) 1977-2003

<i>Dependent</i>	Constant	$\Delta BDEF_{t-1}$	ΔCAD_{t-1}	ECM_{t-1}	R^2	Exclusion F-tests	
						BDEF	CAD
$\Delta BDEF_t$	0.013 (1.78)	-0.521 (2.54)	0.652 (1.78)	0.805 (3.59)	0.486	-	8.443 (0.08)
ΔCAD_t	-0.009 (1.23)	0.147 (0.7)	-0.335 (1.45)	-0.253 (1.1)	0.128	0.487 (0.49)	-

Notes: It is shown in parenthesis the absolute t-statistics for the coefficients, and p-values for the F-tests (last two columns).

The F-tests results appear to point to a single unidirectional Granger-causality relationship direction running from the current account deficit (CAD) to the budget deficit. However, since this is a VECM model, is also necessary to determine which variable adjusts to the deviations from the long-run equilibrium. As it is clear from the results obtained, the adjustment is made by the budget deficit. Put differently, it is the budget deficit that adjusts its level in order for the two variables to share the same relationship over time.¹⁹

Formally, the adequate causality test is a joint test for the null of the above mentioned coefficients together with a null coefficient for the ECM term. The LR test results (distributed as a Chi-Squared with two degrees of freedom) are shown in Table 3-8:

Table 3-8- Granger-causality test in the VECM of Table 3-7

	LR	P-value	Conclusion
CAD does not Granger causes BDEF	11.11	0.003	Rejected
BDEF does not Granger causes CAD	0.98	0.612	Not rejected

¹⁸ As required by the econometric theory, in the ECM, we used the same number of the lags as in the cointegration test (one). Moreover, both the Akaike and the Schwarz information criteria unanimously select just one lag.

¹⁹ The statistically positive coefficient for the ECM in the deficit equation is not unusual, since the ECM term is normalized with regard to the CAD, i.e. it is defined considering the CAD as the independent variable.

The null that the current account deficit does not Granger cause the budget deficit is rejected by the data. In contrast, the null that the budget deficit does not Granger cause the current account deficit is not rejected. This means that there is just one Granger-causality relationship running from the CAD to the budget deficit, schematically:

$$\text{CAD} \rightarrow \text{BDEF}$$

However, as there was no fully compelling evidence in favour of cointegration, we repeated the test procedure omitting the ECM term, i.e. performing just the classical Granger-causality test. Both the Akaike and the Schwarz information criteria select a model with just 1 lag. The estimation reveals a very poor fit to the data (see Table 3-9). As a result, the former conclusion according to which the CAD Granger-causes the BDEF is now only valid at the 10% significance level.²⁰ Nevertheless, the budget deficit is still found not to Granger-cause the CAD.²¹

Table 3-9- Classical Granger-causality test between the budget deficit and the current account deficit (%GDP) 1977-2003

<i>Dependent</i>	Constant	ΔBD_{t-1}	ΔCAD_{t-1}	R^2	Exclusion F-tests	
					BDEF	CAD
ΔBD_t	-0.001 (0.2)	-0.09 (0.44)	0.496 (1.82)	0.171	-	3.298 (0.083)
ΔCAD_t	-0.005 (0.75)	0.011 (0.06)	-0.286 (1.26)	0.078	0.004 (0.95)	-

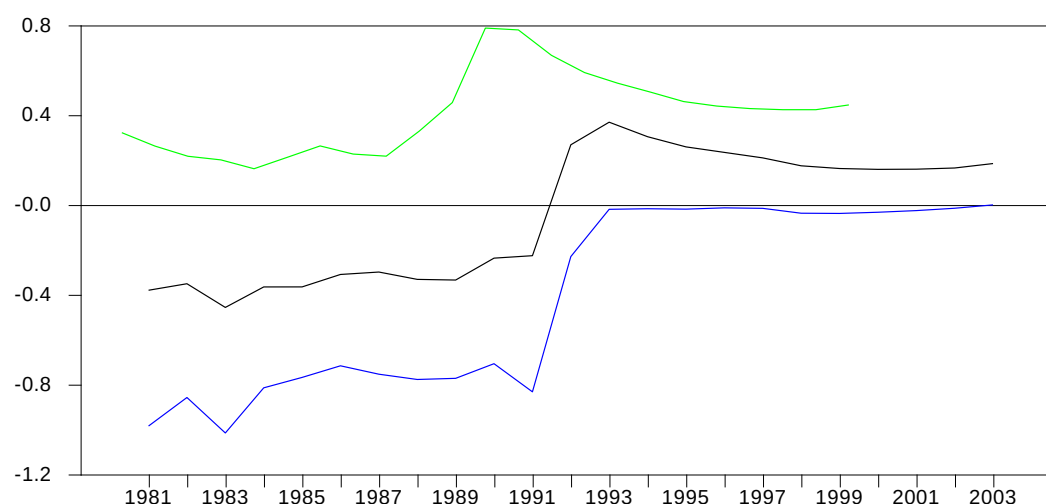
Notes: p-values for F-tests in parenthesis (last two columns).

Since there were large policy changes during the period under analysis, the relationship between both deficits may have changed over time. In order to get some insights about this question, we have run a recursive estimation (by OLS) of the CAD on the BDEF. The respective recursive coefficient (together with its fluctuation band of ± 2 standard errors) is represented in the next graph.

²⁰ This conclusion is not very different from the one we obtained in the F-tests for the exclusion of the CAD coefficient, ignoring the ECM term. The p-value is exactly the same, but the fit is poorer.

²¹ If we allowed for instantaneous causality, we would be unable to find any Granger-causality relationship. However, the results obtained do not point to the relevance of this (relatively unusual) hypothesis.

Figure 2- Recursive budget deficit coefficient estimate (OLS)



Notes: Recursive deficit coefficient estimated by ROLS together with 95% confidence bands.

The graph shows that in fact there were considerable changes over time in the relationship between the CAD and the BDEF. More specifically, the relationship evolved from an negative coefficient in the 1980s to a positive relationship since 1991. In 1991, the exchange rate was unified and Egypt starts a de facto hard nominal peg to the US dollar. 1991 signals also the start of the successful IMF-lead stabilization programme that managed to substantially reduce the amount of the budget deficit. Returning to the recursive estimation results, they should be seen with care since there is no correction for autocorrelation, and the results are obtained using OLS. As a result, the recursive estimates are not directly comparable with the former cointegrating vector. It would be interesting to divide the sample into two sub-samples (1977-1990 and 1991-2003) and repeat the cointegration tests. However, due to the small number of observations involved it is impossible to do a Johansen's cointegration test for the two subsamples. Hence, we have just repeated the Granger causality tests estimating by OLS a VAR in first differences (naturally without considering the ECM term) as in Table 3-9. On one hand, the results pointed to the absence of any causal relationship in the first sub-sample. On the other hand, for the more recent sub-sample (1991-2003) it emerges at the 10% significance level a Granger-causal relationship from the current account deficit to the budget deficit. Therefore, the results for the 1991-2001 are similar to the ones obtained for the full sample.

3.e. Twin deficits evidence: summary and possible explanations

A natural explanation for this reverse causality result rests on the endogeneity of the budget balance to the fluctuations in domestic output. *Firstly*, a capital inflow²² tends to lead to a real appreciation of the exchange rate, which in turn deteriorates the trade balance.²³ Alternatively, a negative exogenous shock, for instance a taste shock, may lead to a decrease in exports or an increase in imports. The induced deterioration in the external balance, reflecting the substitution of domestic production by (relatively cheaper) imports, has *ceteris paribus* a negative impact on domestic output, leading to decreased tax revenues and to a deterioration of the budget balance. *Secondly*, the government could resort to a fiscal stimulus in an attempt to mitigate the negative impact of a current account deficit on domestic output. In this case, the current account deficit is causing an economic slowdown, which increases government spending and reduces tax revenues. This suggests that the government budget deficit is not determining the external deficit; instead there is reverse causation running from the external to the internal budget deficit. The evidence regarding this possible explanation for Egypt is not fully conclusive. Focusing in the period after the start of the stabilisation programme, in 1991, there was an improvement in the current account from 0.4% of GDP in 1990 to 7% in 1992. Moreover, GDP continued to grow despite the loss of competitiveness induced by the real appreciation of the Egyptian pound. Hence, the improvement in the external account allowed for a reduction in the budget deficit, since there was not a decrease in the tax revenues nor was an increase in expenditures necessary to counter a slowdown in growth that was inexistent.

²² The capital inflow could have diverse origins and depending on its roots may have a very different impact on prospective growth. If it is the result of an increase in the level of debt of the economy vis-à-vis the rest of the world it will decrease the prospective growth potential of the economy. On the contrary, if the capital inflow is the result of increased foreign direct investment it will have a positive impact on the growth prospects. Alternatively, a negative exogenous shock may lead to a decrease in exports or an increase in imports triggering a decline in domestic production.

²³ If the exchange rate is flexible, the real appreciation occurs via an appreciation of the nominal exchange rate. Under a fixed exchange rate regime, the real appreciation occurs via higher domestic inflation leading to an increase in the relative price of domestic production.

Another explanation is based on some specificities of the Egyptian economy. Both the Egyptian economy and the Egyptian public receipts rely on important Suez Canal Dues and on oil exports.²⁴ Since such two sources of revenues enter also in the government revenues, its decline has a negative impact on the current account, on GDP, and also in the government budget balance. Hence, this deterioration in the external balance is accompanied by a decrease in the Government's revenues, and hence by a deterioration in the budget balance (and vice-versa for an increase in the oil price). Consequently, there is a direct mechanism between the CAD and the BDEF operating in Egypt, which might contribute to explain the reverse causation result. (Alkswani, 2000) presents similar evidence in favour of reverse causality for the case of Saudi Arabia.

Finally, the reverse causality result may be linked with the important sterilization effort made by the Egyptians authorities during the 1990s.²⁵ Following the unification of the exchange rate in October 1991, the nominal exchange rate was in fact pegged to the US Dollar (USD), at approximately 3.3 Egyptian pounds per USD, due to massive intervention by the central bank. This intervention has effectively abolished the foreign-exchange risk, leading to large short-term capital inflows. Fearing an increase in domestic inflation, which could cause a large real appreciation of the Egyptian pound, the central bank of Egypt (CBE) tried to sterilize the increase in money supply through open market operations, absorbing domestic liquidity in exchange for domestic Treasury Bonds, resulting into an increase in the domestic short-term interest rate.²⁶ As a result of this policy the CBE accumulated large foreign reserves. The sterilization effort was equivalent to the CBE acquiring international reserves in exchange for domestic public debt. The amount of CBE reserves rose even further due to the rapid pace of dedollarization that was taken place.²⁷

²⁴ Oil exports accounted for 37% of total exports in 2003/2004. In the same fiscal year, Suez Canal dues accounted for more than 1/5 of total services receipts.

²⁵ We would like to thank Hanaa Kheir-El-Din for the suggestion of this possible explanation.

²⁶ See (Al-Mashat & Grigorian, 1998) for details.

²⁷ The success of the 1991 stabilisation programme in controlling inflation and reducing the budget deficit coupled with the capital inflows and large foreign reserves have increased the public confidence on the national currency leading to a decrease in the dollarization of the economy from almost 50% in 1990/91 to about 20% in 1996/97. See (Helmy, 1998) and (Subramanian, 1997) for details.

However, as pointed out by (Caramazza & Aziz, 1997, p. 95) and (Caramazza & Aziz, 1998) the sterilization effort is effective at best only in the short-term. Sterilization prevents the domestic interest rate from falling in response to capital inflows, and could in fact attract further capital flows [see also (Al-Mashat & Grigorian, 1998, p. 9)]. Moreover, there are important and rising quasi-fiscal losses from intervention, arising from the differential between the interest earned on foreign reserves and that paid on debt denominated in domestic currency.²⁸ In Egypt, as a result of this policy there was an enormous increase in the domestic debt ratio, which has led to a heavy domestic debt service. Due to the large gap between the domestic treasury bond return and the return on foreign (USD) reserves, there was a snow-balling effect in domestic debt in this period. All in all, due to the sterilization effort, we could have that a current account deficit (i.e., capital inflows) lead to a budget deficit, due to increased domestic debt service. As pointed out by (Calvo & Reinhart, 1998), the accumulation of foreign reserves might also tempt the politicians to use it for large public spending increases, originating a further increase in the budget deficit.

²⁸ Sterilizations efforts usually end up with a sudden reversal of capital flows, or with a large domestic currency appreciation. This because it becomes increasingly difficult for the central bank to maintain a stable nominal exchange rate and simultaneously containing inflation.

3.f. *Twin deficits and Feldstein-Horioka puzzle*

Next we estimate the model proposed by Fidrmuc (2003) that has the advantage of presenting a regression model that encompasses both the twin deficit hypothesis and the Feldstein-Horioka hypothesis. As we have seen previously in Table 3-9, a regression of the CAD on the budget deficit (and vice-versa) presents a low fit to the data. This might be the result of omitting relevant variables in the evolution of both CAD and BDEF. One of such omitted variables is the investment share in GDP. If investment is financed by external resources, an increase in investment could lead to an increase in the external deficit. Hence, the omission of investment might bias the results.

Table 3-10- Johansen's maximum likelihood tests for cointegration for Fidrmuc's (2003) relationship- CA, BBAL, INVT

Eigenvalue	Trace				λ max			
	H ₀	H ₁	Trace	5% Critical Value	H ₀	H ₁	λ max	5% Critical Value
0.5537	r = 0	r > 0	36.98	29.68	r = 2	r = 3	21.74	20.97
0.4481	r ≤ 1	r > 1	15.23	15.41	r = 3	r = 4	14.45	14.07
0.0279	r ≤ 2	r > 2	0.79	3.76	r = 4	r = 5	0.79	3.76

Notes: A lag length of two is used on the VAR (p=1). Critical values for the trace and maximum likelihood tests are from Osterwald-Lenum (1992). The estimations were obtained assuming a linear trend in the levels of the data, and only an intercept in the cointegration equations.

A Johansen cointegration test of Fidrmuc's specification is shown in Table 3-10. It involves estimating equation (9), that is regressing the external balance on the budget balance (BBAL) and on the investment ratio (all as a share of GDP). As discussed above, in section 3.f, differently from Fidrmuc (2003), we have used as dependent variable the current account (CA) balance instead of the trade balance.

The maximum likelihood statistic points to the selection of two cointegrating vectors at the usual 5% significance level, while the trace statistic points to a single cointegrating vector. However, as the first estimated vector is economically meaningless, we decided to retain only the second vector, which is:

$$CA = -0.326 * BBAL - 0.784 * INVT$$

Where CA is the current account balance, BBAL is the budget balance and INVT is investment. All three variables are expressed as a percentage of GDP. The twin deficit

hypothesis implies a positive coefficient for the budget balance ($\gamma_2 > 0$). However, the estimated results point to a negative coefficient leading to a rejection of the twin deficit hypothesis. With regard to investment, a negative coefficient is expected for the coefficient on investment ($\gamma_3 > 0$). If Egypt were perfectly integrated into the world economy and investment were financed on the world capital market, γ_3 would equal the unity. On the other hand, if the Feldstein-Horioka puzzle is present, and there is no capital mobility, the γ_3 coefficient would be significantly smaller than one. This vector points indeed to an intermediate situation: the γ_3 coefficient is not unity, but is not far away from unity, meaning that according to this model 78% of the total Egyptian investment is financed via external financing.

Although interesting, these conclusions were drawn using just the second cointegrating vector. Consequently, it might be advisable to estimate the same formulation using an alternative estimating technique such as the fully-modified OLS (FM-OLS) regression technique of Phillips and Hansen (1990) and the Engle and Granger (1987) method. The FM-OLS cointegration procedure has the advantage of correcting for endogeneity and contemporaneous correlation. Furthermore, the Johansen technique has been found to be sensitive to the number of lags in the specified vector error correction model. Another reason to use these two additional estimation techniques is that both of them enable us to select a single-equation cointegration vector. The results of such two estimating techniques, along with the previous vector estimated by the Johansen method are shown in Table 3-11.

Table 3-11- Estimation results of Fidrmuc's (2003) relationship- Dependent variable CA balance– 1977-2003

<i>Estimation method</i>	Constant	BBAL	INVT
Johansen	n.d.	-0.326	-0.784
Engle-Granger	0.143 (4.77)	-0.341 (2.63)	-0.801 (4.74)
FM-OLS	0.128 (2.45)	-0.276 (1.23)	-0.708 (2.39)

Notes: Absolute t-statistics in parenthesis. The ADF test for the residuals of the OLS regression (Engle-Granger method) is -3.33, and the MacKinnon (1991)'s critical value is -4.08 and -3.70 at the 5% and 10% levels, respectively. The Johansen's method estimate comes from Table 3-10.

The results obtained by using the Engle-Granger method and the FM-OLS are not very different from the previous one. Since the null of no cointegration in the OLS

estimation of the Engle-Granger method is not rejected, we should focus our attention on the more robust FM-OLS regression results. Nonetheless, according to both such estimates, the budget balance presents always a negative coefficient.²⁹ This finding reinforces our previous conclusion of rejection of the twin deficit hypothesis for Egypt. This rejection of this hypothesis is not inconsistent with our previous finding of reverse causality running from the current account to the budget deficit.

With regard to investment, the γ_3 coefficient is statistically significant and not very far from the unity (70% according to the FM-OLS method). Hence, it appears that Egypt is fairly integrated in the world's capital markets, meaning that most of domestic investment appears to be financed from external funds.

All in all, if Ricardian equivalence is found not to hold for Egypt and there is a large degree of capital mobility, we would expect the existence of a twin deficit, since increases in the government's net borrowing requirements could be financed by the external financing. However, and according to Summers (1988) if countries systematically use the economic policy to maintain the external balance, avoiding large capital flows, capital may be internationally mobile while simultaneously the FH test signals low capital mobility. This is possible because economic policy is bringing savings and investment into balance.³⁰ Moreover, in the case of Egypt, there is some evidence towards partial Ricardian equivalence (consumers were found to offset roughly 40% of government tax-for-debt swaps) and the degree of capital mobility is just 70%. Hence, only 42% (0.6×0.7) of an increase in the budget deficit would be expected to be financed from abroad, mitigating the theoretical possibility of a twin deficit. Still in the case of Egypt, due to the already high level of external debt, the forces leading to reverse causation appear to be dominant, leading to a non-statistically significant budget deficit coefficient in this regression. Notwithstanding these arguments, the empirical results point indeed to a puzzle that deserves further research.

²⁹ Yet, according to the FMOLS method the budget balance coefficient is not statistically different from zero.

³⁰ Summers (1988) criticizes the approach of Feldstein-Horioka (FH) to measure the degree of financial integration. Due to the current account policy of the government, the FH measure may indicate a low degree of financial integration even when financial markets are perfectly integrated. If the government succeeds in targeting the current account, bringing it into balance, saving and investment become strongly correlated. As a result, the FH saving-retention coefficient (the coefficient obtained when regressing investment on savings) is high, signaling low capital mobility, when in fact there is a high degree of capital integration.

3.g. Policy implications

As shown in Figure 1, Egypt's current account (CA) at the end of our sample period has turned from a deficit position to a surplus in the early 1990s and from 2002 onwards. More recently (and now outside our sample period), the CA surplus has shrunk and is forecasted to decrease even further (IMF, 2006). As mentioned before, Egypt's CA surpluses are mainly explained by a substantial increase in worker remittances from the Gulf region, which is obscuring an expanding trade deficit. Hence, the country may return to a CA deficit in the near future.

External imbalances in developing countries may have a negative impact on growth performance. For instance, (Edwards, 2002) concludes that although large current account deficits may not persist, the current account reversal that inevitably follows has a negative impact on GDP growth. The usual policy recommendation for the correction of a CA deficit is to devalue the national currency. Yet, in the framework of a general equilibrium model, (Thissen & Lensink, 2001) conclude that devaluation has a modest impact on the CA on the long-run. As a result, it does not seem to be advisable to address a CA deficit by devaluating the Egyptian Pound. Could a reduction in the budget deficit help accomplish an improvement in the CA? This research does not support this idea. Although there is a link between the budget balance and the CA, there is reverse causality: it is the CA that Granger-causes the budget, and not the (usual) other way round. As a result, any deterioration in the CA has a negative impact on the budget balance. Policy makers should therefore be particularly attentive to negative developments in the current account since such developments could hinder budget consolidation efforts. To achieve improvements in the CA balance attention should be paid to export promotion measures, especially to structural reforms that increase productivity.

This study also concludes in favour of the non-validity of Ricardian equivalence, which means that the Egyptian government can use fiscal policy to stabilize the business cycle.³¹ However, care should be taken with sustainability issues, to avoid debt accumulation. The already very high internal debt ratio points to the need to adopt debt

³¹ According to (Abu-Bader & Abu-Qarn, 2003) it could even be argued that increased civilian government expenditure may contribute positively to long-term growth in Egypt. We believe it would be preferable to reallocate the actual expenditure level better, in a more growth-friendly way, reducing the inefficiencies caused by the existing public subsidy schemes.

reduction policies, such as further cutting the budget deficit and intensifying privatisation programmes.

The analysis also suggests that it is important to maintain some flexibility in the exchange rate system. This would make the Egyptian economy less vulnerable to any speculative capital flows, and avoid the above-mentioned costs of sterilization. The Egyptian authorities are encouraged, therefore, to continue to develop the flexible exchange rate regime adopted in December 2004.

4. Conclusions

This paper analysed the validity of the twin deficit hypothesis for Egypt. The validity of this hypothesis has strong policy implications, and is closely linked to the validity of Ricardian equivalence hypothesis and to the Feldstein-Horioka measure of capital mobility. If the twin deficit hypothesis were valid, the appropriate policy prescription to correct a current account deficit would be a tax increase. However, such a policy prescription would be completely ineffective if Ricardian equivalence were a valid description of reality.

The empirical results rejected the validity of this hypothesis for Egypt: there is at most partial equivalence, with private consumption offsetting less than half of a tax-for-debt-swap for a given expenditure path. This means that fiscal policy is effective at stabilising the business cycle, and opens the scope for a twin deficit. It was indeed found (weak) evidence in favour of a long-run relationship between the budget deficit and the current account deficit. However, the Granger-causality tests point to reverse causation: it is the current account deficit that Granger-cause the budget deficit (and not the other way round). As a result, the traditional twin-deficit hypothesis is rejected for Egypt. Some specificities of the Egyptian economy might explain this less usual result. Hence, policy efforts should be directed primarily to the reduction of the current account deficit. In the case of Egypt it does not suffice to reduce the budget deficit to decrease the current account deficit: it is also necessary to resort to other policies like export promotion ones. From the analysis it appears also important to maintain some flexibility in the exchange rate system. This would make the Egyptian economy less vulnerable to eventual speculative capital flows, and avoid the costs of sterilization.

Furthermore, there is evidence in favour of a high degree of capital mobility (or financial integration). However, if we combined the rejection of Ricardian equivalence with a very high degree of international financial integration we would have expected the emergence of a twin deficit. The strong rejection of this hypothesis is indeed a puzzle that deserves further research.

REFERENCES

AL-MASHAT, RANIA A. and DAVID A. GRIGORIAN (1998), "Economic reforms in Egypt: emerging patterns and their possible implications", *World Bank Policy Research Working Paper* No. WPS 1977.

http://www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000178830_9811170352385.

ALKSWANI, MAMDOUH ALKHATIB (2000), *The Twin Deficits Phenomenon in Petroleum Economy: Evidence from Saudi Arabia*, Presented at the Seventh Annual Conference, Economic Research Forum (ERF), 26-29 October, Amman, Jordan.

BAHARUMSHAH, AHMAD ZUBAIDI and EVAN LAU (2005), "Budget and Current Account Deficits in SEACEN Countries: Evidence Based on the Panel Approach", *International Finance* 0504002, *Economics Working Paper Archive at WUSTL*. <http://ideas.repec.org/p/wpa/wuwpif/0504002.html>.

BAHARUMSHAH, AHMAD ZUBAIDI, EVAN LAU and STILIANOS FOUNTAS (2003), "On the sustainability of current account deficits: evidence from four ASEAN countries", *Journal of Asian Economics*, 14, 465-487.

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

BARRO, ROBERT J. (1989), "The Ricardian Approach to Budget Deficits", *Journal of Economic Perspectives*, 3(2), 37-52.

BERNHEIM, B. DOUGLAS (1987), "Ricardian Equivalence: an evaluation of theory and evidence -with three 'Comments'" in S. Fisher (ed.), *NBER Macroeconomics Annual 1987*, Cambridge, Massachusetts: MIT Press, 263-315.

CALVO, GUILLERMO and CARMEN REINHART (1998), "The Consequences and Management of Capital Inflows: Lessons for Sub-Saharan Africa", *EGDI Working Paper*, No. 2.

CARAMAZZA, FRANCESCO and JAHANGIR AZIZ (1997), "Exchange Rate Arrangements and Economic Performance in Developing Countries", *IMF World Economic Outlook*, Chapter 4.

CARAMAZZA, FRANCESCO and JAHANGIR AZIZ (1998), *Fixed or Flexible? Getting the Exchange Rate Right in the 1990s*, Washington, D.C.: IMF Economic Issues No. 13.

ENGLE, R. F. and C. W. J. GRANGER (1987), "Cointegration and Error-Correction: Representation, Estimation, and Testing", *Econometrica*, 55, 251-276.

FELDSTEIN, MARTIN and CHARLES HORIOKA (1980), "Domestic saving and International Capital Flows", *The Economic Journal*, 90(June), 314-329.

FIDRMUC, JARKO (2003), "The Feldstein-Horioka Puzzle and twin deficits in selected countries", *Economics of Planning*, 36, 135-152.

HAKKIO, CRAIG S. and MARK RUSH (1991), "Is the Budget Deficit 'Too Large'?" *Economic Inquiry*, 29(3), 429-445.

HAMILTON, JAMES (1994), *Time Series Analysis*, Princeton, New Jersey: Princeton University Press.

HELMY, OMNEIA AMIN (1998), "The Impact of Capital Inflows on Egypt's Exchange Rate Policy", *ICEG Policy Papers*. <http://www.iceg.org/NE/projects/policypapers/inflows.pdf>.

JOHANSEN, S (1988), "Statistical Analysis of Cointegration Vectors", *Journal of Economic Dynamics and Control*, 12, 231-254.

KOUASSI, EUGENE, MBODJA MOUGOUÉ and KERN O. KYMN (2004), "Causality tests of the relationship between the twin deficits", *Empirical Economics*, 29, 503-525.

KWIATOWSKI, DENIS, PETER C. B. PHILLIPS, PETER SCHMIDT and YONGCHEOL SHIN (1992), "Testing the Null Hypothesis of Stationarity Against the Alternative of a Unit Root: How Sure Are We That Economic Time Series Have a Unit Root?" *Journal of Econometrics*, 54, 159-178.

MACKINNON, J. G. (1991), "Critical Values for Co-integration Tests" in R. F. Engle and C. W. J. Granger (eds.), *Long-Run Economic Relationships*, Oxford: Oxford University Press, 267-276.

MARINHEIRO, CARLOS FONSECA (2003), *EMU and Fiscal Stabilisation Policy: the case of small countries*, Ph.D. dissertation, No. 179, Leuven: Katholieke Universiteit Leuven.

MARINHEIRO, CARLOS FONSECA (2004), "Fiscal Sustainability of Egypt's Public Finances", *FEMISE working paper*, March.

NORMANDIN, MICHEL (1999), "Budget deficit persistence and the twin deficits hypothesis", *Journal of International Economics*, 49, 171-193.

OMRAN, MOHAMMED (2002), "Testing for a Significant Change in the Egyptian Economy under the Economic Reform Programme Era", *World Institute for Development Economics Research Discussion Paper*, No. 2002/59, June.

OSTERWALD-LENUM, M. (1992), "A Note with Fractiles of the Asymptotic Distribution of the Maximum Likelihood Cointegration Rank Test Statistics: four cases", *Oxford Bulletin of Economics and Statistics*, 54, 461-472.

PERELMAN, SERGIO and PIERRE PESTIEAU (1993), "The Determinants of the Ricardian Equivalence in the OCDE Countries" in H. A. Verbon and F. A. Van Winden (eds.), *The Political Economy of Government Debt*, Amsterdam: North-Holland.

PHILLIPS, PETER C. B. and BRUCE E. HANSEN (1990), "Statistical Inference in Instrumental Variables Regression with I(1) Processes", *Review of Economic Studies*, 57, 99-125.

SEATER, JOHN J. (1993), "Ricardian Equivalence", *Journal of Economic Literature*, 31(1), 142-190.

SUBRAMANIAN, ARVIND (1997), "The Egyptian Stabilization Experience: an analytical retrospective", *IMF Working Paper*, No. WP/97/105.

SUMMERS, LAWRENCE (1988), "Tax Policy and International Competitiveness" in J. A. Frenkel (ed.), *International Aspects of Fiscal Policies (NBER Conference Report)*, Chicago: University of Chicago Press, 349-375.

WU, JYH-LIN, SHOW-LIN CHEN and HSIU-YUN LEE (2001), "Are current account deficits sustainable? Evidence from panel cointegration", *Economics Letters*, 72, 219-224.

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