External Debt Sustainability in Egypt's economy: A probabilistic Approach

By

Dr. Marwa Elsayed Kamal

Lecturer of Economics

Faculty of Commerce, Benha University

marwa.kamal@fcom.bu.edu.eg

Scientific Journal for Financial and Commercial Studies and Research (SJFCSR)

Faculty of Commerce – Damietta University

Vol.5, No.2, Part 1., July 2024

APA Citation:

Kamal, M. E. (2024). External Debt Sustainability in Egypt's economy: A probabilistic Approach, *Scientific Journal for Financial and Commercial Studies and Research*, Faculty of Commerce, Damietta University, 5(2)1, 1269-1286.

Website: https://cfdj.journals.ekb.eg/

External Debt Sustainability in Egypt's economy: A probabilistic Approach

Dr. Marwa Elsayed Kamal

ABSTRACT

The concept of external debt sustainability gains importance because it relates to responsible policies that ensure macroeconomic stability. One stability rule of external debt is that the ratio of net debt to GDP be equal to or less than the present value of the ratio of net exports to GDP plus the interest differential times the ratio of total assets to GDP. This paper used a probabilistic approach to examine the sustainability of Egypt's external debt, considering that sustainability requires the net debt to be less than or equal to the present value of net exports. We have applied VAR methodology using a quarterly panel dataset comprising 2010–2023. The estimated parameters were then used in a Monte Carlo simulation to calculate the distribution of the repayment capacity. Our empirical analysis led us to conclude that there is evidence of the unsustainability of Egypt's external debt. Accordingly, Egypt must balance domestic adjustment and foreign borrowing adequately.

Key words: External debt, sustainability, VAR estimation, simulation.

INTRODUCTION

The analysis of global imbalances and their sustainability is considered one of the central themes of modern international macroeconomic theory. Indeed, debt sustainability has become a highly important issue for governments because it requires responsible policies adopted to ensure macroeconomic stability.

The key issue related to external debt management is its sustainability over the medium and long run term. External debt sustainability, also referred to as current account sustainability, means the level of debt that permits a country to fulfill its present and upcoming servicing obligations without any rescheduling or accumulation of accruals. In other words, sustainable debt is a level of debt where the interest rate exceeds the economic growth rate, then the ratio of external debt to GDP would increase. In this case, only a surplus in the ratio of the current account balance to GDP could stop the dynamics of debt accumulation. Accordingly, the ratio of external debt to GDP depends on the behavior of external debt, the behavior of real GDP, and the movements in the real exchange rate. (Roubini, 2001), (Loser, 2004), (Chandia and Javid, 2013), (Esteve and Prats, 2023).

According to the so-called Ponzi game condition, which states that when time converges to infinity, this component may converge to zero or grow to infinity, there are two scenarios to make the external debt sustainable. The two scenarios are: converging to zero and not converging to zero. Under the scenario of converging to zero, all debt levels would be sustainable if the interest rate on external liabilities (r_L) is greater than the growth rate (g). This implies a positive difference of r – g. Hence, debt sustainability depends on the current level of debt and the expected capacity of payment. Under the scenario of not converging to zero, all debt levels would be sustainable if r_L is less than g. This implies a negative difference of r – g. In this case, the total external debt would grow less than the GDP, making the debt-to-GDP ratio fall over time. Accordingly, debt sustainability depends on the expectation of future payment regardless of the level of debt (Piketty, 2014), (Blanchard and Das, 2017), (Checherita-Westphal, 2019), (Navarro-Ortiz and Sapena, 2020).

Another theoretical approach has been introduced by Geerolf (2018). Geerolf has distinguished between two scenarios in which the economy is dynamically efficient or inefficient. The first scenario, namely the dynamic efficiency of the economy, is the case where r_L is greater than or equal to g. This scenario implies that the economy would have dynamically efficient savings, and therefore the positive value of r – g will make the investment aim to maximize profits, not store capital. Accordingly, under this scenario default is possible. This situation is common in developing economies. The second scenario, namely the dynamic inefficiency of the economy, is the case where r_L is lower than g. This scenario implies that the economy would have dynamically inefficient savings, and therefore the negative value of r – g will make the investment aim to store capital, not maximize profits. Accordingly, the debt is perfectly sustainable because it is expected to be repaid using future revenues. This situation is common in developed economies.

Geerolf's theoretical approach may help us explain the negative value of r-g for developed economies and the opposite effect for developing economies, where r-g value is positive. The higher r_L over g would make an expectation that financial flows will move from developed to developing economies in pursuit of a higher return on assets. Then, in the long run, r_L would converge to g, and the expected convergence would occur (Navarro-Ortiz and Sapena, 2020).

Debt burden results from the need to finance mounting current account deficits. Therefore, the indebted country would require positive current account surpluses with creditor countries to have the ability of paying back. Improving the current account status requires currency devaluation to recover price competitiveness. Accordingly, the external debt crisis has implications for currency strength and monetary independence. (Eichengreen and Hausmann 2019), (Navarro-Ortiz and Sapena, 2020).

The basis for analysing Egypt's external debt sustainability presented in this paper depends on the theoretical framework proposed by Roubini (2001) which states that external debt is sustainable if the net debt is less than or equal to the present value of net exports. The paper is organized as follows: Section 2 deals with the survey of empirical literatures on measuring external debt sustainability. Section 3 introduces a descriptive analysis of the data used for measurement. Section 4 discusses the theoretical foundation and methodology used. Section 5 draws the main conclusions.

LITERARURE REVIEW

This section reviews empirical literature investigating external debt sustainability using different econometric approaches. most studies varied among two approaches. in the following, we discuss these two approaches

The first approach, namely the traditional analysis of external sustainability, focuses on the stationarity of the current account or external debt stock by applying unit root techniques and/or cointegration tests for panel data. Trehan and Walsh (1991) propose a procedure that requires the stationary of the ratio of external debt to GDP for the sustainability of the external debt by applying unit root techniques. among the studies adopted the approach of Trehan and Walsh (1991) are:

Utkulu (1999) investigated the external debt sustainability of Turkey using unit root tests. His results suggested that Turkey's external debt was unsustainable. Holmes (2006) examined the stationarity of current account deficits for a sample of sixteen Latin American countries, employing a new Dickey-Fuller (ADF) test, advocated by Breuer et al. (2002), that allows one to test for unit roots in heterogeneous panel data sets. His results suggested that the external debt is sustainable for at least 12 Latin American countries. Takeuchi (2010) investigated the sustainability of US external debt using a Markov switching (MS) unit root test applied to the flow of debt, i.e., the current account. He argued that the extended MS unit root test calculated by the Markov Chain Monte Carlo (MCMC) method provides with new insights on the issue of US external debt. His results suggested that the USA's ratio of the external debt to GDP was unsustainable (See also, Zanghieri, 2004; Bussière et al., 2006; Chen, 2011; Camarero et al., 2015).

On the other hand, Hakkio and Rush (1991) suggest an alternative approach to Trehan and Walsh (1991), one which is based on the cointegrating relationship between exports and imports of a country. among the studies adopted the approach of Hakkio and Rush (1991) are:

Wu et al. (2001) applied panel cointegration tests to examine the cointegration between exports and imports among the G7 countries. Their results supported the sustainability of external debt among major industrial countries. Önel and Uctulu (2006) examined the sustainability of Turkey regarding its external debts. Using the methodology of Hakkio & Rush, the conventional cointegration tests, the Zivot–Andrews unit root test, and the Gregory–Hansen cointegration test to evaluate the sustainability, they concluded that with or without considering any structural break, Turkish external debt is weakly sustainable. Using a similar methodology, the results of Mohammadi et al. (2007) supported that Turkey's external debt was sustainable. Hussain and Idrees (2019) analyzed the impact of fiscal performance on external debt sustainability for Pakistan using the Johansen Co-integration technique, Vector Error Correction Model, and parameter stability tests. Their results suggested that Pakistan's external debt was sustainable.

Afonso, et al. (2019) investigated the sustainability of the current account (CA) balance, net international investment position (NIIP), and net external debt (NED) in a sample of 22 EU countries using time-series stationarity tests of current account balance-to-GDP ratios and co-integration tests of exports and imports of goods and services. Their results suggested that there is sustainability of the CA balance in eight countries, NIIP in five countries, and NED in 10 countries, whereas there is evidence of a lack of sustainability in five debtor nations and three creditor nations. Monastiriotis and Tunali (2020) investigated the sustainability of external imbalances in 15 countries from the EU's so-called eastern and super-periphery across a range of sustainability tests. Their results suggested that a higher likelihood of confirming sustainability when looking separately at the current account and the net foreign asset position than when looking jointly at the current and capital accounts.

Some literatures applied unit root techniques and cointegration tests together. For instance, Sheikh et al. (2014) examined the external debt sustainability for the eight SAARC economies by applying three techniques: univariate unit root tests, panel unit root tests, and cointegration tests. The results of unit root tests suggested that the external debt of SAARC economies is unsustainable individually but sustainable as a whole, while the results of the cointegration tests reveal that the external debt of the SAARC economies is unsustainable individually and wholly with some exceptions. Llorca (2017) has assessed the external debt sustainability in a panel of 24 Asian emerging and developing countries. He used the present-value methodology to determine whether a country's external debt is long-term sustainable. Employing unit root and cointegration tests, his results suggested that the external debt is sustainable in the long run.

Even if panel unit root or stationary tests may provide a rough first insight in to the sustainability of public finances, they fail to highlight the adjustment mechanisms to debt overhang in recent years Paniagua et al. (2017). Furthermore, a drawback of this approach is that it ignores changes in the valuation of foreign assets and liabilities (Navarro-Ortiz and Sapena, 2020).

The second methodological approach relies on the non-linear estimation of an error correction model. Among the studies adopted this approach are:

Yilanci and Özcan (2008) investigated the sustainability of external debt for Turkey using a method that allows testing nonlinearity and nonstationarity simultaneously. They used the time series data of the ratio of Turkey's net external debt stock to GDP. Their results suggested that Turkish external debt is not sustainable. Nasir and Noman (2012) examined the sustainability of external debt using debt-to-external earnings ratios from 36 countries and current account balance-to-gross national income (GNI) ratios from 55 countries. They applied a non-linear ADF unit root test proposed by Kapetanios et al. (2003), on the non-linear processes and the linear ADF test on the linear processes. Their results suggested that there is strong evidence of non-linearity and sustainability of external debt. Semmler and Tahri (2017) examine the dynamics of external debt sustainability of three Euro area economies, Italy, Spain, and Germany. They introduce new empirical measures of sustainability. Instead of using the common measure of external debt over GDP, they use debt over assets. They use an intertemporal model of finite time horizon, which they numerically solve through Non-linear Model Predictive Control (NMPC) method. Their results suggested that Italy and Spain moved toward a slow moving debt crisis, whereas Germany moved into a stable environment.

Based on the debate about investigating external debt sustainability using different econometric approaches, as discussed in this literature review section, the current paper attempts to examine the external debt sustainability of Egypt using a probabilistic approach as a different and more recent methodology. Accordingly, this paper is considered the first to explore the external debt sustainability of Egypt applying new and more recent method to obtain more accurate results. Below, we describe each of these empirical approaches.

DATA

Since external debt refers to the sum of external financial liabilities owed by a country's residents to foreign creditors, after subtracting the value of external financial assets owned by domestic agents at a particular moment, the external net debt adjustment differs as the returns on assets and liabilities differ. Countries perceived as riskier, as case of developing countries, pay a higher rate on their liabilities than they receive on their assets. Conversely, Countries perceived as safer, as case of developed countries, receive a higher rate for their external assets than they pay for their liabilities (Gourinchas and Rey, 2014), (Navarro-Ortiz and Sapena, 2020).

Accordingly, the framework for analyzing external debt sustainability requires using the data of external liabilities and external assets. The time series data source regarding external liabilities and external assets of Egypt was obtained from International Monetary Fund (IMF) data on international investment position (IIP) and balance of payments (BoP). The time span of the analysis is from the first quarter of 2010 to the third quarter of 2023, resulting in 55 quarterly observations. The value of assets and liabilities was used in U.S. dollars (USD).

The asset position was taken to be the IIP financial accounts asset position at the end of the period. Likewise, the liability position was taken to be the IIP financial accounts liability position at the end of the period. The interest rate on external assets (returns on assets) was computed using Egypt's BoP's primary income (credit) position. It was calculated as the primary income (credit) position divided by the total assets and liabilities. Likewise, the interest rate on external liabilities (returns on liabilities) was computed using Egypt's BoP's primary income (debt) position. It was calculated as the primary income (debt) position divided by the total assets and liabilities.

As we examine the external debt sustainability of Egypt following probabilistic approach considering that, the sustainability requires the net debt to be less than or equal to the present value of net exports, therefore the value of net exports here represents the current account balance (the difference between the current account credit and debit of the goods and services balance).

It is important to discuss the descriptive statistics of the variables adopted in the study to provide background information on the variables. Figure (1) documents how the external liabilities-to-GDP ratio was much higher than the external assets-to-GDP ratio over the period (201٠:Q1-2023:Q3). The data on this Figure reflects that Egypt's external debt burden remains high as a proportion of GDP. In other words, the external debt burden forms one of the serious consequences for its long-term growth prospects.

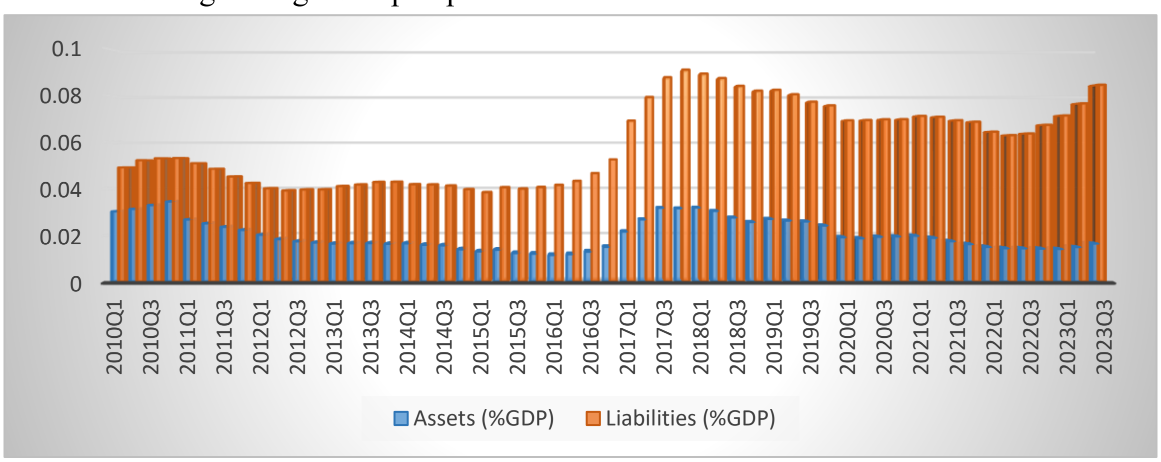

Figure1: External assets-to-GDP ratio and External liabilities-to-GDP ratio (2010-2023).

Figure (2) documents how the interest rate on liabilities was much higher than the interest rate on assets over the period (2010-2023). The highest and lowest return on assets so far was 0.01% and 0.24% in 2023:Q2 and 2020:Q3, whilst the highest and lowest return on liabilities so far was 1.34% and 0.4% in 2023:Q1 and 2016:Q1. This reflects that the interest rate received from citizens of Egypt for investments in both developed and developing countries is much lower than the interest rate paid to external lenders. Therefore, there is a major difference between how much Egypt is paying from its funds and how much it is receiving from its investments.

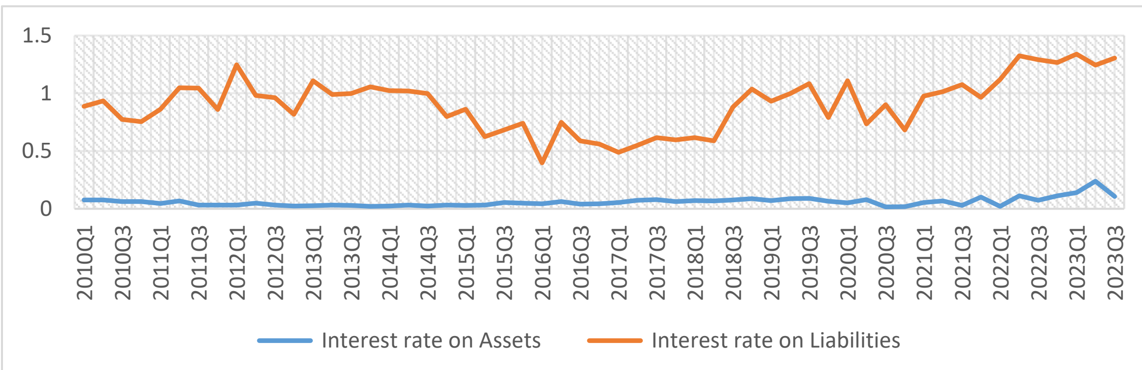

Figure 2: Interest rates on external assets and liabilities (2010-2023).

ECONOMETRIC METHODOLOGY

In this section, we examine the external debt sustainability of Egypt following the probabilistic approach proposed by Blanchard and Das (2017) and improved by Navarro-Ortiz and Sapena (2020). Blanchard and Das (2017) proposed an index of external debt sustainability that reflects uncertainty. They constructed the index as the probability that net debt is less than or equal to the present value of net exports at the current exchange rate. At the beginning, they assumed that external debt accumulation is given by:

$$D_{t+1} = (1 + r_t)D_t - NX_t \qquad (1)$$

Where D_t denotes net debt at the beginning of period t and it equals total external liabilities after subtracting the total external assets ($D_t = L_t - A_t$), NX_t denotes net exports in period t, and $r_t$denotes the real interest rate on external assets and external liabilities in period t.

Dividing by GDP and iterating forward gives the following expression:

$$d_t = \sum_{j=0}^{n}\prod_{i=0}^{j}\frac{1+g_{t+i}}{1+r_{t+i}}nx_{t+j} + \prod_{i=0}^{n}\frac{1+g_{t+i}}{1+r_{t+i}}d_{t+n+1} \qquad (2)$$

Where d denotes the ratio of external debt to GDP, nx denotes the ratio of net exports to GDP, and g denotes the rate of GDP growth.

The condition that the debt to GDP ratio does not explode implies that the last term must be non-positive as n tends to ∞. Taking into consideration the exchange rate needed to keep debt at some date in the future equal to or less than debt at the beginning of period t, we impose that $d_t = d_{t+n+1}$. Hence, the condition of sustainability becomes as follows.

$$d_t(1 - \prod_{i=0}^{n}\frac{1+g_{t+i}}{1+r_{t+i}}) \leq \sum_{j=0}^{n}\prod_{i=0}^{j}\frac{1+g_{t+i}}{1+r_{t+i}}nx_{t+j} \qquad (3)$$

The model Equation (1) describes the behavior of external debt, assuming that the rates of return on assets and liabilities are the same. Indeed, the evidence is that the two rates are often different (Gourinchas and Rey, 2014). These differences in rates can play an important role in debt dynamics. Therefore, the sustainability index, which considers these differences, could be represented as follows.

$$D_{t+1} = (1 + r_{Lt})D_t - (r_{At} - r_{Lt})A_t - NX_t \qquad (4)$$

Where r_A denotes the interest rate on external assets, and r_L denotes the interest rate on external liabilities.

Dividing by GDP and iterating forward gives the following expression Navarro-Ortiz and Sapena (2020).

$$d_t = \sum_{j=0}^{n}\prod_{i=0}^{j}\frac{1+g_{t+i}}{1+r_{Lt+i}}[\left(r_{At+j} - r_{Lt+j}\right)a_{t+j} + nx_{t+j}] + \prod_{i=0}^{n}\frac{1+g_{t+i}}{1+r_{Lt+i}}d_{t+n+1} \qquad (5)$$

Accordingly, the condition of sustainability becomes as follows:

$$d_t(1-\prod_{i=0}^{n}\frac{1+g_{t+i}}{1+r_{Lt+i}}) \leq \sum_{j=0}^{n}\prod_{i=0}^{j}\frac{1+g_{t+i}}{1+r_{Lt+i}}\ [(r_{At+j}-r_{Lt+j})a_{t+j}+nx_{t+j}] \quad (6)$$

Where a_t denotes the ratio of total assets to GDP.

Navarro-Ortiz and Sapena (2020) have applied VAR methodology to calculate the distribution of the repayment capacity. They constructed two stationary clusters of variables before estimating the model to obtain the requirement of stationarity of variables. These are the first and second components of the first part of Equation (5). The first component ($C_{1,t+i}=\frac{1+g_{t+i}}{1+r_{Lt+i}}$) is the discount factor, and the second ($C_{2,t+i}=\left(r_{At+j}-r_{Lt+j}\right)a_{t+j}+nx_{t+j}$) is the addition of net exports to the repricing of net foreign assets for the period. Accordingly, VAR model could be specified as follows:

$$\begin{bmatrix}C_{1,t}\\C_{2,t}\end{bmatrix}=\begin{bmatrix}\alpha_{11}\\\alpha_{21}\end{bmatrix}+\begin{bmatrix}\beta_{11}&\beta_{12}\\\beta_{21}&\beta_{22}\end{bmatrix}\begin{bmatrix}C_{1,t-1}\\C_{2,t-1}\end{bmatrix}+\begin{bmatrix}\gamma_{11}&\gamma_{12}\\\gamma_{21}&\gamma_{22}\end{bmatrix}\begin{bmatrix}C_{1,t-2}\\C_{2,t-2}\end{bmatrix}+\begin{bmatrix}\varepsilon_{1,t}\\\varepsilon_{2,t}\end{bmatrix} \quad (7)$$

Where α_{11} and α_{21} are the constants of the model, β_{11}, β_{12}, β_{21} and β_{22} represent the slopes of the VAR model, and $\varepsilon_{1,t}$ and $\varepsilon_{2,t}$ are white noise errors.

However, the second part of Equation (5) has not been estimated because it depends on d_{t+n+1}, which in a 50-period forecast would be the expected value of the debt 50 periods ahead. So, a distribution of possible futures distinguishing the cases where the multiplier of d_{t+n+1} converges to zero and the cases where it does not, is plotted.

Regarding the case of Egypt, Table 5 presents the results of VAR estimation to calculate the distribution of the capacity to repay. The results of the parameters estimated are used to run a Monte Carlo simulation for 50 periods ahead with 500,000 observations for each of the variables (C_1, C_2). These variables represent the first part of equation 5, namely the net present value of the expected net exports. Using this forecast, the expected net present value of the external debt repayment performance and the corresponding probability distributions of the capacity to repay are computed.

Regarding the second part of equation 5, in the cases where the multiplier of d_{t+n+1} is converged to zero, the actual possibility of repayment is equal to the first part of that Equation, therefore the economy would be dynamically efficient. In a dynamically efficient economy, where the simulated interest rate is above the growth rate, the external debt would probably be unsustainable; in other words, a default is possible. On the other hand, the economy would be dynamically inefficient when the multiplier of d_{t+n+1} is not converged to zero. In a dynamically inefficient economy, where the simulated interest rate is below the growth rate, the debt is perfectly sustainable because it is expected to be repaid using future revenues.

Table (1): ADF unit-root test for unit root variable.

Variable	*ADF*	*p-value*
d_t	-0.141	0.939
nx_t	-1.725	0.726
r_A	-2.399	0.3747
r_l	-1.39	0.853
a_t	-2.46	0.346
g_t	-2.694	0.2433

*10%, **5%, ***1% significance. ADF, t-statistic reported.

Note: The appropriate lag lengths were selected according to the Schwartz Bayesian criterion.

Table (2): Cointegration test.

Included observations: 53 after adjustments

Trend assumption: Linear deterministic trend (restricted)

Series: A___GDP_ DT_____GDP_ G
INTEREST_RATE_ON_LIABILITIES
INTEREST_RATE_ON_ASSETS NX___GDP_

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.655427	142.7973	117.7082	0.0005
At most 1	0.489051	86.32851	88.80380	0.0744
At most 2	0.335412	50.73974	63.87610	0.3815
At most 3	0.208827	29.08457	42.91525	0.5569
At most 4	0.195128	16.66994	25.87211	0.4400
At most 5	0.092857	5.165111	12.51798	0.5728

Table (3): Interest rates on external assets and liabilities

	r_A	r_L	g	$\frac{1+g}{1+r_L}$		r_A	r_L	g	$\frac{1+g}{1+r_L}$
2010-2017	0.044%	0.83%	0.15%	0.47%	2017-2023	0.079%	0.995%	2.060%	1.66%

Table (4): VAR Lag Order Selection Criteria

Endogenous variables: C2 C1

Exogenous variables: C

Date: 05/22/24 Time: 13:57

Sample: 2010Q1 2023Q3

Included observations: 50

HQ	SC	AIC	FPE	LR	LogL	Lag
-2.994516	-2.947159	-3.023640	0.000167	NA	77.59100	0
-4.160067	-4.017997	-4.247440	4.90e-05	65.03859	112.1860	1
-4.285635*	-4.048852*	-4.431257*	4.08e-05*	15.47176*	120.7814	2
-4.106357	-3.774861	-4.310227	4.62e-05	1.675728	121.7557	3
-4.075996	-3.649787	-4.338115	4.51e-05	7.703401	126.4529	4
-3.936151	-3.415229	-4.256519	4.93e-05	3.057759	128.4130	5

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Table 5: VAR Results

Effective sample size: 53 Number of estimated parameters: 10 Log-likelihood: 129.53 AIC: -4.51 BIC: -4.139				
	Value	SD	t-stat	p-value
α_{11}	-2.777	1.0994	-2.525	0.0432
α_{21}	-0.002	0.00164	-1.243	0.1251
β_{11}	0.479	0.1429	3.355	0.026
β_{12}	0.0656	0.138	0.4745	0.2598
β_{21}	0.000255	0.00021	1.1996	0.1305
β_{22}	0.000187	0.00021	0.911	0.1739
γ_{11}	-69.74	85.199	-0.819	0.1905
γ_{12}	-104.53	88.11	-1.19	0.1317
γ_{21}	0.402	0.127	3.17	0.0288
γ_{22}	0.5001	0.1311	3.82	0.0204

Graphically, we may distinguish between the distributions of a country's capacity to repay its external debt. The areas plotted in red represent the dynamically inefficient areas, where the economy would have dynamically inefficient savings. Hence, the main determinant of investment would be the store of value, not the interest rate. Here, the external debt would probably be sustainable. The areas plotted in blue represent the dynamically efficient areas, where the economy would have dynamically efficient savings. Hence, the main determinant of investment would be the interest rate, not the store of value. Here, the external debt would probably be unsustainable.

Figure (3) shows the present value distribution of the capacity to repay external debt and the actual external debt position for Egypt. The first notable observation is that the majority of distribution of the possibility of repayment of external debt lies to the right of the black line (i.e. the line of actual external debt). This is the area of probability of default. The distribution implies that Egypt is not perceived as a safe destination for savings, as long as a lack of trust in its payment capabilities. In other words, Egypt has a huge external debt burden, so the probability that it will have problems servicing its external debt should be a concern for national and international investors. The direct reasons behind the lack of confidence would probably be the tensions in the Middle East area, financial and structural imbalances associated with institutional performance, and the weakness of export structure compared to the heavy increase in imports. Accordingly, Egypt needs to find an adequate balance between domestic adjustment and foreign borrowing.

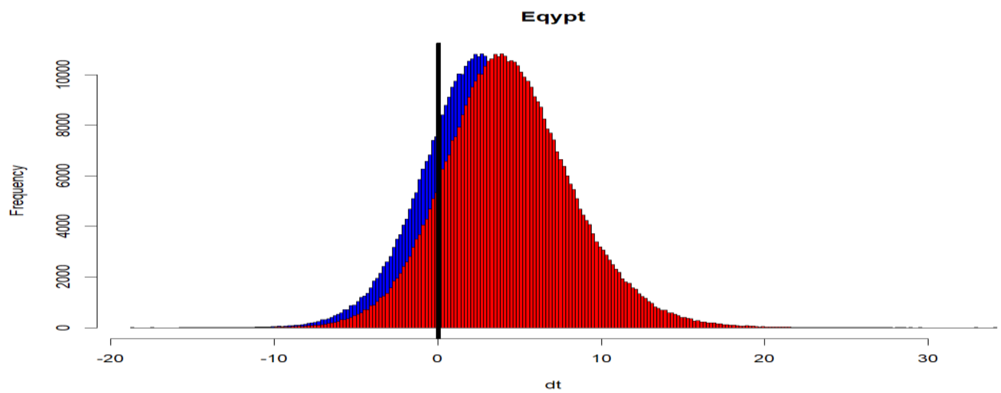

Figure (3): the probability density distributions of the capacity to repay external debt for Egypt.

CONCLUSION

The concept of external debt sustainability gains importance because it relates to responsible policies that ensure macroeconomic stability. One stability rule of external debt is that the ratio of net debt to GDP be equal to or less than the present value of the ratio of net exports to GDP plus the interest differential times the ratio of total assets to GDP.

This paper conducts an empirical investigation of external debt sustainability using a probabilistic approach based on the probability that net debt is less than or equal to the present value of net exports at the current exchange rate, with data for Egypt for the 2010–2024 period. The paper adopted VAR estimation model and used the parameters estimated to perform a Monte Carlo simulation. This is to be able to empirically determine whether the external debt of Egypt may sustainable or not.

The results suggested that the external debt of Egypt would probably be unsustainable. This emphasizes that the high debt burden and the low growth rates have put in serious doubt the premise that foreign borrowing is an appropriate mechanism to enhance growth.

REFERENCES

1) Afonso, A., *Huart, F., Jalles, J. T., & Stanek, P. (2019). Assessing the sustainability of external imbalances in the European Union. The World Economy, 42(2), 320-348.*
2) *Bussière, M., Fratzscher, M., & Müller, G. J. (2006). Current account dynamics in OECD countries and in the new EU member states: An intertemporal approach. Journal of Economic Integration, 593-618.*
3) *Blanchard,* O. J., & Das, M. (2017). A new index of external debt sustainability. *Peterson Institute for International Economics Working Paper*, (17-13).
4) Chen, S. W. (2011). Current account deficits and sustainability: Evidence from the OECD countries. Economic modelling, 28(4), 1455-1464.
5) Chandia, K. E., & Javid, A. Y. (2013). An analysis of debt sustainability in the economy of Pakistan. *Procedia Economics and Finance*, *5*, 133-142.
6) Camarero, M., Carrion-i-Silvestre, J. L., & Tamarit, C. (2015). Testing for external sustainability under a monetary integration process. Does the Lawson doctrine apply to Europe?. Economic Modelling, 44, 343-349.
7) Checherita-Westphal, C. (2019). Interest rate-growth differential and government debt dynamics. Economic Bulletin Boxes, 2.
8) Eichengreen, B., & Hausmann, R. (Eds.). (2019). *Other people's money: debt denomination and financial instability in emerging market economies*. University of Chicago Press.
9) Esteve, V., & Prats, M. A. (2023). External sustainability in Spanish economy: Bubbles and crises, 1970–2020. *Review of International Economics*, *31*(1), 60-80.
10) Gourinchas, P. O., & Rey, H. (2014). External adjustment, global imbalances, valuation effects. In *Handbook of international economics* (Vol. 4, pp. 585-645). Elsevier.
11) Hakkio, C.S., Rush, M., 1991. Is the budget deficit 'too large'? Economic Inquiry 29, 429–445.
12) Holmes, M. J. (2006). Do Latin American countries have an incentive to default on their external debts?: a perspective based on long-run current account behavior. *Emerging Markets Finance and Trade*, *42*(1*), 33-49.*

13) *Hussain, A., & Idrees, A. S. (2019). Fiscal performance and external public debt sustainability: A case study of Pakistan. Review of Economics and Development Studies, 5(4), 142-149.*
14) *Kapetanios, G., Shin, Y., & Snell, A. (2003). Testing for a unit root in the nonlinear STAR framework. Journal of econometrics, 112(2), 359-379.*
15) Loser, C. M. (2004). External debt sustainability: guidelines for low-and middle-income countries (Vol. 26). UN.
16) Llorca, M. (2017). External debt sustainability and vulnerabilities: evidence from a panel of 24 Asian countries and prospective analysis (No. 692). ADBI Working Paper.
17) Mohammadi, H., Cak, M., & Cak, D. (2007). Capital mobility and foreign debt sustainabilty: some evidence from Turkey. Applied Economics, 39(19), 2441-2449.Monastiriotis, V., & Tunali, C. B. (2020). The sustainability of external imbalances in the European periphery. *Open Economies Review*, *31*, 273-294.
18) Monastiriotis, V., & Tunali, C. B. (2020). The sustainability of external imbalances in the European periphery. Open Economies Review, 31, 273-294.
19) Nasir, A., & Noman, A. M. (2012). Sustainability of external debt: further evidence from non-linear framework. *International Review of Applied Economics*, *26*(5), 673-685.
20) Navarro-Ortiz, J., & Sapena, J. (2020). Is external debt sustainable? A probabilistic approach. *Economic Modelling*, *93*, 142-153.
21) Önel, G., & Utkulu, U. (2006). Modeling the long-run sustainability of Turkish external debt with structural changes. Economic Modelling, 23(4), 669-682.
22) Piketty, T. (2014). Capital in the twenty-first century. Harvard University Press.
23) Paniagua, J., Sapena, J., & Tamarit, C. (2017). Fiscal sustainability in EMU countries: A continued fiscal commitment?. *Journal of International Financial Markets, Institutions and Money*, *50*, 85-97.
24) Roubini, N. (2001). Debt sustainability: How to assess whether a country is insolvent. *Stern School of Business, New York University, mimeo*.

25) Sheikh, M. R., Abbasi, M. N., Iqbal, S., & Masood, S. (2014). External debt sustainability analysis: A Case of SAARC countries. International Journal of Management Research and Emerging Science, 4(1).
26) Semmler, W., & Tahri, I. (2017). Current account imbalances: A new approach to assess external debt sustainability. *Economic Modelling, 62, 161-170.*
27) *Trehan, B., & Walsh, C. E. (1991). Testing intertemporal budget constraints: Theory and applications to US federal budget and current account deficits. Journal of Money, Credit and banking, 23(2), 206-223.*
28) Takeuchi, F. (2010). US external debt sustainability revisited: Bayesian analysis of extended Markov switching *unit root test. Japan and the World Economy, 22(2), 98-106.*
29) *Utkulu, U. (1999). Is the Turkish External Debt Sustainable? Evidence from Unit Root Testing. Yapı Kredi Economic Review, 10, 55–65.*
30) *Wu, J. L., Chen, S. L., & Lee, H. Y. (2001). Are current account deficits sustainable?: Evidence from panel cointegration. Economics Letters, 72(2), 219-224.*
31) *Yilanci, V., & Ozcan, B. (2008). External debt sustainability of Turkey: A nonlinear approach. International Research Journal of Finance and Economics, 20(10), 91-99.*
32) Zanghieri, P. (2004). Current account dynamics in new EU Members: Sustainability and policy issues.

استدامة الدين الخارجي في الاقتصاد المصري: نهج احتمالي

المستخلص

يكتسب مفهوم استدامة الديون الخارجية أهمية كبيرة، وذلك لارتباطه بالسياسات التي تضمن استقرار الاقتصاد الكلي. إحدى قواعد استقرار الدين الخارجي هي أن تكون نسبة صافي الدين إلى الناتج المحلي الإجمالي تساوي أو تقل عن القيمة الحالية لنسبة صافي الصادرات إلى الناتج المحلي الإجمالي مضافا إليها فرق الفائدة (الفائدة على الأصول – الفائدة على الخصوم) مضروبة في نسبة إجمالي الأصول إلى الناتج المحلي الإجمالي. استخدمت هذه الدراسة منهجًا احتماليًا لدراسة مدى استدامة الدين الخارجي لمصر، مع الأخذ في الاعتبار أن الاستدامة تتطلب أن يكون صافي الدين أقل من أو يساوي القيمة الحالية لصافي الصادرات. وقد قمنا بتطبيق منهجية متجه الانحدار الذاتي (VAR) باستخدام مجموعة بيانات ربع سنوية تضم الفترة الزمنية (٢٠١٠-٢٠٢٣). وقد تم استخدام المعلمات المقدرة الناتجة من النموذج في محاكاة مونت كارلو، وذلك لحساب توزيع القدرة على السداد. وقد أدي بنا هذا التحليل التجريبي إلى استنتاج الدليل على عدم قدرة مصر على استدامة ديونها الخارجية. وبناء على ذلك، يتعين على مصر أن توازن بين سياسات التكيف المحلي والاقتراض الأجنبي بشكل مناسب.

الكلمات المفتاحية: الدين الخارجي، الاستدامة، متجه الانحدار الذاتي، المحاكاة