

Does Tunisia Need More Economic Freedom to Reduce its Public External Debt?

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Abstract: *This study tests the effect of economic freedom on Tunisian external debt. This empirical study is based on the three-gap model of Bacha (1990) extended by economic freedom indices. To estimate the long-run effect of economic freedom on debt, I use the fully modified ordinary least square (FMOLS) model by Philips and Hansen (1990). From 1980 to 2020, I find that: a one-unit increase in the Fraser Institute and a 10-unit increase in the Heritage Foundation indices reduce the external debt ratio by 0.77 and 0.38 percentage points; economic freedom indirectly affects the external debt accumulation through macroeconomic variables. More economic freedom enhances investment and reduces the negative effect of trade deficit and government expenditure on the Tunisian economy; and finally, to reduce the demand for external borrowing, Tunisia must liberalise its economy and build a good institutional environment that generates additional financial resources.*

Keywords: External debt; Economic freedom; Institutional environment; FMOLS; Tunisia

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1. Introduction

Since its independence, Tunisia has set the objective of achieving economic and social development by ensuring sustainable growth that will guarantee the country's take-off. Nevertheless, those objectives proved to be a real burden that Tunisia could not bear. Indeed, the government is increasingly dependent on the outside world because of limited resources, growing domestic demand in the face of unsatisfactory production, national savings that do not cover investment expenditure, and the persistence of the twin deficits.

Theoretically, Chenery and Strout (1966) provide a dual gap model that emphasises the two critical constraints to economic growth in developing countries: the savings-investment gap and the foreign exchange gap. The persistent imbalance between domestic savings and investment needs in Tunisia has necessitated external borrowing to fill this gap. Additionally, the foreign exchange gap resulting from a disparity between export earnings and import requirements has further driven Tunisia's reliance on external debt to sustain its growth objectives. These dual constraints have been central to Tunisia's increasing dependence on the global economy, as limited domestic production and savings fail to meet rising domestic demand. Building on the dual gap model, Bacha's (1990) three-gap model introduces a third critical constraint: the fiscal gap. This model provides a more comprehensive framework for understanding Tunisia's economic challenges, particularly in the post-independence period and the 1986 debt crisis. The fiscal gap arises when government revenues are insufficient to cover current expenditures and necessary investments, forcing the government to use external borrowing. In Tunisia, this has been evident in the persistent fiscal deficits that have compounded the issues of inadequate savings and foreign exchange.

After the 2011 revolution, current account and budget deficits increased with economic decline. As a result, public external debt has risen steadily, reaching 60% of gross domestic product (GDP) in 2020. Without rigorous consolidation and correction measures, the evolution of external debt and its consequences on Tunisian economic growth has become a cause of concern. Recent trends in Tunisia's debt have revived the interest of policymakers and specialists in finding out how to reduce its negative effect.

Besides the macroeconomic determinants, which will be discussed further, policy measures and institutional quality can be crucial factors

in shaping debt. Because of those factors, a country can set a suitable environment for creating wealth and for the efficiency of using scarce resources to improve the management and use of debt. A proxy of the quality of economic policies and institutions will be used in this study, which is economic freedom, to evaluate its role in explaining the external debt build-up for the Tunisian case. Thus, this study aims to answer two main questions: (i) Can we consider economic freedom as a determinant of external debt? (ii) Economic freedom is a compilation of different areas such as government size, property rights protection, stability of the monetary system, deregulation of financial and labour markets, and freedom to trade in the international markets. Do those components have the same weight and effect on public external debt?

This study was influenced by the work of Alesina and Tabellini (1990), suggesting that a level of debt can be higher in a large and polarised government than in a social planner or consentient political parties. In addition, changes in political regimes cause the level of debt. It tends to be higher in an autocratic regime than a democratic one (Balkan & Greene, 1990). The works of Roubini and Sachs (1989) and Woo (2003) also emphasise the political and institutional environment as essential elements of public debt.

Regarding personal choice, governments must provide an enabling environment to encourage voluntary exchange, protect individual property, and liberalise market entry. As a result, personal and economic freedom will be enhanced, leading to prosperity. Two indices are available in the literature to assess the effect of economic freedom on economic performance- in our case, on the external debt. One is provided by the Fraser Institute and the second by The Heritage Foundation.¹ In our case, Tunisia is considered a country with restricted economic freedoms and, in extreme cases, repressed. It is ranked 128 out of 165 countries worldwide by the Fraser Institute and 132 out of 176 by The Heritage Foundation.

So far, very few studies underlined the relationship between debt and the political/institutional environment. This study makes significant contributions by addressing critical gaps in the existing literature on Tunisia's economic challenges, particularly external debt and institutions. Previous research has extensively analysed the impact of external debt on economic performance. They focus primarily on macroeconomic indicators, and there is a need to consider how variations in economic freedom can influence

the effectiveness of debt management strategies. This paper fills this gap by incorporating two economic freedom indices, which provide a more comprehensive understanding of how economic freedom impacts external debt. These indices allow for a deeper analysis of the institutional and policy environments in which debt is managed, offering insights beyond traditional macroeconomic analysis. By applying both indices, this paper provides a more nuanced and multidimensional perspective on how economic freedom interacts with external debt. It can strengthen the robustness of the findings and offer a fresh perspective on the policy implications for Tunisia.

To provide answers to the questions asked before, this study is organised as follows. Section 2 presents a literature review on the determinants of debt and the contribution of the institutional environment. Section 3 is focuses on the model and estimation techniques used in the case of Tunisia. Section 4 shows the main results concerning the determinants of external debt, highlights the role of economic freedom and presents robustness checks. Finally, the significant findings are summarized in Section 5.

2. Literature review

2.1 *Macroeconomic determinants*

Several studies highlight the importance of economic growth and income levels in managing debt. Barro (1979) and Hercowitz (1986) suggest that higher income can reduce debt levels, with income growth lowering external debt as nations or individuals gain more financial capacity to repay. Hall and Sargent (2011) also underscore how post-World War II economic growth helped reduce the United States' debt-to-GDP ratio. However, the findings are nuanced, as some studies, like those by Eaton and Gersovitz (1981) and Ojo (1989), show that income variability, imports as a percentage of GDP, and other economic activities can increase debt, particularly when these factors fluctuate.

Inflation also can be an important determinant of debt, but the relationship turns out to be complex. While Barro (1979) posits that inflation can positively affect debt, it may also increase the cost of borrowing if not managed correctly. Reinhart and Sbrancia (2015) show that mild inflation, combined with other policies like interest rate caps and capital controls, can gradually erode the real value of debt without causing hyperinflation. In the

case of Tunisia for the period of 1986 to 2015, Belguith and Omrane (2017) find that inflation significantly reduced public debt by using the Vector Error Correction Model (VECM) technique.

Other studies focus on the fiscal deficits and debt relationship, as persistent fiscal deficits often lead to the accumulation of debt. For instance, Blanchard and Perotti (2002) conclude that expansionary fiscal policies—such as increased government spending without corresponding increases in taxes—lead to higher fiscal deficits, which in turn increase public debt. They show that while fiscal deficits can temporarily boost economic output, they often result in higher debt levels, which can constrain future fiscal policy options and lead to higher interest rates. In a very particular case, Awan et al. (2015) show that fiscal deficit among other variables is as an important determinant of Pakistan's external debt. Using the Autoregressive Distributed Lag (ARDL) model, they find that fiscal deficit significantly increases external debt in the period of 1976 to 2010.

2.2 External shocks

While openness can facilitate access to foreign capital, to the international market and potentially spur economic growth, it also increases vulnerability to external shocks. Managing external debt in the presence of external shocks can be a difficult task for developing countries. Numerous studies highlight the importance of external shocks in accumulating external debt.

For instance, Colombo and Longini (2009) take a sample of 61 developing countries between 1970 and 2000 to examine the determinants of external debt. Among other variables, they find that debt is positively correlated with the degree of openness of the economy. Also, Dawood et al. (2021) reach similar results by taking 32 Asian developing and transitioning economies for the period of 1995 to 2019. For most developing countries, trade openness can be challenging, especially when imports exceed exports, leading to a deficit. In a particular case, Beyene and Kotosz (2020) show that the trade deficit significantly increases Ethiopia's external debt.

Empirical studies have confirmed that terms of trade deterioration can also lead to a reduction in export earnings, which can encourage recourse to external borrowing. The importance of the export sector is also evident when there is a depreciation of the domestic currency; an increase in the real effective exchange rate will lead to a rise in external debt unless the

depreciation leads to sufficient export growth to allow a reduction in external indebtedness. For instance, Greenidge et al. (2010) indicate that good export performance and the depreciation of the Caribbean currency lead to a decrease in their external debt. The results specify a significant and negative relationship between real effective exchange rate and debt. However, Bouabidi (2023) finds that the exchange rate significantly increased Tunisia's external debt between 2010 and 2020. This suggests that the depreciation of the Tunisian currency combined with a bad export performance led to debt build-up.

2.3 *Political factors*

Debt accumulation is not caused solely by macroeconomic variables or internal and external shocks. Using a theoretical model, Alesina and Tabellini (1989) show that a government at the end of its mandate tends to borrow too much, since it is a new government that will bear the consequences of this debt. As a result, it externalises part of the cost of borrowing. This highlights the role of political regimes and institutions, such as constitutions, laws, and fiscal rules, which can either constrain or enable the accumulation of public debt. Van Rijckeghem and Weder (2009) state that political institutions and regimes are fundamental keys to avoiding default on debt. Their findings support the idea that in democracies, parliamentary regimes with a large number of checks and balances reduce the external debt in a group of lower middle-income economies from 1974 to 2000. On the other hand, Chiminya and Nicolaidou (2018), focusing on 36 sub-Saharan African countries from 1975 to 2012, find that democratic countries accumulate more external debt than autocratic regimes. However, executive constraints (i.e., institutional constraints on executive decision-making) combined with an open and competitive electoral system reduces the accumulation of external debt. Governments with effective control over decision-making and a competitive political system experience efficient public spending and sustainable budget deficits. In this case, debt accumulation is reduced. While the above findings support a strong link between political factors and debt, another study obtained a different result. Bittencourt (2015) takes a sample of nine Latin American countries between 1970 and 2007. Using executive constraints, the results are not statistically significant to support the importance of institutional reforms in debt reduction.

2.4 Institutional influences

The first wave of studies that emphasise the importance of institutions for economic performance includes the works of Knack and Keefer (1995), Mauro (1995), and Hall and Jones (1999). Their findings reveal that corruption, institutional quality, and government policies significantly impact economic growth, investment, and productivity. In addition, the institutional environment affects growth and development not only through traditional channels like investment and productivity, but also through debt levels and the efficiency of its use. For instance, in the work of Abdullahi Sani et al. (2019), sub-Saharan African countries can benefit from public debt and thus minimise its negative impact on economic growth.

Those studies, among others, sparked interest in investigating further the relationship between debt and institutions. By using indices from Kaufmann et al. (2013) and Transparency International, Cooray et al. (2017) find that corruption increased public debt in 126 developed and developing countries from 1966 to 2012. Baklouti and Boujelbene (2021) also show the same results in 16 Arab countries over the period of 2000 to 2016. This effect can be amplified through two channels. Firstly, if the informal economy is prominent in a country, this implies an increase in corruption, a reduction in government tax revenues, and an inevitable increase in public debt. Secondly, public spending is a link between corruption and public debt. An increase in spending accompanied by poor and unmonitored management accentuates the adverse effects of corruption.

Moreover, Tarek and Ahmed (2017) test six governance indicators and their impact on public debt for 17 Middle-East and North Africa (MENA) region countries. From 1996 to 2015, the results indicate that political stability and absence of violence, regulatory quality, and rule of law significantly reduce debt. On the contrary, control of corruption, government effectiveness, and voice and accountability increase debt in the MENA region. Regarding the effect of institutional quality on debt can be different from one group of countries to another. By observing European countries (European Union or EU and non-EU), Cooray and Ozmen (2024) note that governance indicators like political stability and control of corruption significantly reduce debt only in countries with strong institutions, such as EU nations. Also, Benfratello et al. (2017) argue that the impact of corruption on public debt is statistically higher in high-income than in lower middle-income countries.

Related to the research objective, Miller and Foster (2012) associate economic freedom with government debt. Their correlation study highlights a negative effect of economic freedom on debt for a large sample of advanced and developing countries. In line with the above literature, I assess the impact of institutions on public external debt in the Tunisian case. To my knowledge, the literature does not include either a country-specific analysis or a study of a country like Tunisia in the understanding of the relationship between institutions and external debt. In addition, I use The Heritage Foundation's Index of Economic Freedom, which is a novelty to the existing literature. Thus, improving institutional quality through greater economic freedom, reduced corruption, and better governance could help Tunisia manage and reduce its external debt. Economic freedom, in this context, includes not only market liberalisation, but also improvements in regulatory quality, transparency, and the rule of law, all of which are essential for sustainable debt management.

3. Methodology

3.1. Model

The empirical study is based on the three-gap model of Bacha (1990). According to this theoretical framework, the level of external debt is dictated by three gaps: (i) if private consumption is higher than private income, the saving-investment gap emerges, and the need for external borrowing grows; ii) government expenditure and tax revenue differences usually lead to a fiscal deficit; therefore, the government finances its deficit by borrowing; (iii) a trade deficit appears when export earnings are smaller than import costs, which also leads to more borrowing.

This study considers five macroeconomics variables: tax revenue, government expenditure, investment, trade deficit and the real exchange rate. The regressions of external debt are based on time series data. Thus, I employed the following model in the econometric analyses:

$$\begin{aligned} \text{Log}(ExDebt)_t = & \beta_0 + \beta_1 \text{Log}(ExDebt)_{t-1} + \beta_2 \log(Tax)_t + \beta_3 \text{Log}(G)_t + \\ & \beta_4 \text{Log}(I)_t + \beta_5 \text{TradeDef}_t + \beta_6 \text{Log}(REER)_t + \beta_7 \text{Log}(Fraser)_t + \varepsilon_t \end{aligned} \quad (1)$$

where *ExDebt* is the public external debt as a percentage of GDP. The explanatory variables used here are, respectively, external debt lagged by one period,² *Tax* which refers to tax revenue, *G* to government expenditure, *I* to investment, and *TradeDef* to trade deficit, as well as a control variable, *REER* or the real effective exchange rate. The theoretical model is extended by adding the economic freedom variable (from the Fraser Institute) in its aggregated and disaggregated form. The *log* is a logarithmic operator, the *t*-index reflects years, ε is the error term, and β_0 is a constant. This model is regressed for the Tunisian case using data from 1980 to 2020.

3.2 Sample and data

The World Bank's World Development Indicators, the International Monetary Fund's World Economic Outlook, the Fraser Institute's Economic Freedom of the World, and The Heritage Foundation's Index of Economic Freedom provided this study with data. I choose 40 years to catch the long-run relationship between the dependent and explanatory variables. The data are described and summarised, respectively, in Table 1 and in the Appendix. The dependent variable is the ratio of public external debt to GDP. I compute it using public and publicly guaranteed external debt stocks (PPG).

Table 1: Tunisian Database

	Description of variables	Expected sign	Data availability	Sources
<i>ExDebt</i>	External public debt as a percentage of GDP (US\$)		1980–2020	World Development Indicators
<i>Tax</i>	Tax revenue as a percentage of GDP	(-)	1980–2020	World Economic Outlook
<i>G</i>	Government expenditure as a percentage of GDP	(+)	1980–2020	World Development Indicators
<i>I</i>	Total investment as percentage of GDP (gross fixed capital formation)	(-)	1980–2020	
<i>TradeDef</i>	Trade deficit as a percentage of GDP	(+)	1980–2020	
<i>REER</i>	Real effective exchange rate index (2010 = 100)	(+)	1980–2020	
<i>Fraser</i>	Fraser Institute's World Index of Economic Freedom	(-)	1980–2020	Economic Freedom of the World
<i>Heritage</i>	The Heritage Foundation's Index of Economic Freedom	(-)	1995–2020	Index of Economic Freedom

On one hand, macroeconomic variables and their expected sign were derived from the theoretical and empirical literature. On the other hand, the scales of economic freedom indices are as follows: the first is the Fraser Institute's index, which indicates the country's freedom score ranging from 0 to 10 (a higher value means higher liberalisation and economic freedom), and the second is The Heritage Foundation index, which measures economic freedom on a scale of 0 (no economic freedom) to 100 (total economic freedom). The following hypothesis is formulated:

H_1 : The more the economy is liberalised, the less the government depends on the outside world to finance its economy

3.3 *Estimations procedure*

To estimate the long-run relationship between external debt and the explanatory variables in the model, it is necessary to test the cointegration between the variables. Doing so avoids the risk of estimating spurious relationships (spurious regression) and subsequently deriving erroneous results.

First, I employ the Engle and Granger test in two steps. The first step tests the order of integration of the variables. The necessary condition for cointegration is that the series are integrated in the same order. If they are not, they cannot be cointegrated. In this step, it is necessary to determine the type of deterministic or stochastic trend of each of the variables using the augmented Dickey-Fuller and Philips-Perron tests before proceeding to determine the order of integration of the series under study. If these series are not integrated in the same order, the cointegrating relationship does not exist. The second step consists of estimating the long-run relationship between the variables of the model in the case where the first step is verified. Ordinary Least Squares (OLS) is then used for this estimation. The residual from each regression ($\hat{\varepsilon}_t$) must be stationary to accept the cointegration relationship. To determine the stationarity of the residual, the unit root tests of Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) can be applied (in this study, I apply the PP test).

Second, the Johansen cointegration test (1988) is also performed to reaffirm the results obtained from the model. Finally, the model is estimated using the fully modified ordinary least square (FMOLS) method by Philips

and Hansen (1990). This method considers the nuisance parameters, autocorrelation, and heteroscedasticity of the residues. Moreover, FMOLS corrects the bias of long-term endogeneity among the explanatory variables.

4. Empirical Results

4.1 Preliminary tests: Stationarity of the variables

Using the ADF and PP tests, the stationarity of the variables to be included in the regressions is evaluated. Tables 2 and 3 show the results of these tests for the macroeconomic and economic freedom variables used in this study. The results are identical and show that the variables used in the regressions are non-stationary in level, but stationary in first difference. As a result, the variables follow the I(1) process and the cointegration relationship can be confirmed.

Table 2: Stationarity Test Results

Variables	Augmented Dickey-Fuller test			Philips-Perron test	
	MacKinnon	Trend	PP	Trend	Integration order
<i>Log(ExDebt)</i>	-1.21	No	-1.73	No	I(1)
$\Delta \text{Log(ExDebt)}$	-5.36***	No	-5.47***	No	I(0)
<i>Log(Tax)</i>	-1.61	No	-1.70	No	I(1)
$\Delta \text{Log(Tax)}$	-6.13***	No	-6.20***	No	I(0)
<i>Log(I)</i>	-1.95	Yes	-2.38	Yes	I(1)
$\Delta \text{Log(I)}$	-4.89***	No	-4.89***	No	I(0)
<i>TradeDef</i>	-1.96	No	-2.03	No	I(1)
$\Delta \text{TradeDef}$	-6.96***	No	-6.98***	No	I(0)
<i>Log(REER)</i>	-2.15	No	-1.47	No	I(1)
$\Delta \text{Log(REER)}$	-2.63***	No	-2.47**	No	I(0)

Note: ***, ** and * indicate the statistical significance of the variables at the 1%, 5% and 10% threshold respectively.

Table 3: Stationarity Test Results for Economic Freedom Variables

Variables	Augmented Dickey-Fuller test		Philips-Perron test		
	MacKinnon	Trend	PP	Trend	Integration order
<i>Log(Fraser)</i>	-1.82	No	-1.92	No	I(1)
Δ <i>Log(Fraser)</i>	-3.80***	No	-3.75***	No	I(0)
<i>Log(Gov_Size)</i>	-2.18	No	-1.62	No	I(1)
Δ <i>Log(Gov_Size)</i>	-3.21 **	No	-3.32**	No	I(0)
<i>Log(Prop_Rights)</i>	-2.24	No	-2.20	No	I(1)
Δ <i>Log(Prop_Rights)</i>	-8.29***	No	-8.25***	No	I(0)
<i>Log(Sound_Money)</i>	-2.45	No	-2.34	No	I(1)
Δ <i>Log(Sound_Money)</i>	-3.64***	No	-1.50*	No	I(0)
<i>Log(Int_Free_Trade)</i>	-1.94	No	-1.93	No	I(1)
Δ <i>Log(Int_Free_Trade)</i>	-5.2***	No	-5.35***	No	I(0)
<i>Log(Regu_Credit_Labor_Bus)</i>	-1.37	No	-1.37	No	I(1)
Δ <i>Log(Regu_Credit_Labor_Bus)</i>	-8.25***	No	-8.09***	No	I(0)
<i>Log(Heritage)</i>	-1.87	No	-1.60	No	I(1)
Δ<i>Log(Heritage)</i>	-7.14***	No	-8.20***	No	I(0)
<i>Log(Gov_Integ)</i>	-2.74	Yes	-2.65	Yes	I(1)
Δ <i>Log(Gov_Integ)</i>	-5.38***	No	-5.58***	No	I(0)
<i>Log(Gov_Spen)</i>	-2.34	No	-2.32	No	I(1)
Δ <i>Log(Gov_Spen)</i>	-7.12***	No	-7.12***	No	I(0)
<i>Log(Tax_Burden)</i>	-1.10	No	-1.09	No	I(1)
Δ <i>Log(Tax_Burden)</i>	-4.92***	No	-4.92***	No	I(0)
<i>Log(Prop_Rights)</i>	-1.49	No	-1.56	No	I(1)
Δ <i>Log(Prop_Rights)</i>	-3.04**	No	-4.36***	No	I(0)
<i>Log(Mon_Free)</i>	-1.85	Yes	-1.92	Yes	I(1)
Δ <i>Log(Mon_Free)</i>	-3.91***	No	-3.92***	No	I(0)
<i>Log(Trade_Free)</i>	-3.07	Yes	-3.07	Yes	I(1)
Δ <i>Log(Trade_Free)</i>	-5.24***	No	-5.38***	No	I(0)
<i>Log(Bus_Free)</i>	-2.01	No	-2.02	No	I(1)
Δ <i>Log(Bus_Free)</i>	-5.06***	No	-5.06***	No	I(0)
<i>Log(Fin_Free)</i>	-1.12	No	-1.12	No	I(1)
Δ <i>Log(Fin_Free)</i>	-5.73***	No	-5.87***	No	I(0)
<i>Log(Inv_Free)</i>	-1.45	No	-1.51	No	I(1)
Δ <i>Log(Inv_Free)</i>	-4.77***	No	-4.81***	No	I(0)

Note: ***, ** and * indicate the statistical significance of the variables at the 1%, 5% and 10% threshold respectively.

4.1.1 Lag length selection and Johansen cointegration test

Before running the Johansen cointegration test, it is necessary to determine the optimal lag length for the model. The lag length selection can be done using criteria like AIC (Akaike information criterion), SC (Schwarz information criterion) and HQ (Hannan-Quinn information criterion). In Table 4, the optimal lag length is 1 according to AIC, SC and HQ.

Table 4: Lag Length Criteria Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	172.7119	NA	3.85e-13	-8.7217	-8.4200	-8.6143
1	383.2873	332.4875	8.15e-17	-18.6787*	-14.8124*	-16.3670*
2	444.4735	74.0675*	5.64e-17*	-17.8670	-13.3421	-16.2571
3	508.8944	54.2491	5.74e-17	-17.2257	-12.0421	-16.3174

Notes: * Indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level).

Once the lag length is determined, the Johansen cointegration test can be conducted. The results in Table 5 show the existence of more than one cointegration equation.

Table 5: Johansen Cointegration Test

Based on trace of stochastic matrix				
Hypothesized no. of CE(s)	Eigenvalue	Trace statistic	0.05 critical value	Prob.**
None *	0.8510	222.5470	125.6154	0.0000
At most 1 *	0.8038	150.1903	95.7537	0.0000
At most 2 *	0.6891	88.3073	69.8189	0.0008
At most 3	0.3980	43.9082	47.8561	0.1119
At most 4	0.3578	24.6222	29.7971	0.1754
At most 5	0.1691	7.7913	15.4947	0.4880
At most 6	0.0196	0.7540	3.8415	0.3852

Based on maximal eigenvalue of the stochastic matrix				
Hypothesized no. of CE(s)	Eigenvalue	Max. eigen statistic	0.05 critical value	Prob.**
None *	0.8745	78.8665	46.2314	0.0000
At most 1 *	0.8154	64.1963	40.0776	0.0000
At most 2 *	0.6953	45.1617	33.8769	0.0015
At most 3	0.4928	25.7951	27.5843	0.0832
At most 4	0.3961	19.1649	21.1316	0.0922
At most 5	0.1672	6.9506	14.2646	0.4950
At most 6	0.0593	2.3232	3.8415	0.1275

Notes: Both trace and maximum eigenvalue tests indicate three cointegration equations at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level.

4.1.2 Variance inflation factor (VIF) for multicollinearity test

Table 6 shows that there is no risk of severe multicollinearity in the model. The results indicate that the centered VIF values did not exceeds the value of 10, which is the rule of thumb for multicollinearity.

Table 6: Results of Variance Inflation Factor

Variable	Coefficient Variance	Uncentered VIF	Centred VIF
<i>Log(Tax)</i>	0.2826	7979.0010	3.7053
<i>Log(G)</i>	0.2835	7031.5940	3.6737
<i>Log(I)</i>	0.1037	3239.5690	7.2127
<i>TradeDef</i>	7.36E-05	10.6806	3.0531
<i>Log(REER)</i>	0.0365	2631.2920	8.8491
<i>Log(Fraser)</i>	0.1951	1889.8760	5.2232
<i>C</i>	6.6238	20523.0200	NA

4.2 Basic results

Table 7 outlines the results of the basic debt regressions. The estimated coefficients related to the variables represent the long-run elasticities regarding the debt-to-GDP ratio. The theoretical model of Bacha is tested in column (1). In column (2), the Fraser variable is added to test its effect on external debt. Starting from columns (3) to (7), the disaggregated form of the Fraser index is tested.

Table 7: Effects of Economic Freedom on Public External Debt

Dependant variable:	FMOLS						
Log (ExDebt)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Log(ExDebt)_{t-1}</i>	0.8758*** (22.34)	0.7021*** (9.15)	0.8149*** (15.09)	0.7868*** (15.31)	0.8540*** (17.04)	0.8760*** (17.04)	0.7296*** (16.13)
<i>Log(Tax)</i>	-0.1275 (-0.91)	-0.6252*** (-2.74)	-0.5970*** (-2.83)	-0.1633 (-1.22)	-0.2357 (-1.27)	-0.2119 (-1.12)	-0.2687** (-2.42)
<i>Log(G)</i>	0.9379*** (5.39)	1.3918*** (5.36)	1.1688*** (5.32)	1.0875*** (6.18)	1.1477*** (4.67)	0.9393*** (4.17)	1.3479*** (9.14)
<i>Log(I)</i>	0.0847 (0.79)	0.2101 (1.41)	0.1752 (1.32)	0.0617 (0.60)	0.1507 (1.11)	0.1161 (0.86)	0.0743 (0.90)
<i>TradeDef</i>	-0.0039 (-1.404)	0.0029 (0.70)	0.0008 (0.22)	-0.0022 (-0.79)	0.0000 (0.02)	-0.0035 (-0.98)	-0.0003 (-0.17)
<i>Log(REER)</i>	0.1051** (2.14)	-0.0865 (-1.00)	0.0289 (0.45)	0.1228** (2.59)	0.0358 (0.55)	0.0604 (0.71)	0.0325 (0.73)
<i>Log(Fraser)</i>		-0.7728*** (-2.99)					
<i>Log(Gov_Size)</i>			-0.2919*** (-2.99)				
<i>Log(Prop_Rights)</i>				-0.2437** (-2.13)			
<i>Log(Sound_Money)</i>					-0.7423*** (-2.71)		
<i>Log(Int_Free_Trade)</i>						-0.0559 (-0.50)	
<i>Log(Regu_Labor_Bus)</i>							-0.3290*** (-3.77)
<i>Constant</i>	-2.5778*** (-3.74)	0.2256 (0.16)	-0.9622 (-0.95)	-2.1679*** (-3.19)	-1.1852 (-1.18)	-2.1157 (-1.75)	-1.7674*** (-2.90)
No. observations	39	39	39	39	39	39	39
Adjusted R ²	0.860	0.882	0.872	0.862	0.869	0.857	0.870
LR variance	0.001	0.002	0.001	0.001	0.001	0.001	0.0006
Engle & Granger cointegration test	-7.285***	-6.509**	-7.263***	-6.689***	-6.941***	-7.045***	-5.577*
Philips-P	-45.702*** (-3.61) (1%)	-41.472** (-3.61) (1%)	-46.028*** (-3.61) (1%)	-42.385*** (-3.61) (1%)	-43.235*** (-3.61) (1%)	-44.598*** (-3.61) (1%)	34.099 (-3.61) (1%)

Notes: *t*-statistics in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In the Engle and Granger cointegration tests, upper are the *t*-statistics and lower are the *Z*-statistics. Using Philips-P to test the stationarity of the residuals. The method for estimating long-term covariance is Bartlett Kernel’s method. The lags (equal to 1 for all estimates) are chosen according to AIC and SC criteria.

Before interpreting the results, it is necessary to verify the existence of a long-term relationship in the estimates. In all specifications, the Engle and Granger test shows that a cointegrating relationship exists. This hypothesis is further verified with the PP stationarity test. In the seven estimated models, the residuals $\hat{\epsilon}_t$ are stationary at the 1% threshold and thus confirm a cointegrating relationship.

For the macroeconomic variables and their impact on external debt, two significant points can be derived from the regressions based on their signs. First, government expenditure has a positive and significant impact on the long-run level of external debt. An approximate 1% increase in government expenditure leads to a rise of external debt-to-GDP by 0.93 percentage points. This can lead to a fiscal deficit, and the government must borrow to finance it, especially when the economy suffers from capital resources shortage (Presbitero et al., 2016). However, the coefficient on investment is positive but statistically insignificant throughout all the estimations. In line with Bacha's model, external debt may rise—especially when a country's savings are insufficient to cover its investment needs. Moreover, the trade deficit variable exhibits a non-significant sign through all the estimates. On the other hand, the real effective exchange rate variable has a positive and significant effect on debt (in columns (1) and (4)). A one per cent increase in REER elevates debt by 0.10 to 0.12 percentage points. In Bacha's model, the devaluation of the REER can lead to an accumulation of external debt because it increases the cost of servicing foreign-denominated debt, worsens the debt-to-GDP ratio, and may necessitate additional borrowing to manage the economic fallout of devaluation. For a country like Tunisia, where external debt is a significant concern, devaluation can exacerbate the debt burden, especially if the economy cannot quickly adjust to take advantage of the potential benefits of a weaker currency.

Second, tax revenue significantly reduces Tunisia's external debt. The results show an external debt elasticity of around 0.26 related to this variable. As expected, higher tax revenue strengthens the government's fiscal capacity, allowing it to finance expenditures more effectively with domestic resources rather than relying on external borrowing. Also, with more tax revenue, the government can allocate a portion of its budget to paying down existing external debt, reducing the need for further borrowing.

By examining the variable of interest, I find a negative relationship between institutional quality and public external debt. Tarek and Ahmed (2017), Cooray and Ozmen (2024), and Tee and Teoh (2024) show similar results concerning the negative effect of institutional quality on debt. In fact, the Fraser variable, which indicates the level of economic freedom in Tunisia, denotes that a more liberalised and free economy significantly reduces external debt accumulation. In column (2), the index has a negative and highly significant sign (at less than 1% significance level). A one-unit

increase in Fraser reduces external debt by 0.77 percentage points. This is in line with Miller and Foster (2012), who emphasise that the freer the economy, the less the stock of government debt will be.

Moreover, this finding was investigated by introducing the economic freedom index in its disaggregated form. Results show that government size, legal system and property rights, sound money, and regulation in the credit market, labour market, and business significantly reduce the accumulation of external debt in Tunisia. However, the variable freedom to trade internationally has no significant effect on debt. In total, these findings confirm the hypothesis that a free and liberated economy can generate 'enough' resources, reducing the demand for external borrowing.

4.3 External debt and economic freedom: Indirect effect

In the previous section, I found evidence supporting the significant link between economic freedom and external debt. Therefore, I suspect that economic freedom can reduce debt accumulation through macroeconomic variables.

Table 8 shows results indicating the indirect effect of economic freedom on debt. First, column (1) shows the interaction between government expenditure and the *Fraser* variable. The negative and statistically significant sign indicates that economic freedom reduces the potential positive impact of government expenditure on external debt. In this case, government expenditure is more efficient and productive in a good institutional environment, leading to less reliance on external borrowing. Second, $\log(\text{Fraser}) \times \log(I)$ negatively and significantly affects external public debt, implying that the positive effect of investment on debt falls with higher economic freedom. An effective legal protection of property rights and a less constrained environment for doing business enhance investment, creating more capital resources for the economy. Finally, the coefficient on the interaction term between economic freedom and trade deficit ($\log(\text{Fraser}) \times \log(\text{TradeDef})$) is negative and highly significant. Thus, improving economic freedom and, in particular, opening the international markets reduce trade deficit and external debt accumulation.

Table 8: Indirect Effects of Economic Freedom on Public External Debt

Dependant variable:	FMOLS		
	(1)	(2)	(3)
<i>Log(ExDebt)</i>			
<i>Log(ExDebt)</i> _{<i>t-1</i>}	0.7002*** (9.15)	0.7488*** (15.89)	0.9119*** (24.36)
<i>Log(Tax)</i>	-0.6228** (-2.72)	0.0109** (2.25)	0.0424 (0.72)
<i>Log(G)</i>	1.8710*** (5.30)	0.4736*** (3.78)	0.9855*** (6.92)
<i>Log(I)</i>	0.2086 (1.39)	-0.2584*** (-8.82)	0.1471 (1.48)
<i>TradeDef</i>	0.0027 (0.65)	-0.0288 (-0.53)	0.0906** (2.33)
<i>Log(REER)</i>	-0.0820 (-0.94)	-0.0179*** (-5.68)	0.1871*** (4.21)
<i>Log(Fraser) × log(G)</i>	-0.2719*** (-2.97)		
<i>Log(Fraser) × Log(I)</i>		-0.2345*** (-4.24)	
<i>Log(Fraser) × TradeDef</i>			-0.0538** (-2.45)
<i>Constant</i>	-1.1531 (-1.05)	1.4017 (0.86)	-3.9545*** (-5.03)
No. observations	39	39	39
Adjusted <i>R</i> ²	0.882	0.900	0.865
LR variance	0.002	0.002	0.000
Engle & Granger	-6.517**	-9.303***	-7.872***
cointegration test	-41.391**	-54.147***	-47.902**
Philips-P	-6.53 (<-3.61 (1%))	-9.22 (<-3.61 (1%))	-9.78 (<-3.61 (1%))

Notes: *t*-statistics in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In the Engle and Granger cointegration tests, upper are the *t*-statistics and lower are the *Z*-statistics. Using Philips-P to test the stationarity of the residuals. The method for estimating long-term covariance is Bartlett Kernel's method. The lags (equal to 1 for all estimates) are chosen according to AIC and SC criteria.

4.4 Robustness checks

The robustness of the results is checked by using another proxy of economic freedom, The Heritage Foundation index. Also, the robustness is tested using nine variables related to The Heritage Foundation database with a different time length from 1995 to 2020. Table 9 reports the estimation results of the model, which can be summarized as follows.

Table 9: Robustness Test with Heritage Index

Dependant variable:	FMOLS									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Log(ExDebt)_{t-ix}</i>	0.8533*** (40.79)	0.8648*** (73.31)	0.8290*** (18.91)	0.9260*** (40.49)	0.7978*** (33.73)	0.8360*** (40.09)	0.5882*** (7.17)	0.7009*** (24.59)	0.7895*** (45.33)	0.8043*** (30.33)
<i>Log(Tax)</i>	-0.2156*** (-3.46)	-0.2099*** (-5.43)	-0.4023*** (-5.15)	-0.2120** (-2.80)	-0.5214*** (-7.82)	-0.4272*** (-6.77)	-0.8995*** (-12.31)	-0.4482*** (7.69)	-0.3468*** (-7.30)	-0.1013 (-1.18)
<i>Log(G)</i>	1.9767*** (25.00)	1.7509*** (39.16)	2.1962*** (23.73)	1.4831*** (19.29)	2.4456*** (30.92)	1.9189*** (24.45)	1.8694*** (30.48)	2.1338*** (29.71)	1.7152*** (29.81)	2.1840*** (22.13)
<i>Log(I)</i>	0.7714*** (15.10)	0.6294*** (20.89)	0.7977*** (12.58)	0.5050*** (8.84)	0.8567*** (15.59)	0.6526*** (12.37)	0.5400*** (10.43)	0.7751*** (16.11)	0.7056*** (17.61)	0.8622*** (12.96)
<i>TradeDef</i>	-0.0057*** (-5.04)	-0.0151*** (-18.56)	-0.0045*** (-2.41)	-0.0123*** (-8.27)	-0.0053*** (-4.68)	-0.0057*** (-5.13)	0.0023 (1.60)	-0.0018 (-1.39)	-0.0137*** (-13.23)	-0.0041*** (-2.95)
<i>Log(REER)</i>	0.0313 (0.91)	0.2556*** (9.45)	-0.0638 (0.38)	-0.0160 (-0.37)	0.0399 (1.29)	-0.0652** (-2.20)	-0.5439*** (-9.26)	-0.3417*** (1.29)	0.0396* (1.76)	-0.1040** (-2.47)
<i>Log(Heritage)</i>	-0.3855*** (-4.04)									
<i>Log(Gov_Spending)</i>		0.3145*** (11.84)								
<i>Log(Tax_Burden)</i>		0.0646 (0.23)								
<i>Log(Gov_Integrity)</i>				0.2535*** (3.42)						
<i>Log(Mon_Freedom)</i>					-0.3901*** (-3.81)					

Dependant variable:	FMOLS									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Log(ExDebt)</i>						-0.0255 (-0.64)				
<i>Log(Bus_Freedom)</i>										
<i>Log(Inv_Freedom)</i>						0.2034*** (9.24)				
<i>Log(Fin_Freedom)</i>								0.1485*** (6.40)		
<i>Log(Prop_Rights)</i>									0.1827*** (6.70)	
<i>Log(Trade_Freedom)</i>										-0.0545*** (-3.47)
<i>Constant</i>	-5.4248*** (-11.26)	-8.4124*** (-26.66)	-6.8782*** (-4.19)	-5.8175*** (-11.83)	-5.8022*** (-10.67)	-5.2028*** (-10.33)	-0.9791 (-1.53)	-4.9665*** (-11.54)	-6.2113 (-21.74)	7.1739*** (-14.11)
No. observations	24	24	24	24	24	24	24	24	24	24
Adjusted R ²	0.877	0.900	0.870	0.855	0.859	0.877	0.906	0.901	0.908	0.886
LR variance	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0006	0.0001	0.0001
Engle & Granger cointegration test	-7.492***	-8.101***	-7.811***	-8.197**	-8.674***	-7.550***	-7.771***	-7.364***	-7.927***	-7.916***
Philips-P	-32.984***	-34.469***	-33.765***	-34.665***	-35.533***	-33.176***	-34.039***	-32.740***	-34.212***	-33.984***
	-7.20	-10.16	-6.82	-9.48	-4.90	-6.89	-16.53	-13.08	-16.58	-9.48
	(<-3.75 (1%))	(<-3.75 (1%))	(<-3.75 (1%))	(<-3.75 (1%))	(<-3.75 (1%))	(<-3.75 (1%))	(<-3.75 (1%))	(<-3.75 (1%))	(<-3.75 (1%))	(<-3.75 (1%))

Notes: *t*-statistics in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. In the Engle and Granger cointegration tests, upper are the *t*-statistics and lower are the Z-statistics. The lags (equal to 1 for all estimates) are chosen according to AIC and SC criteria.

First, the macroeconomic variables like tax revenue, government expenditure and investment keep their signs as in the previous results. Nevertheless, real effective exchange rate has a positive but weak sign on debt, and in some estimations, it changes to a negative sign. The low significance of this variable may imply that a longer time is needed to affect external debt. In addition, with the variation in the estimation period, the trade deficit no longer has a positive and significant effect. Surprisingly, trade deficit reduces significantly external debt.

Second, the Heritage index is significant at 1%. This result confirms the negative relationship between economic freedom and external debt. Indeed, a 10-point increase in *Heritage* reduces debt by 0.38 percentage points. In addition, from specification (2) to (10), the disaggregated form of the index is tested, and I found three major facts: *i) Bus_Freedom* has a negative but no significant effect on the dependent variable. Also, *Tax_Burden* shows an insignificant sign. *ii) Monetary_Freedom* and *Trade_Freedom* significantly reduce the accumulation of external debt. *iii) Contrary to the previous results, the coefficients on Gov_Integrity, Inv_Freedom, Fin_Freedom, and Prop_Rights* are positive and statistically significant. In 2020, the Tunisian level of corruption and transparency scored 39.7 out of 100, and never exceeded 53 in the total sample. Higher corruption in Tunisia can harm debt management, which explains the positive relationship between those variables (Benfratello et al., 2017; Cooray et al., 2017). Furthermore, the positive effect of investment freedom on the Tunisian economy, especially on reducing its debt, can fade when external resources (from external debt) are diverted from the productive private sector (Milton & Foster, 2012). In addition, financial freedom can be compromised if public debt crowds out private investment due to the increase in interest rates. Lastly, the sign related to the property rights variable is not robust. This underlines the complexity of measuring its impact on debt dynamics. For example, Cooray and Ozmen (2024) do not explicitly use the property right index but find no relationship between the rule of law³ and debt. However, Van Rijckeghem and Weder (2009) highlight that that property rights can be unsecured in a presidential regime, fuelling the risk of defaulting on debt.

5. Conclusion and Implications

This study examines the impact of economic freedom on public external debt in the Tunisian case. The empirical results show that economic freedom is crucial in reducing debt accumulation. From 1980 to 2020, I estimate that a one-unit increase in the Fraser index reduces the external debt ratio by 0.77 percentage points. The estimation results also indicate an indirect effect between economic freedom and debt. A free economy is tested to be an investment booster, a disciplinarian government spending, and an enhancement of international trade, and, in return, it contributes to reducing public external debt. In addition, the disaggregated forms of the Fraser and the Heritage indices have been tested in the empirical analysis. Having a limited size of government, protecting property rights, enforcing rules to ensure regulation in the credit market, labour market, and business sector, fostering a healthy and stable monetary system, and liberalising international trade are crucial factors in lowering the Tunisian external debt significantly.

Throughout the findings, several implications can be derived that help to give some insights across various sectors. For the industrial sector, the study supports the idea that a liberalised economic environment encourages investment and growth. In Tunisia, industries can benefit from greater economic freedom by expanding their operations and enhancing competitiveness. The Tunisian industrial sector may experience growth and investment expansion if there is a predictable and transparent regulatory environment and an unchallenging procedure to start/do business.

For the government and policymakers, the research emphasises the role of economic freedom in managing and reducing public external debt. Applying policies that limit government size, protect property rights, and ensure market regulatory efficiency will be essential. Additionally, fostering an open trade environment and maintaining a stable monetary system is necessary to reduce dependency on external borrowing. These measures can contribute to a more sustainable fiscal environment, reducing the risk of debt crises.

Tunisian citizens can be stimulated by the potential benefits of a free economy so they can advocate for structural reforms that lead to responsible government spending, create investment opportunities, and encourage job creation. The country can reduce debt and tax burdens by improving institutional quality, ensuring that present and future generations benefit from a stable and prosperous economy.

Generally, the findings support the significant impact of institutional quality on external debt, conforming to the theoretical predictions. This study contributes to the existing literature by using economic freedom indices—as an institutional proxy—and by studying a specific case like the Tunisian economy. However, it is acknowledged that this study does not include the influence of political regimes nor their interactions with the institutional environment in explaining the debt dynamics. Future research could explore those mechanisms for developing countries.

Endnotes

- ¹ Definitions and details of calculations of these indices can be found at www.fraserinstitute.org/economic-freedom and at www.heritage.org/index
- ² I introduce the lagged version of the dependent variable to measure the persistence of external debt over time.
- ³ The property rights dimension is a key component in the Worldwide Governance Indicators (WGI) rule of law index.

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Appendix**Table A1:** Descriptive Statistics (Tunisia, 1980-2020)

Variables	Value in 1980	Value in 2020	Avg. values 1980-2020	Std. dev.	Min.	Max.
<i>ExDebt</i>	36.79	60.42	45.78	8.45	32.21	62.56
<i>Tax</i>	20.99	22.71	20.50	1.35	18.44	23.50
<i>G</i>	14.46	21.63	16.89	1.21	14.46	21.63
<i>I</i>	28.30	15.84	24.20	3.73	15.84	34.03
<i>TradeDef</i>	-5.36	-8.34	-5.77	3.65	-12.90	0.36
<i>REER</i>	221.04	85.20	130.98	42.19	78.38	221.07
<i>Fraser</i>	4.90	6.09	5.84	0.55	4.90	6.48
<i>Heritage (1995-2020)</i>	63.4	55.8	59.13	2.60	55.40	63.90