



## THE SUSTAINABILITY OF EXTERNAL ADJUSTMENT PROCESS IN TUNISIA: LESSONS FOR POST “ARAB SPRING” REVOLUTION POLICIES

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### ABSTRACT

*This paper highlights one of the first attempts in the empirical studies. It shall examine the sustainability of external adjustment policy using a quantitative approach. Using intertemporal and consistency approaches of deficits sustainability, our specific framework for Tunisia shows a positive required external adjustment over the entire period (1976-2010). A dynamic Error Correction Model is used to check short and long run relationships between primary current account deficits and the related sustainable thresholds. The evidence resulting from econometric model robustness checks indicates that adjustment forces are in operation to restore long-run equilibrium following a short run disturbance which involves authorities' ability and willingness to adjust. As a guide to possible policy actions after the “Arab spring” revolution, the sustainability of past adjustment policy which had generated, amongst others, foreign buffers helps the government, to some extent, to support the post revolution sizeable official external financing flows and provides scope for the economy to operate at a higher level than would otherwise be the case, in order to sustain political transition. However uncertainty over the “rules-of-the-game” and the period of the political transition cannot be dismissed so easily which could put at risk the future of an already successful adjustment when the reversal in deficit trends becomes practically very difficult.*

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**Keywords:** Current account deficits, External adjustment, Sustainability, Error-correction models.

**JEL Codes:** F32, H63, H12, C32.

### 1. INTRODUCTION

The current account is the broadest measure of a country's trade with the rest of the world. It might serve as one of the main leading indicators for future behaviour of an economy and is part of everyday decision process for policy makers. Large and persistent current account deficits provide a signal of macroeconomic imbalance, calling for devaluation and/or tighter macroeconomic policies (Baharumshaha *et al.*, 2003). In the short run, the increase in current account deficits

provides a shift in market sentiment and poses a risk to economy. Thus, the interest rates would need to rise moreover and the exchange rate would need to fall. In the long run, indebtedness to the rest of the world increases, causing debt service to consume an ever larger share of income and servicing the debt will burden future generations and lower the standard of living (Hakkio, 1995). In a series of research, Edwards (2006) had found that countries that experience large and abrupt current account “reversals” have experienced drastic reductions in investment and in GDP growth. He also found that if the current account adjustment was orderly and gradual, it would not disrupt economic activities in a significant way.

The existence of large and chronic current account deficits in some developing countries (DCs) has received considerable attention over the last 20 years. Sustainability is widely regarded as one of the core elements of the analysis of external unbalances. The precise concern is sometimes unclear because the term “external sustainability” does not have an exact meaning. The literature on external sustainability has evolved, with practical indicators of sustainability being derived independently rather than emerging from the theoretical framework that is generally used to analyse sustainability. Thus, one common practical approach to assess sustainability uses non-increasing external debt as a benchmark to tell sustainable external policies from unsustainable ones.

While the intuition is clear, the analytical and operational definition of sustainability is not straightforward. The theory has proposed different conditions for sustainability. Furthermore, the problem has always been dealt with in a partial equilibrium framework where the interactions between the current account and the economy are not fully taken into account. In this context, two conceptual approaches have been used to analyse sustainability of the current account deficits: the Present Value Budget Constraint (PVBC) and the consistency approach.

The intertemporal budget constraint approach applied for external disequilibrium (Bohn, 2007) (Ahmed and Rogers, 1995) implies that external policy is sustainable when the current debt can be offset by the sum of expected future discounted primary current account surpluses. In other words, the freedom of external policies will be influenced by outstanding stock of past debt while the ability to serve debt will depend on the future primary current account surplus. Within this framework, the current account balance behaves as a buffer against transitory shocks in productivity or demand (Sachs, 1981; Obstfeld and Rogoff, 1995). However intertemporel approach is not very useful and less than ideal for application in the DCs because of the inability and the failure of this category of countries to generate primary surplus which depends on forward-looking dynamic saving and investment decisions driven by expectations of productivity growth, government spending, interest rates, and several other factors (Cuddington John, 1996). Using error-correction reaction function approach and dynamic panel framework to test a negative long-run relationship between net exports (NX) and net foreign assets (NFA) as a sufficiency condition for the intertemporal budget constraint to hold, Durdua *et al.* (2013) have shown that countries with relatively weaker fundamentals need to respond more strongly to the changes in NFA to keep their NFAs on a sustainable path, which is informative about external adjustment process.

The consistency approach of fiscal deficit sustainability developed by [Wijnbergen and Anand \(1988;1989;1990\)](#) and [\(Buiter, 1993\)](#), attempts to determine what constitutes an appropriate fiscal deficit by making assumptions that liabilities can continue to grow at the growth rate of the economy's GDP, so that debt/GDP ratios remain constant. It is a more modest approach with less forbidding requirements for information and, presumably, very useful in the DCs context. This approach provides a simple quantitative method for assessing whether fiscal deficits are consistent with macroeconomic targets in other areas, such as inflation, output growth and real exchange rate. This approach allows the calculation of the "financeable deficit", given targets for inflation and other macroeconomic variables. If the actual deficit exceeds the level that can be financed or authorized by the economic fundamentals, policymakers must adjust their fiscal stance or revise their other objectives. Nevertheless, [Chalk and Hemming \(2000\)](#) argue that despite the simplicity and ease of interpretation associated with this approach, these indicators do not distinguish between countries with varying degrees of indebtedness and are therefore more useful in the case of countries characterised by high debt and persistent primary deficits.

The persistent of current account deficits and the inability to achieve balance of payment equilibrium in some DCs translate the idea about the "unsustainability of the adjustment process" itself. The sustainability of the process involves that the evolving gap between the observed current account deficit and the authorized one – *Required External Adjustment* – cannot jeopardise a country's creditworthiness. Using a panel set for 44 DCs and annual information for the period 1966-95, [Calderon et al \(2000\)](#) have found that current account deficits in developing countries are moderately persistent and a rise in domestic output growth generates a larger current account deficit.

Despite the relatively extensive body of empirical literature on the sustainability of current account deficits, this issue has not received much attention in the literature. To deal with the major shortcomings of previous studies, we intend to complement and extend previous empirical research by providing a specific quantitative framework for Tunisia to estimate the sustainable thresholds (or the financeable levels) of current account deficits and to quantify the related fiscal adjustment. After that, we attempt to respond to the two key issues in this study: *How do the governments manage their external disequilibrium and how do the adjustment forces work?*

In order to accomplish this task, a number of techniques of econometric time series analysis such as stationarity, cointegration and Error Correction Model should be applied. These techniques are aimed to check the history of the gap between primary deficits and sustainable levels and to provide an accurate assessment of the adjustment efforts.

Tunisia represents an interesting case study for several reasons: since its 2011 Arab Spring Revolution, the current account deficit has reached record level (7% of GDP in 2012) financed mostly by sizeable official external financing flows, the post revolution political uncertainty accompanied by a substantial widening of current account imbalances have involved a gradual downgrading of Tunisia's creditworthiness. Before the revolution, the current account has been consistently in deficit and such deficits have been moderately persistent between 2% and 3%.

Hence, it is interesting to check the ongoing external adjustment process before the revolution and to draw lessons from this experience for the post crisis policies. This study is a contribution to highlight if the past policies have generated foreign buffers to sustain post revolution sizeable official external financing flows and allow more room for manoeuvre to ensure political transition.

The rest of the paper is organized as follows: both the present value constraint approach and the consistency approach of external deficits sustainability are considered to develop a specific quantitative accounting framework for assessing the sustainable thresholds of current account deficit and the related required external adjustment in Tunisia. This framework is presented in Section 2. Data and Time series econometric methodology are outlined in section 3 where a dynamic Error Correction Model is used to check short and long run relationships between primary deficits and sustainable thresholds. Conclusions and policy recommendations are presented in section 4.

## 2. CONCEPTUAL AND OPERATIONAL FRAMEWORK

The most straightforward way to assess the sustainability of current account deficits for the (DCs) is to start from the balance of payment flow constraint. This is written in nominal terms as :

$$PCAD_t + i_t^* E_t \left( (B_{t-1}^* - NFA_{t-1}^*) + (B_{t-1}^{*p} - NFA_{t-1}^{*p}) \right) = E_t (\Delta B_t^* + \Delta B_t^{*p}) + ONFA - E_t \Delta R_t^* \tag{1}$$

$$= E_t (\Delta B_t^* + \Delta B_t^{*p} - \Delta R_t^*) + ONFA$$

Where  $PCAD_t$  denotes the primary current account deficit at the end of the period  $t$ ,  $B_t^*$  is the stock of public external debt,  $B_t^{*p}$  is the external debt stock of the private sector,  $i^*$  the nominal interest rate on external debt,  $E_t$  expresses the nominal exchange rate as the number of domestic currency units per foreign currency unit,  $NFA_t^*$  is the net foreign assets held by the public sector,  $NFA_t^{*p}$  is the net foreign assets held by the private sector,  $(B_{t-1}^* - NFA_{t-1}^*)$  the net public external debt.  $(B_{t-1}^{*p} - NFA_{t-1}^{*p})$  is the net private sector external debt,  $ONFA$  other net foreign assets<sup>1</sup>,  $R_t^*$  denotes the reserve assets, and  $\Delta$  indicates the variation in value between two periods of time. All the net foreign assets are assumed to earn the nominal rate  $i^*$ .

Note that the change in reserve assets can be written as follow:

$$\Delta R_t^* = (NFA_t^* - NFA_{t-1}^*) + (NFA_t^{*p} - NFA_{t-1}^{*p}) \tag{2}$$

According to equations 1 and 2, and using lower-case letters again to stand for upper-case variables as a proportion of GDP,

$$pacd_t + \frac{(1+r_t^*)(1+\hat{e}_t)}{(1+n_t)} \left[ (b_{t-1}^* - nfa_{t-1}^*) + (b_{t-1}^{*p} - nfa_{t-1}^{*p}) \right] \tag{3}$$

$$=$$

$$(b_t^* - nfa_t^*) + (b_t^{*p} - nfa_t^{*p}) + onfa_t$$

<sup>1</sup> Net foreign direct investment+ nets portfolio investment assets + loans – amortization of the external debt.

where the lowercase letters denote the ratio of the corresponding uppercase variables to nominal GDP,  $n_t$  the rate of growth in real output,  $\pi_t^*$  is the foreign inflation rate,  $\hat{e}_t$  is the percentage depreciation of the real exchange rate and  $r_t^*$  is the foreign real interest rate on external debt knowing that:

$$1 + r_t^* \equiv \frac{1 + i_t^*}{1 + \pi_t^*}$$

The equation (3) can be restated as follows:

$$\begin{aligned} p\text{cad}_t + \frac{(1+r_t^*)(1+\hat{e}_t)-(1+n_t)}{(1+n_t)} \left[ (b_{t-1}^* - nfa_{t-1}^*) + (b_{t-1}^{*p} - nfa_{t-1}^{*p}) \right] \\ = \\ \Delta(b_t^* - nfa_t^*) + \Delta(b_t^{*p} - nfa_t^{*p}) + onfa_t \end{aligned} \quad (4)$$

Adding to the stability of the public external debt-GDP ratio benchmark, the stability of private external debt-GDP ratio, we can define the *net<sup>2</sup> primary current account deficit sustainable threshold*  $p\text{cadst}_t$  at period t:

$$p\text{cadst}_t = \frac{(1+n_t)-(1+r_t^*)(1+\hat{e}_t)}{(1+n_t)} \left[ (b_{t-1}^* - nfa_{t-1}^*) + (b_{t-1}^{*p} - nfa_{t-1}^{*p}) \right] + onfa_t \quad (5)$$

Equation 5 shows that the current primary current account deficit of the balance of payments, as a share of GDP, is constrained to not exceed the sum of financing sources authorized by the current economic conditions: revenue from net direct foreign investments, net portfolio investment assets and loans; and the excess of domestic growth over the relevant real interest cost of adjusted foreign debt.

The Required External Adjustment (REA) can be expressed as the difference between the observed primary current account deficit as a percentage of GDP and the primary current account sustainable threshold:

$$REA_t = p\text{cad}_t - p\text{cadst}_t \quad (6)$$

### 3. DATA AND METHODOLOGY

#### 3.1. Data

The data here consists of annual observations from Tunisia over the period 1976-2010. This is the full data availability, obtained and calculated from the International Financial Statistics, the World Bank Development Indicators, Tunisian Central Bank Reports, Ministry of Finance, and Institute of National Statistics; as well as from the Institute of Quantitative Economics. The period

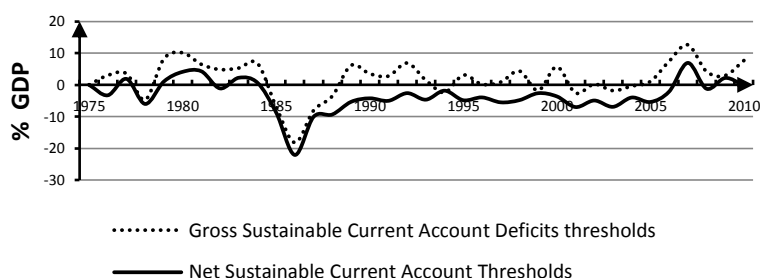
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<sup>2</sup> Because the  $ONFA_t = \text{Net foreign direct investment} + \text{nets portfolio investment assets} + \text{loans} - \text{amortization of the external debt}$

1976-2002 is judged sufficient to review the main economic events recognized by the Tunisian economy.

On the basis of the framework developed above, external sustainability analysis consists in measuring (ex-post) primary sustainable deficit thresholds (equation 5) and the corresponding size of the required external adjustment (equation 6). When analyzing the evolution of the sustainable thresholds of the primary current account deficits on the basis of figure n°1, one can divide the period 1976-2010 into four sub-periods:

**Figure n° 1. Sustainable Current Account Deficits thresholds**



Source: author's calculations

Before 1986, the situation was characterized by positive sustainable primary current deficit thresholds, which revealed the viability of the balance of payments. Indeed this favorable situation is assigned to growth rates superior to 5% in real terms, to the negative real interest rates, to the appreciation of the real exchange rate and the net foreign direct investments passing from 20.2 MD in 1978 to 201.1M.D in 1983.

The negative pick in 1986 corresponding to the economic crisis, as shown by figure n°1, has provided the implementation of the Structural Adjustment Program in 1986 supported by the World Bank and IMF under their policy-based lending regimes. It has as its principal component the external adjustment. Within this program, the main external measures were the devaluation of the exchange rate, the encouragement of exports and the slowing of imports.

The successful adjustment efforts during the period 1987-1995 have contributed to strengthening the external equilibrium and to conferring to the sustainable current account thresholds an ascending trend. In 1992, the gross primary current account deficit threshold represented 5.9 % of GDP and the net threshold -2.6 % of the GDP. The balance of payment improvement was mainly attributable to the impulse given to the tourist activity with the reopening of Tunisian-Libyan frontiers, to growth rates raised in real terms, and particularly, to the massive entry of the foreign direct investments passing from 67.5 MD in 1990 to 577 MD in 1993.

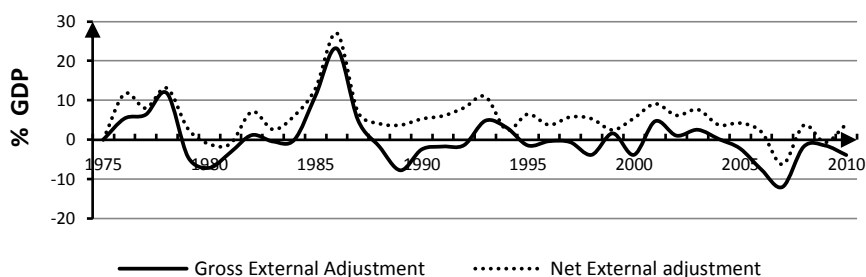
Over the period 1995-2005, a certain external stability has been detected. Indeed, in spite of the fact that the sustainable threshold displayed a decrease between 1992 and 1994 explained by the rise of interest rates real served on the external debt and particularly by the decrease of the net flows of the foreign direct investments, the period 95-2005 is characterized by positive gross sustainable thresholds and changes are described by a "sawtooth" movement.

During the period 2005-2010, the improvement in the sustainable levels is explained principally by remittances receipts, real growth and depreciation rate of the real effective exchange rate. At the end of 2010, net assets in foreign currencies have reached 13,522 MTD, corresponding to 147 days of projected imports. The pick observed in 2006 is due to Government sale of 35% of “Tunisie Telecom” capital to foreign investors. The foreign direct investments have more than quadrupled to rise in 2006 to 4403 MTD.

The gap between the evolution of the gross and net sustainable thresholds of the primary current deficit shows the size of the debt repayment (as % of GDP). It is interesting to notice that this gap is characterized by a certain stability, which offers the idea of a rigorous management of the external debt marked by the absence of an exploding trend of this gap. However, it is useful to continue and to strengthen the external adjustment effort in order to provide primary surpluses required to be able to pay the debt services.

The external adjustment is quantified as the difference between the primary current account deficit as % of the GDP and the sustainable threshold (equation 6). Figure n°2 shows the evolution of the external adjustment, which permits to visualize two curves whose interpretation is subject to divergences when one tries to evaluate the external adjustment effort led by authorities: the evolution of gross external adjustment leads us to believe that over the last few years the authorities have reached the target of a sustainable balance of payments. However, taking into account the external debt redemption unveils a positive external adjustment on all the period with a tendency to decrease.

Figure n°2. External Adjustment



Source: author' calculations

### 3.2. Econometric Methodology and Results

In order to examine the “successful” and “unsuccessful” external adjustment policy, where a successful adjustment is defined as the maintenance of control measures over a large period of time avoiding the “snow-ball” effect on the size of adjustment and debt: the self-reinforcing effect of adjustment accumulation arising from the difference between primary current account deficit and the sustainable threshold deficit, we suggest specifying the possible relationships between this two variables using a dynamic Error Correction Model (ECM) ( Engle and Granger, 1987). This empirical specification enables to incorporate the presence of inertia, which represents a typical feature of policy reaction functions in the short run to an increase in the size of external adjustment.

At the same time, the ECM constitutes an adequate estimation procedure in the presence of cointegrated variables according to Granger's Representation Theorem.

This econometric methodology will allow a better understanding of whether the Tunisian external disequilibrium history displays a robust negative reaction of the primary current account deficit-GDP ratio to an increase in the external adjustment, such a significant negative response is sufficient for adjustment sustainability.

In line with (Trehan and Walsh, 1991), Haug (1995), (Smith and Zin, 1991), Yang (2011) and Burger *et al.* (2011), the estimated equations are a p-order ECM, given by:

$$\Delta pcad_t = \gamma_1 z_{t-1} + \sum_i \gamma_{2i} \Delta pcad_{t-i} + \sum_i \gamma_{3i} \Delta pcast_{t-i} + \xi_{1t} \quad (7.1) \quad (7)$$

$$\Delta pcast_t = \mu_1 z_{t-1} + \sum_i \mu_{2i} \Delta pcast_{t-i} + \sum_i \mu_{3i} \Delta pcad_{t-i} + \xi_{2t} \quad (7.2)$$

Where  $pcad_t$  is ratio of the primary external deficit-GDP at period t,  $pcast_t$  is the ratio of the net sustainable threshold-GDP at period t,  $\xi_{1t}$  and  $\xi_{2t}$  are white noise processes and  $z_t = pcad_t - \beta_1 pcast_t - c$  is the I(0) residual of the cointegration equation.

The sustainability conditions for the external adjustment process are determined by the sign of  $\gamma_1$  and  $\mu_1$ . Notice that the magnitude of the adjustment coefficient  $\gamma_1$  ( $\mu_1$ ) controls the speed at which  $pcad$  ( $pcast$ ) responds to the disequilibrium error.

$\gamma_1$  must be negative: if the primary current account deficit has increased (and/or the sustainable threshold has decreased) above (below) its long-run ratio which means positive disequilibrium error ( $z_{t-1} > 0$ ), the ECM predicts that  $pcad_t$  will decrease significantly to restore the long run equilibrium. On the contrary if  $z_{t-1} < 0$ , here the primary current account deficit has decreased (and /or the sustainable threshold has increased) below(above) its long-run ratios (negative disequilibrium error), the ECM predicts that  $pcad_t$  will grow more than its long-run ratio to restore the *long run equilibrium*.

$\mu_1$  must be positive : if the primary current account deficit has increased above its long-run ratio which means positive disequilibrium error ( $z_{t-1} > 0$ ), the ECM predicts that sustainable level will increase to restore the long run equilibrium. Contrary if  $z_{t-1} < 0$ , here the primary current account deficit has decreased below its long-run ratio (negative disequilibrium error) and the ECM predicts that sustainable level will decrease more than its long-run ratio to restore the long run equilibrium which in turn alleviate the size external tightening and allow external policy a greater leeway to respond to shocks.

The lagged terms of primary deficit,  $\Delta pcad_{t-i}$ , and primary sustainable threshold,  $\Delta pcast_{t-i}$ , considered as explanatory variables, indicate short-run cause-and-effect relationship between the two variables. Thus, if the lagged coefficients of  $\Delta pcast_{t-i}$  appear to be significant in the regression of  $\Delta pcad_{t-i}$ , this will mean that  $pcast$  causes  $pcad_t$ . Similarly, if the lagged coefficients of  $\Delta pcad_{t-i}$  appear to be significant in the regression of  $pcast_t$ , this will mean that



$pcad_t$  causes  $pcadst_t$ . Coefficients  $\gamma_{3i}$  and  $\mu_{3i}$  can be interpreted as an indicators of the primary deficit-GDP and sustainable threshold-GDP growth paths which give more information on the sustainability of the adjustment efforts. When the primary deficit increases in (t-1), the following period sustainable level must increase more quickly to ensure the stability or the reduction of the external adjustment. When the sustainable level increases the primary deficit can increase more slowly (or decreases) to avoid the “snow-ball” effect on the size of adjustment.

To avoid spurious statistical inferences, Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) unit root test confirm that the non stationary in all variables ( $pcad_t$ ,  $pcadst_t$ ) in levels. However, the result indicates that all the variables are stationary in first difference as highlighted in Table-1. Hence, primary current account deficit and the corresponding sustainable level are integrated of order one. All the variables are checked at a lag length selected by on AIC, SIC and HQ criterion as shown in Table-1.

**Table-1.** Non stationarity test of the series

Sample period	1976-2010							
Test	ADF				Phillips-Perron			
hypothesis	H0: X has unit root (non stationarity)				H0: X has unit root(non stationarity)			
variable	T statistic	p-value	Test specification	Lag Length (Automatic based on AIC and SIC)	T statistic	p-value	Test specification	Bandwidth (Newey-West using Bartlett kernel)
$pcad_t$	-2.8	0.0685	Intercept	0	-2.7	0.0818	Intercept	4
$d(pcad_t)$	5.56** *	0.0001	Intercept	0	-5.57***	0.0001	Intercept	4
$pcadst_t$	-3.13	0.1154	trend and intercept	0	-3.13	0.1154	Trend and intercept	0
$d(pcadst_t)$	-7.4***	0.0000	trend and intercept	0	-11.97***	0.0000	Trend and intercept	11

Before using of Johansen's (1991,1995) cointegration methodology, the choice of the lag length needs to be justified as shown in Table-2 by running a VAR model in level.

**Table-2.** Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-176.9850	NA	247.3608	11.18656	11.27817	11.21693
1	-155.3405	39.23060*	82.19811*	10.08378*	10.35861*	10.17488*
2	-153.6396	2.870349	95.28579	10.22747	10.68552	10.37930
3	-153.1259	0.802606	119.5801	10.44537	11.08663	10.65793

Two Endogenous variables are considered in this VAR: PCAD PCADST, Exogenous variables: C, Sample: 1976 2010, Included observations: 32. \* indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

All selection criteria provide a lag length equal to 1 and the related VAR Residual Serial Correlation LM Tests (LM-Stat= 0.61 and P-value = 0.96) show that there is no serial correlation at this lag order. In addition to that, to select one of the five deterministic trend cases considered by Johansen (1995, p. 80-84), AIC and SC criteria are considered and represented in Table-3. Thus, our cointegration test assumes no deterministic trend in data: intercept (no trend) in cointegration equation- no intercept in VAR.

**Table-3. Information Criteria by Rank and Model**

<b>Data Trend: Rank or No. of CEs</b>	<b>None No Intercept No Trend</b>	<b>None Intercept No Trend</b>	<b>Linear Intercept No Trend</b>	<b>Linear Intercept Trend</b>	<b>Quadratic Intercept Trend</b>
Log Likelihood by Rank (rows) and Model (columns)					
0	-162.1265	-162.1265	-161.2908	-161.2908	-160.5331
1	-155.0395	-148.6255	-148.0835	-146.7344	-146.7166
Akaike Information Criteria by Rank (rows) and Model (columns)					
0	10.06827	10.06827	10.13883	10.13883	10.21413
1	9.881184	9.553063*	9.580819	9.559660	9.619191
Schwarz Criteria by Rank (rows) and Model (columns)					
0	10.24967	10.24967	10.41093	10.41093	10.57692
1	10.24397	9.961202*	10.03431	10.05850	10.16338

\* denotes AIC and SC rank and model selection criteria.

After having specified the lag length and assuming no deterministic trend in data, Johansen's cointegration test including an exogenous variable *d85\_86* as outlined in the summary Table-4, shows that the null hypothesis that there are no cointegrating equations that can be ruled out, is significantly rejected at the 01% level. However, the null hypothesis of the trace statistic is that there are no more than 1 cointegrating relations is accepted; furthermore the maximum eigenvalue statistics in turn confirm one cointegrating equation. This implies that long run relationships among primary current account deficits and the sustainable levels can be explained by one cointegration equation. *D85\_86* is a binary dummy variable which takes a value of one (1) during the politico-economic crisis period (85-86), and zero (0) otherwise. Figure n°1 and Figure n°2 highlight the magnitude and speed of the global economic crisis over the period 1985- 1986 which that has given rise to the need for drastic measures in the form of structural adjustment policies.

Having established the cointegration of the series, we can proceed to discuss the use and the validity of the Error Correction Model approach. All the variables are checked at the lag length of one, this in line with the cointegration analysis. For the purpose of figuring out how adequate our specification is (equation 7), VEC Residual Serial Correlation LM Test indicates that null hypothesis of no autocorrelation in the residuals at the first lag order is accepted (LM-Stat = 5.15; P-value = 0.27) as well as adjusted R-Squared related to the equation 7-1(7-2) is 0.51 (0.52). It means that the independent variable in the model can predict 51% (52%) of the variance in dependent variable. Furthermore F statistic rejects the null hypothesis of all the coefficients at the 1%.

**Table-4.** Johansen cointegration test for Primary current account deficit ( $pcad_t$ ) and primary current account deficit sustainable threshold ( $pcadst_t$ )

Sample period 1976-2010						
Exogenous series: D85_86						
Trend assumption: intercept (no trend) in cointegration equation- no intercept in VAR						
Test	Unrestricted Cointegration Rank Test (Trace)			Unrestricted Cointegration Rank Test (Maximum Eigenvalue)		
hypothesis	H0: number of cointegration vector is less than or equal to k (k=0 ;k=1)			H0: number of cointegration vector is equal to k (k=0 ;k=1)		
Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	34.2210	20.26184	0.0003	27.00186	15.89210	0.0006
At most 1	7.21919	9.164546	0.1153	7.219191	9.164546	0.1153
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level, * denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values						
1 Cointegrating Equation(s): Log likelihood -148.6255						
Normalized cointegrating coefficients (standard error in parentheses)						
$pcad_t$	$pcadst_t$	c				
1.000000	0.618226 (0.11602)	-3.46373 (0.67015)				

The results of the ECM estimates according to the equation 7 are reported Table -5 . The results from the estimated equation 7-1 show a negative, as it should be, and significant coefficient of the error correction term ( $\gamma_1 = -0.52; t = -5.44$ ) which means that if the primary current account deficit has increased above its long-run ratio which means positive disequilibrium error, the ECM predicts that primary current account will decrease in the following period to restore the long run equilibrium. This negative significant reaction involves the sustainability of the primary current account deficit, implies the efficiency of external adjustment and translates the ability and the willingness to adjust.

Precisely, the speed of adjustment towards a long-run equilibrium is that about 52 % of the external disequilibrium is corrected each year which involves the willingness of the authorities to restore the balance of payment equilibrium. Thus, the gap between primary current account deficit and the related sustainable threshold would be closed roughly about two years. The adjustment coefficient in the ECM with primary current account deficit sustainable level as the dependent variable (equation 7-2) is positive, as it should be, and it is showing statistically insignificant ( $\mu_1 = 0.45, t = 2.42$ ).

The VEC Granger Causality Test results reported in Table-6 indicate that the null hypothesis of causality from primary current account deficit to primary current account deficit sustainable level is rejected at the 5% level of significance. However, the null hypothesis is accepted when we check the causality from  $\Delta pcad$  to  $\Delta pcadst$ .

**Table-5.** Vector Error Correction Estimates

Sample (adjusted): 1978 2010 Included observations: 33 after adjustments Standard errors in ( ) & t-statistics in [ ]		
Cointegrating Eq:	<i>CointEq1</i>	
<i>pcad</i> <sub><i>t-1</i></sub>	1.000000	
<i>pcadst</i> <sub><i>t-1</i></sub>	-0.618226 (0.11602) [-5.32881]	
C	-3.463731 (0.67015) [-5.16859]	
Error Correction:	$\Delta$ <i>pcad</i> <sub><i>t</i></sub>	$\Delta$ <i>pcadst</i> <sub><i>t</i></sub>
<i>CointEq1</i>	-0.520073 (0.09548) [-5.44694]	0.456417 (0.18795) [ 2.42841]
$\Delta$ <i>pcad</i> <sub><i>t-1</i></sub>	-0.013083 (0.12887) [-0.10152]	-0.504249 (0.25368) [-1.98772]
$\Delta$ <i>pcadst</i> <sub><i>t-1</i></sub>	-0.116409 (0.08481) [-1.37265]	-0.056166 (0.16694) [-0.33645]
d85_86	1.183531 (1.30465) [ 0.90716]	-14.72787 (2.56817) [-5.73477]
R-squared	0.560321	0.573078
Adj. R-squared	0.514837	0.528913
Sum sq. resid	88.76934	343.9703
S.E. equation	1.749575	3.443987
F-statistic	12.31907	12.97602

**Table-6.** VEC Granger Causality Test

Sample: 1976 2010 H0 : X does not cause Y			
	Chi-sq	df	Prob.
Dependent variable: $\Delta$ <i>pcad</i> <sub><i>t</i></sub>			
$\Delta$ <i>pcadst</i> <sub><i>t-i</i></sub>	1.884179	1	0.1699
Dependent variable: $\Delta$ <i>pcadst</i> <sub><i>t</i></sub>			
$\Delta$ <i>pcad</i> <sub><i>t-i</i></sub> *	3.951017	1	0.0468

\*denotes rejection of the hypothesis at the 0.05 level

There exists a negative unidirectional causality from primary current account deficit to sustainable primary current account threshold which means that a reduction in the growth path of primary current account at (t-1) will lead to an increase in the primary current account deficit sustainable levels at t : a contraction of the current account deficits will leads to an improvement of the standard economic fundamentals (equation 5) that determining the level of the sustainable threshold.

#### **4. CONCLUSIONS AND POLICY RECOMMENDATIONS**

This paper is one of the first attempts in the empirical studies to examine the “successful” and “unsuccessful” external adjustment policy using a quantitative approach. A successful adjustment is defined as effectiveness of measures that keep under control the gap between primary current account deficits and the related sustainable threshold deficits over a large period of time, thus avoiding the “snow-ball” effect on the size of adjustment and debt, i.e. the self-reinforcing effect. Large and persistent of current account deficits and the inability to achieve the balance of payment equilibrium in some developing countries (DCs), have been considered as the main issues for this study. Running the specific model for Tunisia over the period 1976-2010 shows external adjustment persistence.

The applied time series methodology shows significant cointegration relationships between primary current account deficit and the related sustainable level authorized by the economic fundamentals. The estimated Error correction Model predicts that if the primary current account deficit has increased above its long-run ratio which means positive disequilibrium error, the primary current account will decrease in the following period to restore the long run equilibrium. This negative significant response involves the sustainability of the primary current account deficit and implies the efficiency of external adjustment process. The faster adjustment speed (52%) means quicker resolution of external imbalances and therefore results in greater authorities’ willingness to adjust.

VEC Granger Causality Test shows short-run unidirectional negative causality from primary current account deficit to the sustainable thresholds. In the short run, excessive deficits policies have an adverse effect on the economy. However, the authorities’ ability and willingness to adjust policy contribute to keeping under control the disequilibrium. Consequently, a contraction of the current account deficits will lead to an improvement of the standard economic fundamentals that determine the level of the sustainable threshold.

By looking back at Tunisian external disequilibrium story, we have found that external adjustment policies were conducted as a non-linear process and the currents account deficits were kept at historically low levels throughout the period 1975-2010. The realized foreign buffers until 2010, as consequence of successful adjustment policies, have created a room for external debt maneuvering and allow the government a greater leeway, in the short run, to ensure the required external financing for the economy. However, the continued downgrading of Tunisian rating has worried the international financial market and the foreign buffers are unlikely to be sufficient to

sustain sizeable official external financing flows to finance economic activities during the political transition period 2011-2014. Such fears cannot be dismissed so easily which makes us think about some questions: in what extent are foreign buffers enough to sustain sizeable official external financing flows and could the authorities' willingness and ability to adjust in the past continue in the future when the deficits reach record levels ?

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