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Does the external debt composition matter for economic growth in Tunisia?

Samir Abdelhafidh
University of Tunis El Manar, Faculty of Economics and Management of Tunis

Abstract

This paper investigates the long-term impact of external debt components on economic growth in Tunisia over the period 1970-2018. The econometric methodology is based on the ARDL approach and the results show that total external debt negatively influenced economic growth. They also highlight the relevance of a distinction between external debt components. Indeed, we found negative and significant impacts for public and publicly guaranteed non-concessional external debt borrowed from multilateral and from international banks, respectively. In contrast, bilateral external debt and bonds seem positively impacted Tunisian economic growth. These results offer some policy implications on the external debt management in Tunisia.

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Contact: Samir Abdelhafidh - samir.abdelhafidh@fsegt.utm.tn.
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1. Introduction

This paper examines the long-term relationship between the composition of external debt and economic growth in Tunisia for the period 1970-2018. More specifically, we test the hypothesis that debts linked to different financial conditions, mobilized from different sources, and affected for different sectors have different effects on economic growth.

Tunisia is providing a good case analysis on this hypothesis for a number of purposes. First, since its independence in 1956, Tunisia has relied on external financing to fill its savings-investment gap. As a result, its external debt rose sharply from less than 42 percent in 1970 to nearly 87 percent of GDP in 2018. Second, the structure of Tunisia's external debt shifted overtime, indicating a potential effect on economic growth. Indeed, although the share of multilateral sources increased from 7.26 percent in 1970 to 31.17 percent in 2018, the share of bilateral and private sources declined from 53.88 and 29.37 percent to 11.49 and 21.25 percent respectively. Around the same time, the GDP growth rate fell from 4.71 percent in 1970 to 2.51 percent in 2018. Third, a national debate on the external debt issue emerged in Tunisia since the collapse of the Ben Ali regime in 2011. In particular, Left-wing political parties defend the idea that (a part of) external debt was odious. Fourth, few empirical studies have addressed the issue of external debt and economic growth in Tunisia. Furthermore, and to the best of our understanding, no paper has examined the relationship between the composition of external debt and economic growth in that country.

In addition to the analysis of the Tunisian case, we try to contribute to the literature by creating a broad differentiation between external debt components according to their terms, origins and allocations. No other scientific research on the same topic has rendered such a distinction. Also, we employ the AutoRegressive Distributed Lag (ARDL) approach of Pesaran et al. (2001) to estimate the long-term effects of external debt components on growth. The ARDL approach has several advantages and was largely adopted by the literature in recent years (e.g. Abdelhafidh 2011, 2014, Manamperi 2016, and Mitra and Thasinul Abedin 2020).

The rest of the paper is organized as follows. Section 2 provides a brief literature review on the relationships between external debt and growth. The situation of external debt in Tunisia is described in Section 3. We develop our empirical methodology and we provide a descriptive analysis of our data in sections 4 and 5, respectively. Section 6 reports our empirical results and section 7 concludes and suggests some policy implications.

2. Literature review

The economic literature largely discussed the external debt impact on economic growth. The main reason is a lack of a consensus on the nature of the relationship between the two variables. Indeed, the development theory of the 1960s (e.g. Chenery and Strout 1966) supposed that foreign capital should allow developing countries to supplement their savings. In the tradition of the Harrod-Domar models, the latter should finance investment, which should lead to higher growth. However, Alvarez-Plata and Brück (2008) identified three channels across which a negative effect of external debt on economic growth can occur. The first is budgetary and reflects the idea that in order to service its external debt, a country might be forced to reduce its investment spending. The second refers to the delays and/or the misallocation of investments resulting from uncertainty regarding a government's ability to meet its external debt service commitments. The third is a result of the hypothesis that high future debt burdens that are difficult to repay would act as a disincentive to investment and hence to growth. The latter hypothesis emerged as a result of the debt overhang theory, which suggests that the relationship between debt and growth is non-linear (e.g. Krugman 1988, Corden 1988, and Sachs 1989).

Several empirical studies confirmed the debt overhang hypothesis without, however, leading to a consensus on the threshold. For example, Patillo et al. (2002) suggest that the effect of debt on growth becomes negative when external debt attain 40 percent of GDP. However, Clements et al. (2003) found a threshold of about 50 percent of GDP for the nominal debt and of 20 to 25 percent of GDP for the net present value of debt.

Some authors employed linear regressions in which a debt ratio was added to other growth determinants. For example, Chowdhury (2001), Sen et al. (2007) and Siddique et al. (2016) found a negative effect of debt in different sample of countries. The latter result was shared by Were (2001) for Kenya, by Karagöl (2002) for Turkey and by Ben Mimoune (2013) and Abdelhafidh (2014) for Tunisia. For other authors, the effect of debt on growth depends on factors related to economic policies and/or institutions (Jalles 2011, Ramzan and Ahmad 2014, and Nounamo 2019).

Finally, another fewer group of authors tested the hypothesis that the effect of external debt on growth depends on its components. For a panel of 100 developing countries and a sample period of 1970-1999, the results of Butkiewicz and Yanikkaya (2005) suggest that loans from the International Monetary Fund have either a neutral or a detrimental effect on growth, while those from the World Bank are associated in some cases with a positive effect. Doğan and Bilgili (2014) found a higher negative growth impact of the public sector debt than that of the private sector in Turkey. For Ramzan and Ahmad (2014), it is the bilateral and not the multilateral component of the total external debt that retarded growth in Pakistan over the period 1970-2009.

3. The situation of external debt in Tunisia

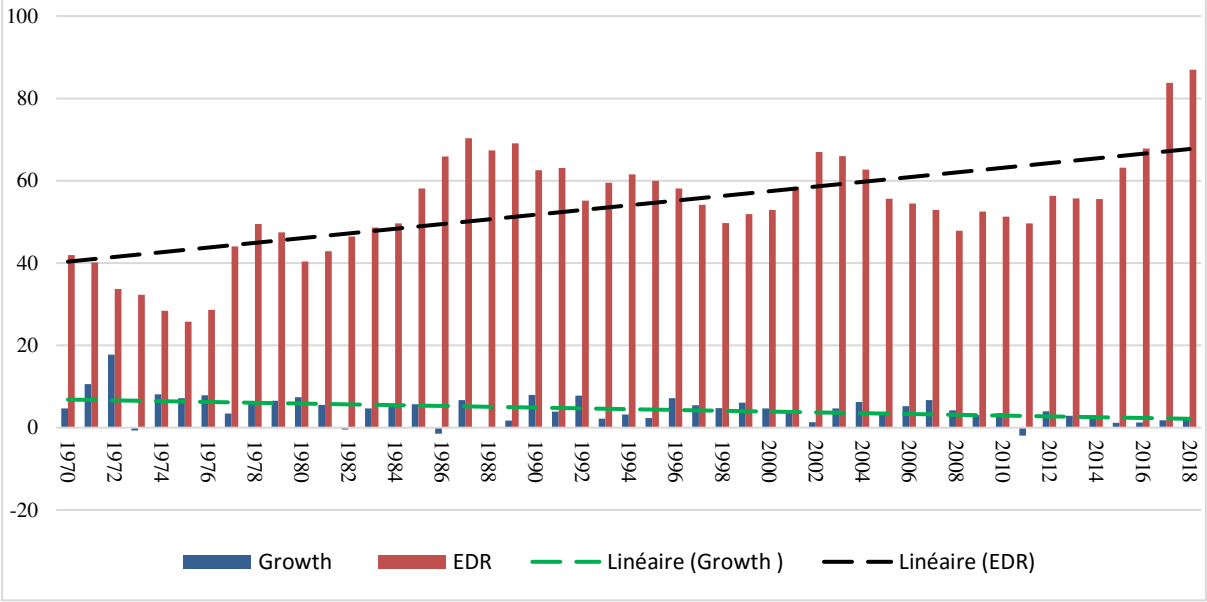
3.1. Debt and growth

From 1970 to 2018, the average annual growth rate of real GDP in Tunisia was about 4.5 percent. However, the Tunisian growth performance observed high discrepancies between several periods. Indeed, a favorable international situation helped Tunisia to achieve its best performance in the 1970s, with a rate of 7.2 percent. The second oil shock in 1979 and subsequent recession in developed countries, added to the emergence of political and social domestic problems, negatively affected growth during the 1980s (3.6 percent). The country implemented a structural adjustment program in 1986, which seems to have led to higher growth levels in the 1990s (5.1 percent) and in the period 2000-2010 (4.3 percent). However, the management of public affairs lacked transparency, contributing to rented opportunities for those near to power and growing geographical and social inequality. The foregoing causes and the absence of political freedom would lead to the fall of Ben Ali's political regime on 14 January 2011. A difficult political transition will follow with dramatic consequences on economic growth. On average, the latter was no more than 1.9 percent from 2011 to 2018.

The fall in economic growth in recent years accompanied a high upward trend in the external debt burden, which rose from 49.7 percent of GDP in 2011 to an unprecedented ratio of 87.2 percent in 2018. For the whole period 1970-2018, the debt ratio was about only 54 percent.

It is important to point out that trend in economic growth and external debt burdens have been characterized by opposite signs. Specifically, although the growth rate decreased, the debt ratio rose (lines in Figure 1). Thus, the constructive role of external debt in Tunisia's economic growth appears uncertain.

Figure 1: External debt ratio and GDP growth: 1970-2018 (in %)



Source: Author's calculations.

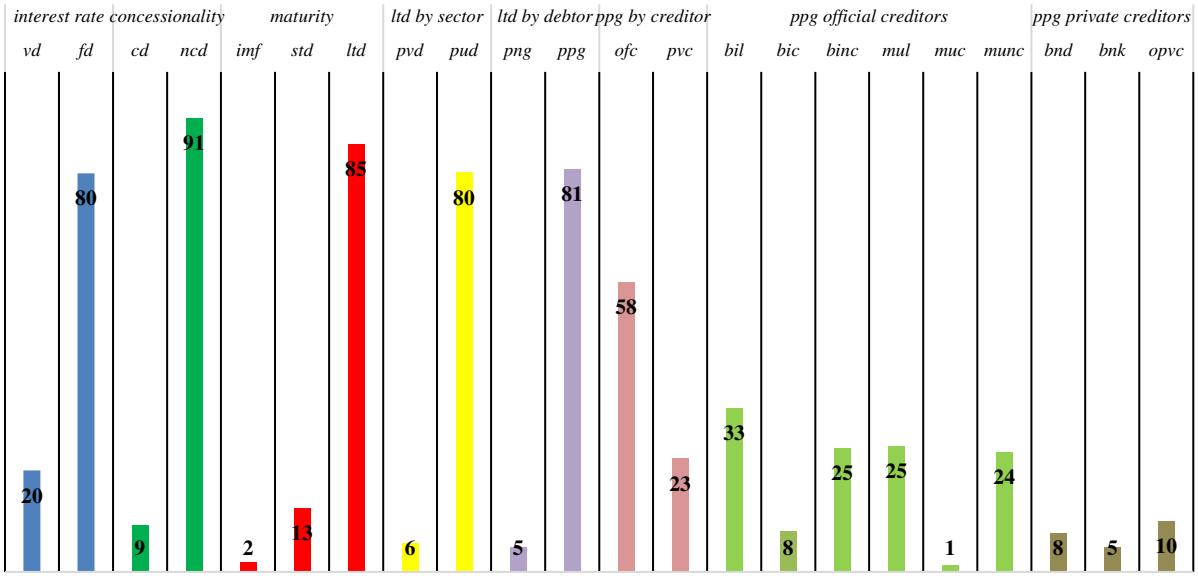
3.2. External debt composition

We rely on the disaggregation of external debt adopted by the World Bank in its "World Development Indicators". Hence, we disaggregate the total external debt according to its financial conditions (concessional (*cd*) versus non-concessional (*ncd*)), the nature of interest rates (fixed (*fd*) versus variable (*vd*)), and the maturity period (long-term (*ltd*), short-term (*std*) and debt contracted from the IMF[1] (*imf*)). The long-term debt is then disaggregated by sector (public (*pud*) versus private sector (*pvd*)) and by debtor (publicly and publicly guaranteed (*ppg*) versus private nonguaranteed (*png*)). The *ppg* debt is further decomposed according to whether the creditor is official (*ofc*) or private (*pvc*). We distinguish in the debt from official creditors between multilateral debt (*mul*) and bilateral debt (*bil*). In the debt from private creditors, the distinction is made between debt borrowed from international banks (*bnk*), bonds debt (*bnd*), and debt contracted from other private creditors (*opvc*). Finally, multilateral as well as bilateral debts are disaggregated on concessional (*muc* and *bic*) and non-concessional (*munc* and *binc*) components.

According to the above criteria of debt disaggregation, figure 2 illustrates the characteristics of external debt in Tunisia over the period 1970-2018. It highlights that 91 percent and 80 percent of external debt was contracted on non-concessional terms and at fixed interest rates, respectively. Figure 2 shows also that debt was mainly of long maturities (85 percent) and contracted by the public sector (80 percent). The share of the latter slightly increase (nearly 81 percent) when we take into account publicly guaranteed private debt. The long-term external debt was mobilized mainly from official creditors (58 percent), the lion's share of which was through bilateral cooperation (33 percent). Bilateral as well as multilateral debts were mainly characterized by market-based conditions (nearly 25 percent). Finally, the debt mobilized from private creditors was dominated by commercial loans (10 percent), followed by bonds (8 percent) and by banks loans (5 percent).

[1] When disaggregating total debt by maturity, the World Bank retain the debt to IMF as an independent component, in which we cannot distinguish between long-term debt and short-term debt.

Figure 2: External debt components in % of GDP. 1970-2018

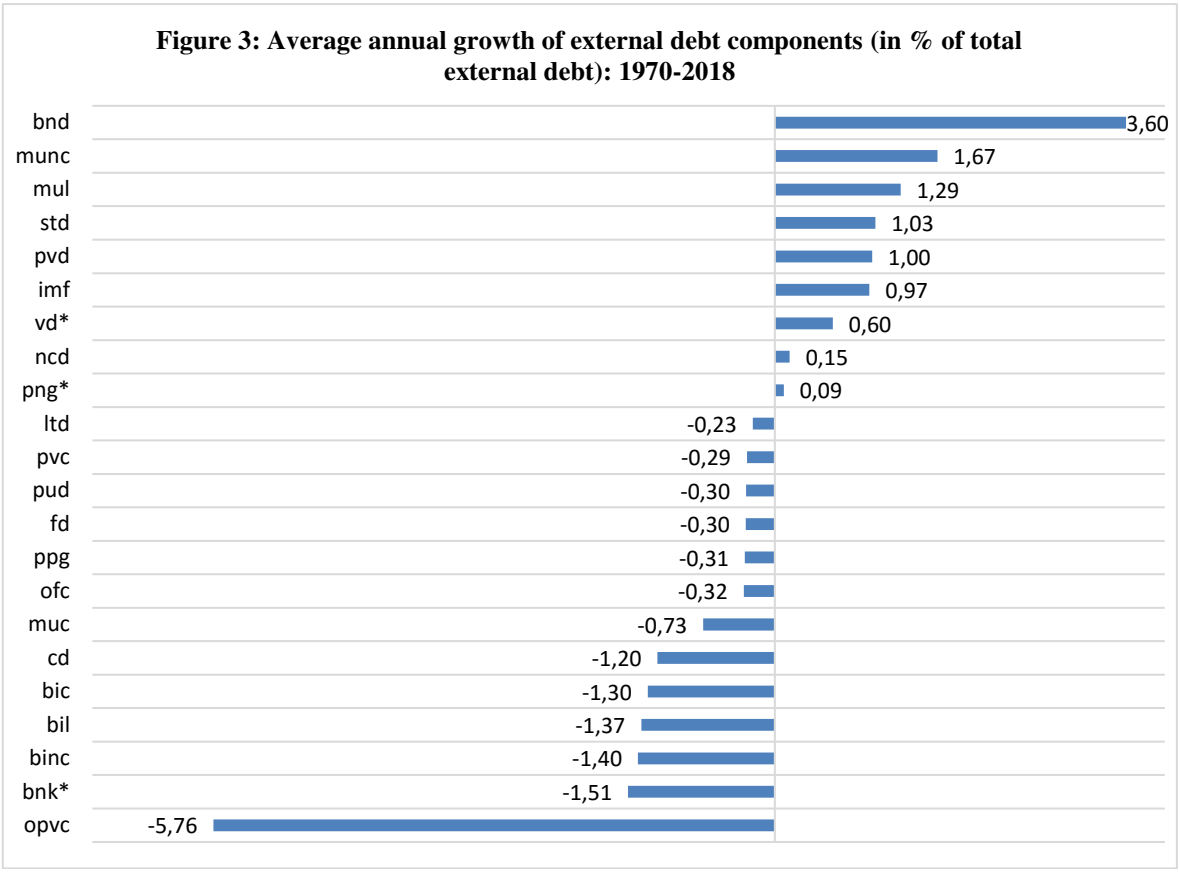


Source: Author's calculations.

Figure 3 shows that the composition of external debt has changed over time. More specifically, the share of non-concessional debt rose (0.15 percent) while that of concessional debt decreased (-1.2 percent). This growth on non-concessional debt seems to be the result of an increase in variable rate (0.6 percent), short-term (1.03 percent), private (1 percent), non-guaranteed (0.09 percent), and/or IMF (0.97 percent) debts. Long-term public and publicly guaranteed debt fell (-0.31 percent), because of a decrease in debts from private (-0.29 percent) and from official creditors (-0.32 percent). Bilateral concessional as well as non-concessional debts decreased in an average rate of 1.3 percent and 1.4 percent, respectively. In contrast, multilateral debt increased, but mainly in the component mobilized under non-concessional conditions (1.67 percent). Finally, the debt from private creditors saw a sharp drop in bank and in commercial credits (-1.51 percent and -5.76 percent, respectively), compared to a significant increase in bonds (3.6 percent).

In sum, data on the Tunisian external debt highlights the diversity of its conditions, its sources and its allocations. Data also underlines that its components grew at different rates.

Figure 3: Average annual growth of external debt components (in % of total external debt): 1970-2018



*:1977-2014: Before 1977, Tunisia did not borrow syndicated bank loans, floating interest loans and private non-guaranteed loans.
Source: Author's calculations.

4. Empirical methodology

We use for our empirical methodology the ARDL approach of Pesaran et al. (2001), which has several advantages. First, it is appropriate for testing long-term effects of debt components on growth. Second, it is more appropriate for small samples than the Johansen and Juselius (1990) and the Engle and Granger (1987) approaches for cointegration. Third, it allows testing cointegration between variables not integrated in the same order.

We assume that economic growth Y_t is explained by its past values Y_{t-i}, by current and past values of external debt ratio, D, or of its components D_k, and by those of other growth determinants, X_h. The latter are the investment to GDP ratio (*inv*), the inflation rate (*inf*) and the trade openness (*opn*). In our specifications, we add also a dummy variable dum_{11} for the year 2011. In that year, Tunisia observed a highly unprecedented negative rate of its real GDP (-1.9 percent), in part because of political uncertainties which emerged after the fall of the Ben Ali's political regime. Hence, we deduce our econometric estimations of long-term effects of debt components on economic growth from a methodology based on the two following ARDL equations, *(1)* and *(2)*:

$$Y_t = c_1 + \sum_{i=1}^{p} a_{1i} Y_{t-i} + \sum_{j=0}^{q} b_{1j} D_{t-j} + \sum_{s=0}^{r} \sum_{h=1}^{m} d_{1h,s} X_{h,(t-s)} + e_1 dum_{11} + \varepsilon_{1t} \quad (1)$$

$$Y_t = c_2 + \sum_{i=1}^{p'} a_{2i} Y_{t-i} + \sum_{j=0}^{q'} \sum_{k=1}^{f} b_{2j,k} D_{k,(t-j)} + \sum_{s=0}^{r'} \sum_{h=1}^{m} d_{2h,s} X_{h,(t-s)} + e_2 dum_{11} + \varepsilon_{2t} \quad (2)$$

In equation *(1)*, *D* refers to total external debt to GDP ratio. In equation *(2)*, we disaggregate the variable *D* into *f* components according to some of the criteria previously discussed in Section 2.
According to the ARDL approach, the Unrestricted Error Correction Models (UECM) of equations *(1)* and *(2)* are respectively expressed in equations *(3)* and *(4)* as:

$$\Delta Y_t = c_1 + \sum_{i=1}^{p} a_{1i}\Delta Y_{t-i} + \sum_{j=0}^{q} b_{1j}\Delta D_{t-j} + \sum_{s=0}^{r_h}\sum_{h=1}^{m} d_{1h,s}\,\Delta X_{h,(t-s)} + \theta_1 Y_{t-1} + \delta_1 D_{t-1} + \sum_{h=1}^{m}\gamma_{1h}X_{h,t-1} + e_1 dum_{11} + \varepsilon_{1t} \quad (3)$$

$$\Delta Y_t = c_2 + \sum_{i=1}^{p'} a_{2i}\Delta Y_{t-i} + \sum_{j=0}^{q'_k}\sum_{k=1}^{f} b_{2k,j}\,\Delta D_{k,(t-j)} + \sum_{s=0}^{r'_h}\sum_{h=1}^{m} d_{2h,s}\,\Delta X_{h,(t-s)} + \theta_2 Y_{t-1} + \sum_{k=1}^{f}\delta_{2k}D_{k,t-1} + \sum_{h=1}^{m}\gamma_{2h}X_{h,t-1} + e_2 dum_{11} + \varepsilon_{2t} \quad (4)$$

Note that *p*, *q*, and r_h in equations *(1)* and *(3)* and p', q'_k, and r'_h in equations *(2)* and *(4)* are optimal lags. The parameters ε_1, ε_2, ε_3, ε_4 are white noise errors and c_1 and c_2 are the constants. In equations *(3)* and *(4)*, Δ is the first difference operator.
A long-term relationship between the variables of the model exists when the null hypothesis of no cointegration is rejected. This is equivalent to a Fisher test in which the null hypothesis is $\theta_1 = \delta_1 = \gamma_{1h} = e_1 = 0$ (for all *h*) in equation (3) and $\theta_1 = \delta_{2k} = \gamma_{2h} = e_2 = 0$ (for all *h* and *k*) in equation *(4)*. The null hypothesis of no cointegrationis is rejected and long-term effects can be estimated when the computed value of the F-statistic is higher than the upper bound of the critical values simulated by Pesarn et al. (2001).
We estimate the long-term effects by setting the first difference variables in equations *(3)* and (4) equal to zero (Morley, 2006). This methodology leads to equations *(5)* and *(6)*:

$$Y_t = \beta_0 + \beta_1 D + \sum_{h=1}^{m}\alpha_h X_h + \vartheta_1 dum_{11} \quad (5)$$

$$Y_t = \mu_0 + \sum_{k=1}^{f}\varphi_k D_k + \sum_{h=1}^{m}\omega_h X_h + \vartheta_2 dum_{11} \quad (6)$$

The parameters β_0 and μ_0 are the constants. The coefficients β_1 and φ_k measure the long-term effects of the total external debt and of its components on economic growth, respectively. The long-term effects of the variables of control are measured by the coefficients α_h and ω_h. For the dummy variable, the coefficients ϑ_1 and ϑ_2 reflect its long term effetcs in equations (5) and (6), respectively. The constants and the long-term ceofficients are calculated as follow:
$\beta_0 = -\frac{c_1}{\theta_1};\ \beta_1 = -\frac{\delta_1}{\theta_1};\ \alpha_h = -\frac{\gamma_{1h}}{\theta_1};\ and\ \vartheta_1 = -\frac{e_1}{\theta_2}$ in equation (5).
$\mu_0 = -\frac{c_2}{\theta_2};\ \varphi_k = -\frac{\delta_{2k}}{\theta_2};\ \omega_h = -\frac{\gamma_{2h}}{\theta_2}$; and $\vartheta_2 = -\frac{e_2}{\theta_2}$ in equation (6).

5. Data

Our statistics on economic growth, debt indicators and control variables for the period 1970 to 2018 come from the World Bank, World Development Indicators. Economic growth rate, *Y*, is measured as the percentage annual change in the GDP at constant 2010 U.S. dollars. Debt indicators reflect the shares of total external debt and of each one of its components in GDP. In the variables of control, investment and openness rates are measured as the shares in GDP

of the Gross Fixed Capital Formation and of the sum of exports and imports, respectively. To measure the inflation rate, we use the GDP deflator, base year 2010.
Appendix 1 documents descriptive statistics. For each variable, it describes the mean, the median, the maximum, the minimum, and the standard deviation. In particular, Appendix 1 confirms our observations in section 2 that external debt was mainly of long-term maturities (*ltd*), mobilized by public sector (*pus*), and from official creditors (*ofc*). Indeed, although the overall debt-to-GDP ratio (*ted*) was almost 54 percent on average, the ratios of long-term debt, public debt, and official debt (multilateral and bilateral creditors) were 45.65 percent, 42.48 percent and 30.75 percent, respectively. Table I in Appendix 1 shows also a very high standard deviation of external debt ratio (12.76 percent), in comparison with that of the GDP growth (3.32 percent). Volatilities of long-term debt, public debt, and of debts from official sources are higher than those of debts mobilized by private sector or borrowed from private sources.
The correlation matrix (Appendix 2) comforts our hypothesis that different categories of external debts should have different impacts on economic growth. Indeed, negative correlations are observed between economic growth in a one hand and each one of the ratios of total debt, long-term debt, short-term debt, IMF debt, public debt, private debt, PPG debt, PNG debt, multilateral debt, multilateral non-concessional debt, bond debts, and debt from international banks, in another hand. In contrast, economic growth has positive correlations with bilateral debt, bilateral concessional debt, bilateral non-concessional debt and debt borrowed from other private creditors. The highly negative and positive correlations with economic growth are observed for multilateral (-0.41) and bilateral concessional (0.26) debts, respectively. For the variables of control, correlation with growth is positive for investment (0.04) and inflation (0.01), but negative for the openness rate (-0.4).

6. Econometric Results

Our empirical methodology follows three steps. In the first one, we conduct unit root tests to insure that the ARDL approach is applicable, i.e. that any of the variables included in the equations is integrated of an order higher than one. In the second step, we estimate ARDL equations and, then, we test cointegration relationships. In the third step, if we cannot reject the cointegration hypothesis, we estimate the long-term impact of our explanatory variables on economic growth. Note that all explanatory variables, except of the inflation rate, are in natural logarithm[2].

6.1. Stationarity tests

We apply the Augmented Dickey Fuller (*ADF*, Dickey and Fuller, 1981) and the Kwiatkowski, Phillips, Schmidt and Shin (*KPSS*, 1992) tests on the variables in level and in first difference. The null hypothesis of the *ADF* test is that the variable is non-stationary whereas that of the *KPSS* test is that the variable is stationary.
Table I shows that for all the variables, except of *opvc,* the two tests lead to the conclusion that they are stationary either in level (I(0)) or in first difference (I(1)). Consequently, the ARDL approach can be applied to cointegration tests for all specifications, under the constraints that they do not include the (log of the) variable *opvc*. In addition, results prove that the ARDL approach of cointegration is more appropriate than the procedures of Engle and Granger (1987) and of Johansen and Juselius (1990), because all variables are not integrated in the same order.

[2] For variables with null values in some years, we add 1 to ovoid a loss of observations following a transformation to natural logarithm.

Table I: Unit root tests

Variable	ADF test H_0: unit root			KPSS Test (1992) H_0: stationary		
	in level	in first difference	Order of integration	in level	in first difference	Order of integration
Y	-6.44***	-10.571***	I(0)	0.661**	0.305	I(1)
bil	-0.732	-5.609***	I(1)	0.69**	0.156	I(1)
bic	-2.018	-5.234***	I(1)	0.811***	0.245	I(1)
binc	-0.388	-3.587***	I(1)	0.64**	0.194	I(1)
bnd	0.792	-2.616*	I(1)	0.807***	0.204	I(1)
bnk	-1.939	-5.649***	I(1)	0.185	0.164	I(0)
fd	-2.161	-4.932***	I(1)	0.249	0.132	I(0)
imf	-0.417	-5.025***	I(1)	0.319	0.317	I(0)
inf	-4.84***	-9.433***	I(0)	0.624*	0.133	I(0)
inv	-2.439	-4.5***	I(1)	0.336	0.18	I(0)
ltd	-1.395	-5.063***	I(1)	0.241	0.076	I(0)
mul	-1.947	--6.024***	I(1)	0.735**	0.301	I(1)
muc	-1.801	-2.739*	I(1)	0.587**	0.276	I(1)
munc	-2.491	-5.92***	I(1)	0.735**	0.419*	I(1)
opvc	0.462	-2.392	I(2)	0.756***	0.426*	I(1)
png	-1.813	-5.279***	I(1)	0.66**	0.052	I(1)
ppg	-1.37	-5.302***	I(1)	0.171	0.125	I(0)
pud	-1.322	-5.265***	I(1)	0.173	0.107	I(0)
pvd	-1.877	-4.977***	I(1)	0.524**	0.045	I(1)
std	-0.334	-5.467***	I(1)	0.848***	0.212	I(1)
ted	-1.798	-4.872***	I(1)	0.518**	0.084	I(1)
opn	-2.47	-6.099***	I(1)	0.768***	0.169	I(1)

Notes: Δ is the first difference operator.Unit root tests are applied to models with a drift and without a trend. ***, **, *: significant at the 1 %, 5 %, and 10 %t level, respectively. The orders of integration are in parenthesis.

6.2. ARDL estimations and cointegration tests

In equation *(1)* of Table II, the debt variable is the total external debt ratio (*ted*). Then, a distinction is made between different categories of debts according to different criteria, leading to different versions of equation *(2)*, i.e. equations *(2a)*, *(2b)*, *(2c)*, *(2d)*, and *(2e)* in Table II. Specifically, we distinguish first, in equation *(2a)*, between long-term debt (*ltd*), short-term debt (*std*), and IMF debt (*imf*). Second, we disaggregate long-term debt respectively by sector (public sector, *pud*, and private sector, *pvd*) in equation *(2b)* and by debtor (PPG debt, *ppg*, and PNG debt, *png*) in equation *(2c)*. Third, in equation *(2d)*, we rely on the creditor criterion to distinguish in the PPG debt between multilateral (*mul*), bilateral (*bil*), bond (*bnd*), and bank (*bnk*) debts. Besides, we disaggregate in equation *(2e)* multilateral and bilateral debts according to their financial conditions. Hence, we distinguish in the latter equation between multilateral concessional debt (*muc*), multilateral non-concessional debt (*munc*), bilateral concessional debt (*bic*) and bilateral non-concessional debt (*binc*).

The maximum lag length varies from two to five years, depending on the availability of a sufficient number of observations in each equation. Equation *(1)* and the different versions of equation *(2)* were estimated by the Ordinary Least Squares method and we employed the Schwarz Information Criterion (SIC) to select optimal lags.

Results (Table II) of the traditional test criteria-goodness-of-fit, i.e., R^2, *adjusted-*R^2 and the *F-statistic* show that the quality of our ARDL regressions is quite satisfactory. Indeed, R^2 ranges from a minimum of 56 percent (equation *(1)*) to a maximum of 79 percent (equation *(2d))*. *Adjusted-*R^2 shows that the explanatory power varies from 47 percent for the variables of equations *(2)* and *(2b)* to 64 percent for those included in equation *(2d)*. Finally, the *F-statistic* indicates high levels of the overall significance of explanatory variables in all specifications.

Table II : ARDL estimations

Equation *[Selected ARDL]{Max.lag}*	***(1)*** *[1, 1, 0, 0, 0]{5}*	***(2a)*** *[1, 3, 0, 3, 0, 0, 1] {4}*	***(2b)*** *[1, 1, 0, 0, 0, 0] {5}*	***(2c)*** *[1, 1, 0, 0, 0, 0] {5}*	***(2d)*** *[1, 0, 4, 0, 4, 1, 0, 0] {4}*	***(2e)*** *[1, 0, 0, 2, 1, 0, 0, 0, 0, 1] {2}*
Y(-1)	-0.392***	-0.457***	-0.409***	-0.394***	-0.385***	-0.645***
ted	-0.179***					
ted(-1)	0.133***					
ltd		-0.118***				
ltd(-1)		0.046				
ltd(-2)		0.087				
ltd(-3)		-0.076**				
std		-0.007				
imf		1.587**				
imf(-1)		1.479				
imf(-2)		-0.583				
imf(-3)		1.122				
pud			-0.213			
pud(-1)			0.174***			
pvd			0.003			
ppg				-0.189***		
ppg(-1)				0.154***		
png				-0.085		
mul					0.062***	
bil					-0.094***	
bil(-1)					0.021	
bil(-2)					0.092	
bil(-3)					0.169***	
bil(-4)					-0.12***	
muc						-0.001
munc						-0.045**
bic						-0.231***
bic(-1)						0.282***
binc						0.072
binc(-1)						-0.171**
binc(-2)						0.124***
bnd					0.522***	0.503**
bnk					0.328	-0.592**
bnk(-1)					-0.551	
bnk(-2)					-0.33	
bnk(-3)					-1.12***	
bnk(-4)					1.1***	
inv	0.024	0.041	0.037	0.039	-0.032	0.079**
inv(-1)					0.1*	
opn	-0.066***	-0.026	-0.109***	-0.087***	0.111*	0.036
inf	-0.224**	-0.161*	-0.157*	-0.184*	-0.267***	-0.399***
inf(-1)		-0.109				-0.247**
dum_{11}	-0.065***	-0.069***	-0.063**	-0.06**	-0.029	-0.042*
C	0.073*	0.064	0.087**	0.088**	0.181***	0.343**
R^2	0.56	0.66	0.57	0.56	0.79	0.73
Adjusted- R^2	0.49	0.49	0.49	0.47	0.64	0.6
F	7.41***	3.91***	6.53***	6.14***	5.44***	5.6***

***, **, *: significant at the 1 %, 5 %, and 10 %t level, respectively.

ARDL Equations have also successfully passed a series of diagnostic tests. Specifically, the Jerqua-Bera (*JB*) test, the Breusch-Godfrey LM (*BG*) test, and the AutoRegressive Conditional

Heteroscedasticity LM (*ARCH*) test failed to reject respectively the hypotheses of normally distributed errors, of no serial correlations, and of no heteroscedasticity problem in the residuals (Table III). Moreover, the plots of the *CUSUM* and the square of the *CUSUM* tests are most frequently within the 5 percent significance lines, confirming the stability of the estimated parameters (Appendix 3).

Table III: Diagnostic and cointegration tests

Equation	***(1)***	***(2a)***	***(2b)***	***(2c)***	***(2d)***	***(2e)***
Diagnostic tests						
JB	0.09	0.41	0.15	0.09	0.95	0.81
BG (1)	0.17	0.66	0.13	0.18	0.46	0.18
ARCH(1)	0.18	0.4	0.18	0.16	0.93	0.53
Cointegration tests [a]						
Computed F-statitic	19.76	24.3	16.39	16.22	14.72	15.44
Lower-bound	3.74	3.15	3.41	3.41	2.96	2.65
Upper-bound	5.06	4.43	4.68	4.68	4.26	3.97

***, **, *: significant at the 1 percent, 5 percent, and 10 percent level, respectively.
[a]: Critical lower and upper bounds of Pesaran et al (2001) at the 1 percent level.

In all equations, cointegration tests show that the computed value of the F-statistic is higher than the upper bound of Pesaran et al. (2001) at the 1 percent threshold (Table III). Therefore, we reject the null hypothesis of no-cointegration. The latter result suggests that long-term relationships exist between economic growth in a one hand and debt and other control variables in the other hand.

6.3. Long-term effects

The long-term effects of external debt on economic growth are deduced on the basis of equation *(5)* and different versions of equation *(6)*, i.e., *(6a)*, *(6b)*, *(6c)*, *(6d)* and *(6e)* in Table IV. Our results show that the growth impact of total external debt was negative in Tunisia over the period 1970-2018, confirming the results of Abdelhafidh (2014) and Ben Mimoune (2013). More specifically, the coefficient of the debt variable (*ted*) in equation *(5)* suggests that an increase of 1 percent in the debt burden reduced growth by 0.033 percent.

The results of Table IV show also that the effect of external debt on growth depends on debt components. Indeed, whereas long-term debt is associated with a negative and significant effect on growth, the effects of short-term and IMF debts are negative, but statistically insignificant (equation *(6a)*). The decomposition of long-term debt by sector indicates that the negative impact of long-term external debt concerns only the debt borrowed by the public sector (equation *(6b)*). The latter result is confirmed by the distinction between public and publicly guaranteed debt and private non-guaranteed debt (equation *(6c)*). In fact, a 1 percent increase in PPG debt decelerates growth by 0.025 percent.

The distinction in the PPG debt between the nature of the creditor (equation *(6d)*) indicates that although multilateral debt has had a negative impact on the growth rate, the effect of the bilateral debt has been positive. Similar opposite effects are found for debts contracted from private creditors. Indeed, a positive effect is observed for bond debts. However, debt accumulated from international banks negatively influenced economic growth in Tunisia. The two latter results are confirmed in equation *(6e)* where we decompose multilateral and bilateral debt into concessional and non-concessional components. Results of equation *(6e)* indicate also that for official debt, only the non-concessional multilateral component has a negative effect on growth.

To summarize, we found that multilateral non-concessionnal debt and debt borrowed from international banks have negative effects on economic growth in Tunisia over the period 1970-

2018. In contrast, significant positive effects are observed for debt borrowed from bilateral creditors and for debt resulting from bonds issuance in international markets.

Table IV: Long-term effects

Equation	(5)	(6a)	(6b)	(6c)	(6d)	(6e)
ted	**- 0.033****					
ltd		**- 0.042*****				
std		-0.005				
imf		0.296				
ppg				**- 0.025***		
png				-0.061		
pud			**- 0.028****			
pvd			0.002			
mul					**- 0.045*****	
bil					**0.049*****	
bic						0.031
binc						0.015
muc						-0.001
munc						**- 0.028****
bnd					**0.38*****	**0.306*****
bnk					**- 0.414*****	**- 0.36*****
inv	0.018	0.028	0.026	0.028	0.049*	0.048**
inf	- 0.161**	- 0.186*	- 0.111*	- 0.132*	- 0.194***	- 0.393***
opn	- 0.048***	- 0.018	- 0.077***	- 0.063***	0.08***	0.022
dum_{11}	- 0.047**	- 0.047***	- 0.045**	- 0.043**	- 0.021	- 0.025*
C	0.052*	0.044	0.062**	0.063**	0.131***	0.209**

***, **, *: significant at the 1 percent, 5 percent, and 10 percent level, respectively.

The long-term effects of the control variables on economic growth are significant in all equations for inflation and in two equations (*(6d)* and *(6e)*) out of six for investment. Results confirm those of the empirical literature arguing that inflation and investment have negative and positive impacts on growth, respectively. Fisher (1993), for example, found that inflation has a negative impact on growth and Levine and Renelt (1992) proved that investment is the most robust positive determinant of growth. Our results, however, do not confirm a positive impact of trade openness on growth. Specifically, the coefficient of trade openness is significant and negative in equations *(5)*, *(6b)*, and *(6c)*, but positive in equation *(6d)* and non-significant in equations *(6a)* and *(6d)*. This finding confirms the doubts of Belloumi (2014) on the positive role of trade on economic growth in Tunisia and gives credit to the hypothesis that some complementary reforms might be needed to observe a positive impact of openness on growth (Chang, Kaltani and Loayza 2009). Finally, the effect of the dummy variable for the year 2011 is, as expected, negative. It is statistically significant in all equations, except of *(6d)*.

7. Conclusions and policy implications

Our results show that bilateral and bond debts have positive effects on economic growth in Tunisia, but that the effects of multilateral non-concessional debt and of debt borrowed from international banks are negative. The effects were non-significant for short-term debt, for private sector debt, for PNG debt, and when a distinction was made in bilateral debt between its concessional and non-concessional components.
Some policy implications emerge from our results:

(i) The allocation of external borrowing by the public sector would not seem to be conducive to economic growth. It should then be re-examined in order to boost its effectiveness.
(ii) Non-concessional loans of multilateral institutions are generally linked to conditionality on the adoption of particular economic reforms and/or of some specific projects. Our findings pose questions about the effectiveness in term of economic growth of all programs and projects funded by multilateral institutions in Tunisia. They highlight the need to rethink the ways non-concessional multilateral debt was negotiated and to audit the reforms and the projects it supported.
(iii) Tunisia has to reinforce the rising share of bonds in its external debt borrowed from private sources. The success of bonds issuance in international markets depends, however, on how Tunisia creditworthiness is appreciated by international investors. Strong economic policies that aim, in particular, to minimize budget and current account deficits and raise foreign exchange stock are required to enhance Tunisia's credit rating by international agencies. The latter objective should also decrease the interest rate of loans from international banks, which can reduce the negative effect observed for debt borrowed from banks on economic growth in Tunisia.
(iv) Our results suggest that Tunisia can gain in terms of economic growth from a higher financial bilateral cooperation. Hence, an active diplomatic approach should be adopted to reinforce cooperation with bilateral partners.
In conclusion, this paper indicates that the composition of the debt is important to the relationship between external debt and economic growth in Tunisia. Our conclusion provides two avenues for potential research on the topic. The first one is to empirically explore why the impacts of various debt components on economic growth are different. The second one is to investigate the hypothesis of a non-linear relationship between each debt component and economic growth. Debt overhang theory justified and tested the latter hypothesis, but only for total external debt.

Appendix 1: Descriptive statistics

	grw	*ted*	*ltd*	*std*	*imf*	*pud*	*pvd*
Mean	4.491913	54.02940	45.65319	7.221046	1.155166	42.48159	3.171600
Median	4.669632	54.47364	44.76644	5.437074	0.569547	41.31744	3.045119
Maximum	17.74272	87.15296	64.89627	20.34948	5.733512	62.56857	6.537339
Minimum	-1.917178	25.77720	23.90563	1.559045	0.000000	23.89959	0.006038
Std. Dev.	3.326263	12.75724	9.614920	5.062614	1.453306	9.352654	2.046495
	ppg	*png*	*mul*	*mulc*	*mulnc*	*bil*	*bilc*
Mean	42.86311	2.790082	14.30048	0.583867	13.71662	16.45245	3.914987
Median	41.39405	2.446508	16.26333	0.551690	16.01441	17.50983	3.921309
Maximum	62.56857	5.999318	27.16438	1.421340	26.14124	29.00136	7.313419
Minimum	23.90563	0.000000	3.042304	0.034850	1.915319	7.369193	2.151024
Std. Dev.	9.224065	1.939859	6.878807	0.435178	7.162903	6.545963	1.365082
	bilnc	*bnd*	*bnk*	*opvc*	*inv*	*open*	*inf*
Mean	12.53747	4.510277	2.653945	4.945948	24.42308	83.96049	6.209863
Median	13.27229	0.759087	2.324696	4.248649	24.03424	85.72035	4.806570
Maximum	23.65892	17.06980	6.861544	12.16684	34.03130	114.3548	24.39473
Minimum	5.218168	0.000000	0.000000	0.038148	18.58685	46.74431	2.107264
Std. Dev.	5.508430	4.958517	1.955398	4.126080	3.918677	16.05028	4.164716
Observations	49	49	49	49	49	49	49

Appendix 2: Matrix of correlations

	grw	*ted*	*ltd*	*std*	*imf*	*pud*	*pvd*
grw	1.000000	-0.430164	-0.335113	-0.339254	-0.377144	-0.268809	-0.345960
ted	-0.430164	1.000000	0.893553	0.613412	0.729596	0.815844	0.469652
ltd	-0.335113	0.893553	1.000000	0.202651	0.521850	0.977096	0.232829
std	-0.339254	0.613412	0.202651	1.000000	0.560340	0.055404	0.698904
imf	-0.377144	0.729596	0.521850	0.560340	1.000000	0.504180	0.147628
pud	-0.268809	0.815844	0.977096	0.055404	0.504180	1.000000	0.020543
pvd	-0.345960	0.469652	0.232829	0.698904	0.147628	0.020543	1.000000
ppg	-0.275991	0.820983	0.979646	0.060850	0.513452	0.998962	0.037271
png	-0.348646	0.525111	0.298269	0.715102	0.145079	0.092896	0.976795
mul	-0.404847	0.842421	0.613321	0.772851	0.644935	0.534926	0.436871
mulc	0.268303	-0.383683	-0.251144	-0.501082	0.039070	-0.136101	-0.557938
mulnc	-0.405090	0.832319	0.604254	0.772641	0.616982	0.521979	0.453441
bil	0.153919	-0.072448	0.325947	-0.781173	-0.071161	0.482819	-0.675148
bilc	0.264308	-0.343126	-0.052963	-0.723498	-0.141272	0.073854	-0.586353
bilnc	0.117410	-0.001062	0.400466	-0.749014	-0.049554	0.555458	-0.657006
bnd	-0.263616	0.531389	0.174272	0.902985	0.366050	0.011346	0.766918
bnk	-0.106614	0.200659	0.474790	-0.355641	-0.140879	0.451320	0.168107
opvc	0.181087	-0.187848	0.215999	-0.829730	-0.187599	0.347920	-0.575209
inv	0.040218	-0.314435	-0.062883	-0.535462	-0.478814	-0.041389	-0.106290
open	-0.402997	0.549131	0.305358	0.694621	0.380372	0.168150	0.666187
inf	0.012024	-0.333555	-0.200817	-0.415324	-0.152601	-0.134397	-0.329280

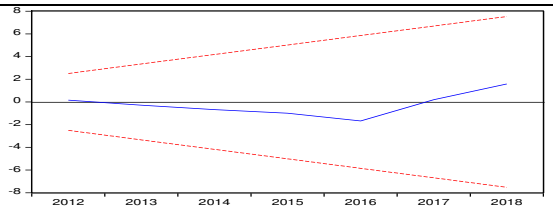
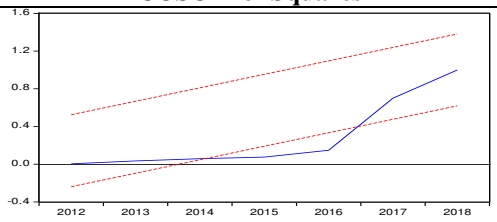
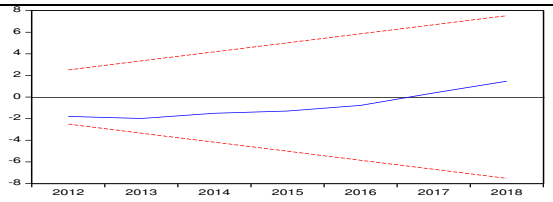
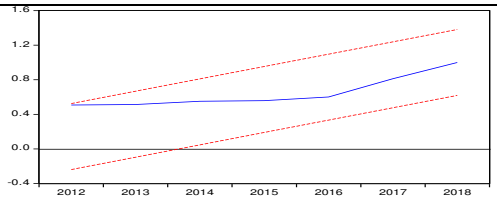
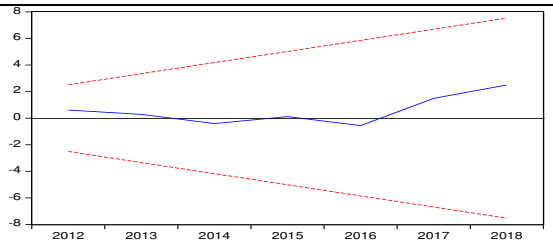
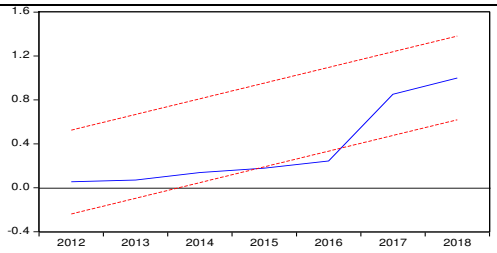
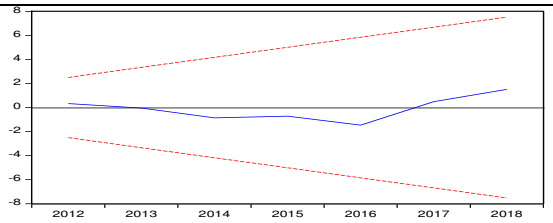
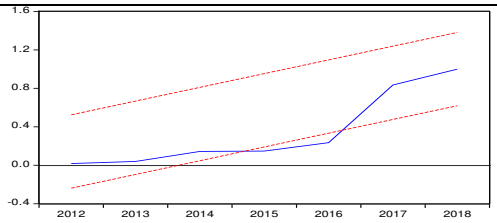
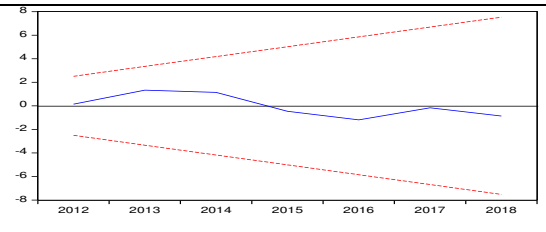
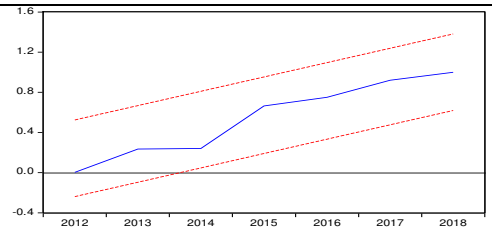
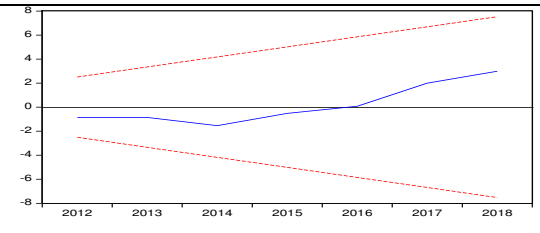
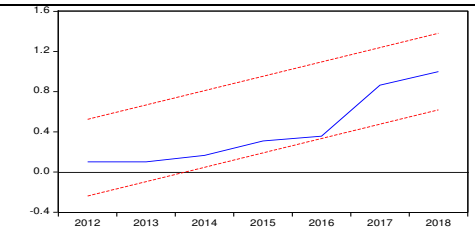
Appendix 2 (continues)

	ppg	*png*	*mul*	*mulc*	*mulnc*	*bil*	*bilc*
grw	-0.275991	-0.348646	-0.404847	0.268303	-0.405090	0.153919	0.264308
ted	0.820983	0.525111	0.842421	-0.383683	0.832319	-0.072448	-0.343126
ltd	0.979646	0.298269	0.613321	-0.251144	0.604254	0.325947	-0.052963
std	0.060850	0.715102	0.772851	-0.501082	0.772641	-0.781173	-0.723498
imf	0.513452	0.145079	0.644935	0.039070	0.616982	-0.071161	-0.141272
pud	0.998962	0.092896	0.534926	-0.136101	0.521979	0.482819	0.073854
pvd	0.037271	0.976795	0.436871	-0.557938	0.453441	-0.675148	-0.586353
ppg	1.000000	0.100603	0.528917	-0.127029	0.515657	0.480591	0.087046
png	0.100603	1.000000	0.524918	-0.640770	0.543028	-0.669661	-0.676416
mul	0.528917	0.524918	1.000000	-0.634676	0.998897	-0.392046	-0.684049
mulc	-0.127029	-0.640770	-0.634676	1.000000	-0.670258	0.534267	0.815978
mulnc	0.515657	0.543028	0.998897	-0.670258	1.000000	-0.408956	-0.706493
bil	0.480591	-0.669661	-0.392046	0.534267	-0.408956	1.000000	0.804087
bilc	0.087046	-0.676416	-0.684049	0.815978	-0.706493	0.804087	1.000000
bilnc	0.549541	-0.628166	-0.296371	0.432685	-0.310903	0.989087	0.707722
bnd	0.012373	0.804948	0.650176	-0.520728	0.656025	-0.825467	-0.766823
bnk	0.470025	0.118322	-0.172315	-0.003299	-0.165280	0.422936	0.245779
opvc	0.353696	-0.611228	-0.562442	0.553864	-0.573784	0.933073	0.864390
inv	-0.028329	-0.176977	-0.426324	0.151266	-0.418605	0.335424	0.313254
open	0.176527	0.674118	0.728408	-0.687528	0.741288	-0.589899	-0.726311
inf	-0.125080	-0.400593	-0.438566	0.394821	-0.445158	0.294199	0.390031

Appendix 2 (continues)

	bilnc	*bnd*	*bnk*	*opvc*	*inv*	*open*	*inf*
grw	0.117410	-0.263616	-0.106614	0.181087	0.040218	-0.402997	0.012024
ted	-0.001062	0.531389	0.200659	-0.187848	-0.314435	0.549131	-0.333555
ltd	0.400466	0.174272	0.474790	0.215999	-0.062883	0.305358	-0.200817
std	-0.749014	0.902985	-0.355641	-0.829730	-0.535462	0.694621	-0.415324
imf	-0.049554	0.366050	-0.140879	-0.187599	-0.478814	0.380372	-0.152601
pud	0.555458	0.011346	0.451320	0.347920	-0.041389	0.168150	-0.134397
pvd	-0.657006	0.766918	0.168107	-0.575209	-0.106290	0.666187	-0.329280
ppg	0.549541	0.012373	0.470025	0.353696	-0.028329	0.176527	-0.125080
png	-0.628166	0.804948	0.118322	-0.611228	-0.176977	0.674118	-0.400593
mul	-0.296371	0.650176	-0.172315	-0.562442	-0.426324	0.728408	-0.438566
mulc	0.432685	-0.520728	-0.003299	0.553864	0.151266	-0.687528	0.394821
mulnc	-0.310903	0.656025	-0.165280	-0.573784	-0.418605	0.741288	-0.445158
bil	0.989087	-0.825467	0.422936	0.933073	0.335424	-0.589899	0.294199
bilc	0.707722	-0.766823	0.245779	0.864390	0.313254	-0.726311	0.390031
bilnc	1.000000	-0.790915	0.441690	0.894610	0.320973	-0.521017	0.252956
bnd	-0.790915	1.000000	-0.260159	-0.825150	-0.500435	0.605962	-0.396193
bnk	0.441690	-0.260159	1.000000	0.505793	0.631492	0.000423	0.202388
opvc	0.894610	-0.825150	0.505793	1.000000	0.417398	-0.612281	0.365001
inv	0.320973	-0.500435	0.631492	0.417398	1.000000	-0.120935	0.273142
open	-0.521017	0.605962	0.000423	-0.612281	-0.120935	1.000000	-0.172840
inf	0.252956	-0.396193	0.202388	0.365001	0.273142	-0.172840	1.000000

Appendix 3: Stability tests (5 percent of significance)

Equation	CUSUM	CUSUM of Squares
(1)		
(2a)		
(2b)		
(2c)		
(2d)		
(2e)		

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