Fiscal Limits in the MENA Region: A Structural Analysis of Debt Sustainability*

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Abstract

The MENA region has faced significant socio-economic and political shocks over the past decade, impacting the fiscal stability of its economies. This paper explores how the fiscal fundamentals of these economies and the economic shocks they face influence their fiscal space, defined as the maximum level of sustainable debt net of actual debt as a share of GDP. Using a non-linear DSGE model with a state-dependent fiscal limit that is calibrated using data from six non-oil-exporting and six oil-exporting MENA countries, I estimate the fiscal limit distributions for these economies. I also examine how shocks to productivity, public spending and government revenues affect the fiscal space, as well as how fiscal policy tools such as transfers and taxation shape debt sustainability. Key findings reveal that non-oil-exporting MENA countries operate with more constrained fiscal positions, that government transfers and tax capacity play a major role in shaping fiscal limits, and that the fiscal resilience of oil-exporting MENA economies is primarily attributed to the oil revenues they generate.

Keywords: Fiscal Limits, Debt Sustainability, DSGE Models, MENA countries.

JEL classification: E62, H30, H63.

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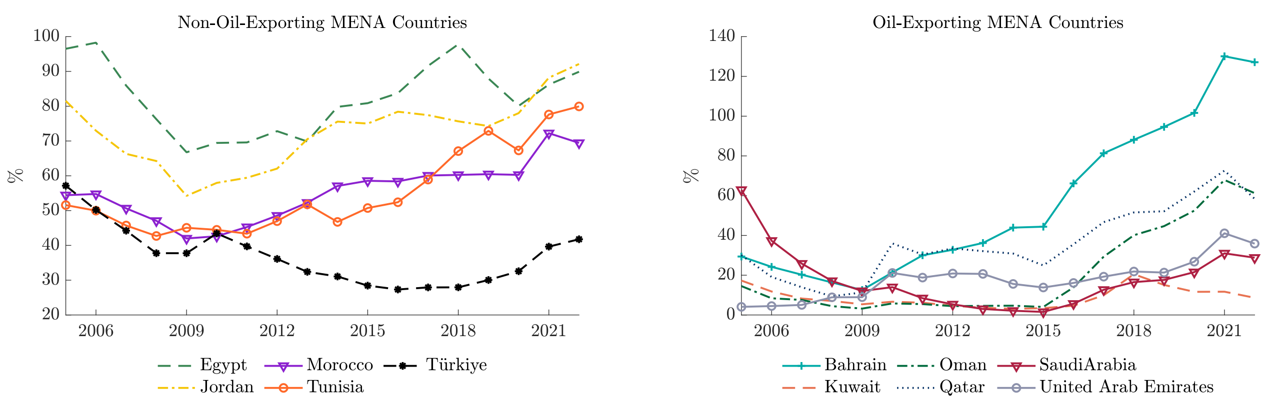
1 Introduction

Economies of the MENA region have faced unprecedented socio-economic and political shocks in the last decade. Middle-income MENA countries witnessed widespread uprisings since 2011, demanding political and economic reforms and resulting in long periods of political instability. Those uprisings, through the humanitarian and refugee crisis they created, had repercussions to neighbouring countries which saw declines in tourism revenues and foreign direct investments as well as deteriorating public finances. Oil-exporting MENA nations, including those in the GCC region, also saw their fiscal balances worsen in 2014 due to the decline in oil prices driven by a growing supply glut and dwindling demand. More recently, the COVID-19 pandemic struck the region at a time when several of its economies were already struggling to recover from protracted downturns and structural fragilities. As a result, the financial situation of MENA countries' public sectors has become a major source of concern for policymakers as these economies have been running budget deficits resulting in the accumulation of sizeable sovereign debts (see Figure 1). The fiscal challenges are further exacerbated by inefficient tax systems and high public spending which is often directed toward subsidies and transfers, which place additional strain on government budgets.

Figure 1: Government Gross Debt as a Share of GDP



Source: IMF World Economic Outlook Database

Against this background, this paper examines how the fiscal fundamentals of selected MENA economies and the economic shocks they face affect the fiscal space – the maximum level of sustainable debt net of actual debt as a share of GDP. For this purpose, I employ a non-linear DSGE model that incorporates a state-dependent fiscal limit building on

Bi (2012). I extend the model to capture different revenue structures for non-oil-exporting and oil-exporting MENA countries. The model's fiscal sector is calibrated and the parameters underlying the shock processes are estimated using data from six non-oil-exporting MENA economies – Egypt, Jordan, Lebanon, Morocco, Tunisia, and Türkiye – as well as for six oil-exporting MENA economies – Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. Using this framework, I examine (i) how the underlying macroeconomic and fiscal fundamentals of the MENA economies drive their fiscal space; (ii) how shocks to productivity, public spending and government revenues affect the distribution of fiscal limits; and (iii) how different fiscal policy actions regarding transfers and taxation affect these economies' debt sustainability prospects.

This paper is connected to two strands of the literature. One strand assesses the dynamics of the macroeconomy in the presence of a state-dependent fiscal limit. A prominent example is Bi (2012) who derives stochastic fiscal limits arising endogenously from a dynamic Laffer curve. Bi and Traum (2012) estimate the sovereign default probability for Greece and Italy using a real business cycle model that allows for interactions among fiscal policy instruments, sovereign default risk, and the fiscal limit. Bi (2017) calibrates the fiscal limits for several economies and finds that Italy and Greece have very little fiscal space, whereas the U.S. and Japan have substantial fiscal space. Other papers estimate the fiscal limits of different countries: Bi et al. (2016) for Argentina, Coimbra (2020) and Andrés et al. (2020) for Spain, Hürtgen and Rühmkorf (2014) for Greece and Hürtgen (2021) for the euro area, among others. The paper thus complements the state-dependent fiscal limit literature with estimates of the fiscal limits for MENA countries, a task previously ignored in the literature.

Another strand, which despite its importance hasn't been explored widely, assesses fiscal sustainability in emerging economies in general and in MENA economies in particular. Neaime (2010) examines public debt sustainability in a selection of MENA economies using time series econometric tests and finds heterogenous evidence pointing towards strong sustainability in some economies and weak sustainability in others. Sarangi and El-Ahmadieh (2017) study the fiscal policy responses to debt in Arab countries while allowing for nonlinear response through quadratic and cubic models. Neaime and Gaysset (2017) use time series econometric models to examine the sustainability of macroeconomic policies in Egypt, Jordan, Morocco, and Tunisia. Mahmah and Kandil (2019) evaluate the long-run sustainability of GCC's public finance by estimating a reaction function of the government's primary balance using system GMM models. They find that the primary balance and the lagged debt-to-GDP ratio are positively related. Khalladi (2019) uses a fiscal reaction function as in Ghosh et al. (2013) to estimate the fiscal limit for some MENA countries and shows the existence of fiscal fatigue in the countries under study. This paper fills a critical gap in this literature by providing a comprehensive analysis of debt sustainability in the region through estimating the distribution of fiscal limits arising endogenously for countries in the MENA region.

I establish a number of key empirical results. First, oil-exporting countries generally exhibit larger fiscal space than non-oil-exporting countries due to their significant oil revenues that provide a buffer against fiscal shocks. Meanwhile, non-oil-exporting MENA countries face more constrained fiscal positions, with some, such as Lebanon and Egypt, requiring fiscal reforms to avoid the risk of sovereign defaults. Second, I find that shocks to productivity largely influence the fiscal space of non-oil-exporting MENA economies, especially Egypt and Jordan where negative productivity shocks can wipe out their fiscal space and raise the risk of default. On the other hand, oil-exporting MENA economies are more resilient to fluctuations in productivity levels but remain vulnerable to shocks in oil revenues. Third, the path of government transfers plays an important role in driving the fiscal space in non-oil-exporting countries and non-stationary government transfers reduced the fiscal limit of these economies. Egypt, Jordan and Morocco stand out in terms of the size of government transfers as a share of output and their estimated growth rates. Fourth, I show that the capacity to raise taxes is an important determinant of the fiscal limit. This is particularly true in non-oil-exporting MENA economies where lower taxes diminish their fiscal limits significantly, highlighting the importance of strengthening tax systems and broadening the tax base in these countries. In oil-exporting MENA economies, the fiscal space declines with lower tax rates but remains sustainable due to substantial oil revenues.

The rest of the paper is organized as follows. Section 2 presents the structural model and introduces the state-dependent fiscal limit. Section 3 explains the computation of the fiscal limits, details the calibration of the model, and presents the estimated fiscal limits and fiscal space for the different economies. In Section 4, I analyze how shocks to productivity, government purchases and oil revenues affect fiscal sustainability. Section 5 shows how changing the fiscal fundamentals – namely the growth in transfers and the maximum tax rate – impact the fiscal limit distribution. Section 6 concludes.

2 Model

I employ a non-linear DSGE model with a state-dependent fiscal limit to study debt sustainability in non-oil-exporting and oil-exporting MENA countries. The model builds on the structure of Bi (2012) and incorporates different revenue structures for non-oil-exporting and oil-exporting countries.

2.1 Households

The economy is populated by an infinite number of identical households that choose consumption C_t, leisure L_t, and bond purchases B_t to maximize expected lifetime utility:

$$E_0 \sum_{t=0}^{\infty} \beta^t \left[\ln C_t + \phi \ln L_t\right] \tag{1}$$

where $\beta \in (0, 1)$ is the discount factor, and ϕ determines the relative weight of leisure in the utility function. The household maximises its objective function subject to the budget constraint:

$$(1 - \tau_t)Y_t + Z_t - C_t = B_t Q_t - (1 - \Delta_t)B_{t-1} \tag{2}$$

Here, τ_t represents the labor tax rate, Y_t is labor income, Z_t is government transfers, B_t are one-period government bond, Q_t is the bond price, and Δ_t denotes the default fraction on government debt.

2.2 Production

Output is determined by the level of productivity, A_t, and labor supply, $1 - L_t$, according to a simple linear production function:

$$Y_t = A_t(1 - L_t) \tag{3}$$

The level of productivity follows an AR(1) process:

$$\ln \frac{A_t}{A} = \rho^A \ln \frac{A_{t-1}}{A} + \epsilon_t^A \qquad \epsilon_t^A \sim \mathcal{N}(0, \sigma_A^2) \tag{4}$$

where A represents the steady-state technology level, ρ^A denotes the persistence of productivity, and ϵ_t^A is a productivity shock.

2.3 Government

Non-Oil-Exporting Countries. The government finances lump-sum transfers Z_t and government purchases G_t through distortionary tax revenues on labor income and by issuing one-period government bonds B_t at a given price Q_t. The government's budget constraint is:

$$\tau_t A_t (1 - L_t) + B_t Q_t = (1 - \Delta_t) B_{t-1} + G_t + Z_t \tag{5}$$

Oil-Exporting Countries. In these countries, the government additionally generates revenues from oil sales, OR_t, which also finance lump-sum transfers and government purchases. The government budget constraint is modified as follows:

$$\tau_t A_t (1 - L_t) + B_t Q_t + OR_t = (1 - \Delta_t) B_{t-1} + G_t + Z_t \tag{6}$$

Oil revenues evolve according to an AR(1) process:

$$\ln \frac{OR_t}{OR} = \rho^{OR} \ln \frac{OR_{t-1}}{OR} + \epsilon_t^{OR} \qquad \epsilon_t^{OR} \sim \mathcal{N}(0, \sigma_{OR}^2) \tag{7}$$

where OR represents the steady-state oil revenues, ρ^{OR} captures the persistence of oil revenues, and ϵ_t^{OR} is an oil revenue shock. It is important to note that the detailed dynamics of the oil sector are not model. Instead, I treat oil revenues as external transfers directly accruing to the government, without accounting for oil production or the factors employed in the sector. Despite this simplification, the framework sufficiently captures the impact of oil revenues on the government's budget which is the focus of this paper.

Tax revenues are raised based on a time-varying tax rate, τ_t, which increases with government debt according to:

$$\tau_t - \tau = \gamma \left((1 - \Delta_t) B_{t-1} - B \right) \tag{8}$$

where $\gamma > 0$ determines how responsive tax rates are to debt levels.

Government purchases, G_t, are stationary and follow an exogenous AR(1) process:

$$\ln \frac{G_t}{G} = \rho^G \ln \frac{G_{t-1}}{G} + \epsilon_t^G \qquad \epsilon_t^G \sim \mathcal{N}(0, \sigma_G^2) \tag{9}$$

where G represents the government purchases at the steady state, ρ^G captures the persistence of government purchases, and ϵ_t^G is a shock to government purchases.

Government transfers, Z_t, follow a Markov-switching process, shifting between a stationary and an explosive regime.:

$$Z_t = \begin{cases} Z & \text{if } rs_t^Z = 1 \\ \mu^Z Z_{t-1} & \text{if } rs_t^Z = 2 \end{cases} \tag{10}$$

with $\mu^Z > 1$, where the regime-switching index rs_t^Z follows a Markov chain with transition matrix M_Z:

$$M_Z = \begin{pmatrix} p_1^Z & 1 - p_1^Z \\ 1 - p_2^Z & p_2^Z \end{pmatrix} \tag{11}$$

Government transfers can thus move from a stable and stationary regime to an explosive path, increasing the likelihood of debt accumulation and default risk. This assumption aligns with the observation that several MENA countries have been transferring an increasing share of GDP from the government to households.[1]

The government may default on a fraction Δ_t of its debt. Default occurs if the government debt exceeds a state-dependent fiscal limit B_t^*, which is drawn from a conditional, endogenous fiscal limit distribution:

$$\Delta_t = \begin{cases} 0 & \text{if } B_{t-1} < B_t^* \\ \delta_t & \text{if } B_{t-1} \geq B_t^* \end{cases} \tag{12}$$

where δ_t is the size of the debt haircut. The fiscal limit B_t^* is drawn from an endogenous fiscal limit distribution $B_t^* \sim \mathcal{B}^*(A_t, G_t, rs_t^Z)$ for non-oil-exporting countries and $B_t^* \sim \mathcal{B}^*(A_t, G_t, OR_t, rs_t^Z)$ for oil-exporting countries.

2.4 State-Dependent Fiscal Limit

The state-dependent fiscal limit represents the maximum level of debt that a government can service. It is defined as the present discounted value of all future possible fiscal surpluses, where the distribution of surpluses depend on the exogenous states of the economy (productivity A_t, government expenditures G_t, oil revenues OR_t and transfers regime rs_t^Z), their future realizations, and the parameters of the model.

Non-Oil-Exporting Countries. For these countries, the state-dependent distribution of fiscal limit is defined as:

$$\mathcal{B}^*(A_t, G_t, rs_t^Z) = E_t \sum_{j=0}^{\infty} \beta^j \frac{U_c^{max}(A_{t+j}, G_{t+j})}{U_c^{max}(A_t, G_t)} \left(T^{max}(A_{t+j}, G_{t+j}) - G_{t+j} - Z(rs_{t+j}^Z) \right) \tag{13}$$

[1]See Figure C.1 in the Online Appendix which plots the evolution of government transfers as a share of GDP for selected MENA countries.

Oil-Exporting Countries. For these countries, the state-dependent distribution of fiscal limit is defined as:

$$\mathcal{B}^*(A_t, G_t, OR_t, rs_t^Z) = \sum_{j=0}^{\infty} \beta^j \frac{U_c^{max}(A_{t+j}, G_{t+j}, OR_{t+j})}{U_c^{max}(A_t, G_t, OR_t)} \Big(T^{max}(A_{t+j}, G_{t+j}, OR_{t+j}) + OR_{t+j} - G_{t+j} - Z(rs_{t+j}^Z) \Big) \tag{14}$$

where T^{max} is the maximum level of tax revenues for a given state computed using the revenue-maximizing tax rate τ^{max} which denotes the point at the peak of the dynamic Laffer curve.[2] U_c^{max} is the marginal utility of consumption also evaluated at the peak of the dynamic Laffer curve. The fiscal limit distribution indicates the likelihood that a given debt level can be supported, given the current state and the stochastic processes for A_t, G_t, Z_t (and OR_t for oil-exporting economies). As such, default is possible at any point in the distribution with the probability of default being higher in the right tail of the distribution than in the left tail.

3 Country-Specific Distributions of Fiscal Limits

Fiscal limits are inherently country-specific since economies differ in their government policies on expenditure and taxation, levels of productivity, and investor preferences (Bi, 2017). In some countries with relatively high debt levels, the risk of default may remain low if fiscal constraints imply that the economy has the capacity to handle additional debt. In contrast, other countries may face substantial default risk at much lower levels of debt if they lack the ability to generate large enough surpluses in the future. In this section, I use the framework outlined earlier to compute the fiscal limit distributions for six non-oil-exporting MENA economies – Egypt, Jordan, Lebanon, Morocco, Tunisia, and Türkiye – as well as for six oil-exporting MENA economies – Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

3.1 Fiscal Limit Simulation

To compute the conditional fiscal limit distribution, I follow Bi (2012) and employ Markov Chain Monte Carlo (MCMC) simulations. For each simulation, future shocks to productivity A_{t+j}, government purchases G_{t+j}, the transfer regime rs_{t+j}^Z (and oil revenues OR_{t+j},

[2] In section 5, I recompute the fiscal limit distribution by replacing the revenue-maximizing tax rate with a lower maximum tax revenues to output ratio.

for oil-exporting economies), are randomly drawn for N periods ($j = 1, 2, \ldots, N$), conditional on the starting states. The fiscal limit is then computed using Equation (13) for non-oil-exporting economies and Equation (14) for oil-exporting economies. This simulation is repeated for M times and the conditional distribution $\mathcal{B}^*$ for a given initial state is approximated using the simulated fiscal limits $\mathcal{B}_i^*$ ($i = 1, 2, \ldots, M$).[3] The cumulative density function (CDF) of this distribution allows us to compute the endogenous default probability, which depends on the current state of the economy.

3.2 Calibration

The model is calibrated at annual frequency to the set of non-oil-exporting and oil-exporting MENA countries using values from related studies, or matching the means of the variables over the sample period 2000-2022. Table 1 summarizes the values of calibrated parameters and steady-state ratios.[4]

The steady-state productivity level and the total amount of time available for labor and leisure and are normalized to 1. Following Bi (2012), I calibrate the relative weight of leisure in the utility function, ϕ, to imply that the household spends 25 per cent of its time working in steady state while at the same time matching the steady-state consumption share of output and tax rate. The household discount factor, β, is calibrated to match the average annual discount rate for each country. I calibrate the steady-state tax rate, τ, to match the country-specific average tax revenues as a per cent of GDP. The government purchases to output ratio, G/Y, is chosen to correspond to total government spending as a per cent of GDP in the data. For oil-exporting countries, the steady-state oil revenues to output ratio, OR/Y, is calibrated to match the ratio of oil rents accruing to the government as a share of GDP.

I set the steady-state transfers to output ratio, Z/Y, to correspond to the average transfers as a share of GDP in the data. I calibrate the growth rate of transfers in the explosive regime, μ^Z, to match the average annual growth rate of transfers in each country over the 20-year period 2002-2022. I follow Bi (2012) and set the regime-switching parameters for transfers to $p_1^Z = p_2^Z = 0.95$, implying that each regime lasts for 20 years.

Finally, the parameters of the exogenous processes (ρ's and σ's) for government pur-

[3] I simulate $N = 200$ periods and repeat this computation $M = 100,000$ times. See the Online Appendix for more details on the simulation procedure.

[4] See the Online Appendix for a full description of the data.

chases, productivity and oil revenues (for oil-exporting countries only) are estimated by fitting AR(1) processes on the HP-filtered ($\lambda = 100$) level of real government spending, real GDP per capita and real oil revenues, respectively, for each country over the period 1990-2022.

Table 1: Model Calibration

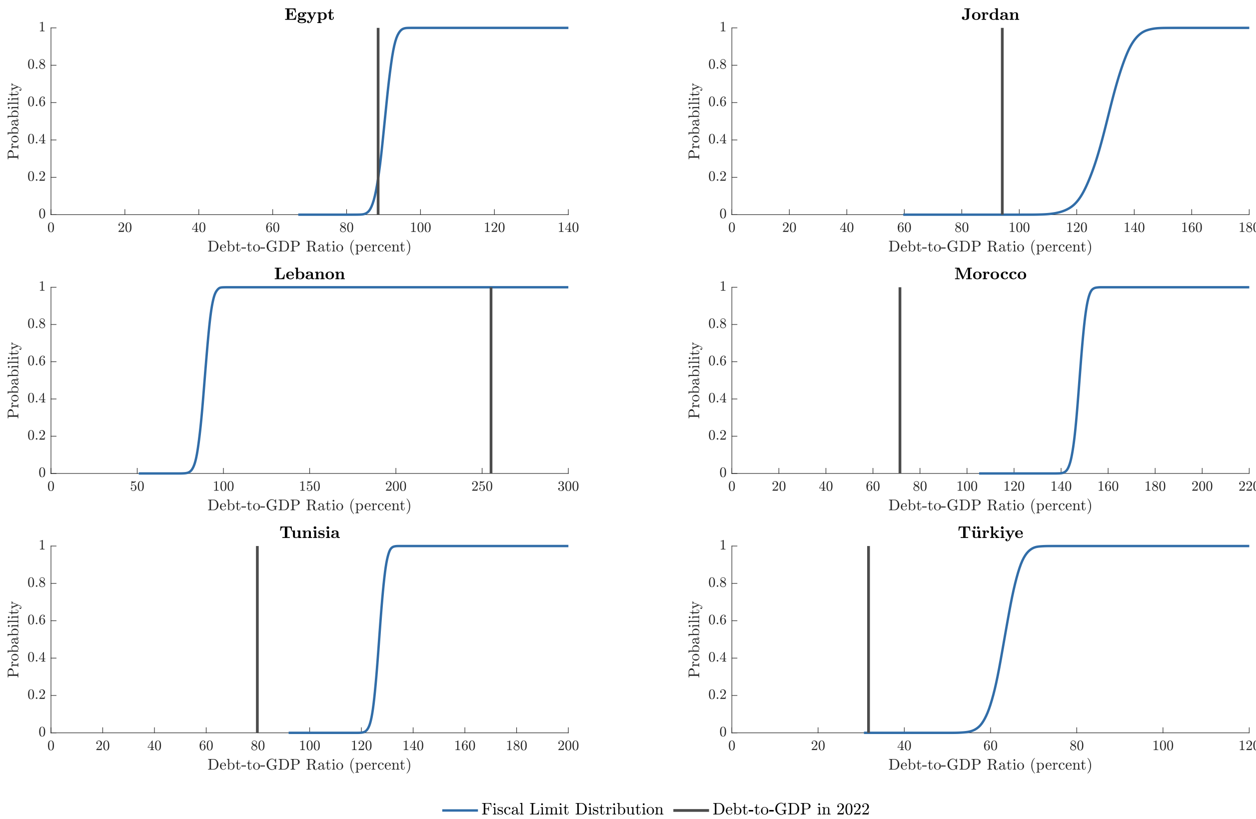
	G/Y	Z/Y	OR/Y	τ	μ^Z	β	ρ^A	σ^A	ρ^G	σ^G	ρ^{OR}	σ^{OR}
Non-Oil-Exporting MENA Countries												
Egypt	0.189	0.109		0.229	1.030	0.903	0.520	0.028	0.091	0.043		
Jordan	0.259	0.075		0.295	1.026	0.929	0.783	0.046	0.173	0.062		
Lebanon	0.213	0.098		0.219	1.023	0.911	0.523	0.045	0.231	0.056		
Morocco	0.204	0.078		0.231	1.034	0.925	0.385	0.033	0.561	0.054		
Tunisia	0.225	0.066		0.227	1.020	0.919	0.553	0.032	0.426	0.033		
Türkiye	0.235	0.114		0.311	1.016	0.883	0.459	0.031	0.562	0.079		
Oil-Exporting MENA Countries												
Bahrain	0.238	0.056	0.213	0.028	1.022	0.918	0.452	0.048	0.049	0.085	0.258	0.194
Kuwait	0.327	0.115	0.492	0.010	1.016	0.935	0.697	0.051	0.085	0.093	0.333	0.158
Oman	0.328	0.031	0.320	0.046	1.032	0.934	0.463	0.048	0.450	0.079	0.262	0.155
Qatar	0.313	0.063	0.225	0.196	1.003	0.932	0.630	0.043	0.409	0.133	0.363	0.175
Saudi Arabia	0.300	0.037	0.287	0.049	1.013	0.943	0.697	0.067	0.257	0.081	0.338	0.180
United Arab Emirates	0.212	0.051	0.301	0.004	1.014	0.949	0.668	0.060	0.436	0.106	0.333	0.204

3.3 Estimated Fiscal Limits and Fiscal Space

In the baseline case, I abstract from stochastic variations in government transfers by setting $Z_t = Z$ and simulate the state-dependent distributions of fiscal limits using the MCMC method outlined earlier. Figure 2 and Figure 3 present the cumulative density functions (CDFs) of the fiscal limits for non-oil- and oil-exporting MENA economies, respectively. These CDFs illustrate the probability of sovereign default at different debt levels, assuming that the average levels of productivity and government purchases prevail. Each country's actual debt-to-output ratio for 2020 is also plotted to provide a visual comparison between the actual debt levels and the estimated debt thresholds. Table 2 presents the estimated fiscal space for both non-oil- and oil-exporting MENA economies. The fiscal space, calculated as the difference between each country's fiscal limit and its actual debt-to-output ratio, indicates the room available before a country reaches its estimated debt threshold. Here, I report the fiscal space available to each country conditional on 5% and 20% percent default probabilities.

Starting with non-oil exporting MENA countries, one can directly observe that the fiscal space varies widely across these countries, reflecting differences in their tax structures, government purchases and interest rates. Egypt's 2022 debt-to-output ratio edges

Figure 2: Baseline Distributions of Fiscal Limits for Non-Oil-Exporting MENA Economies

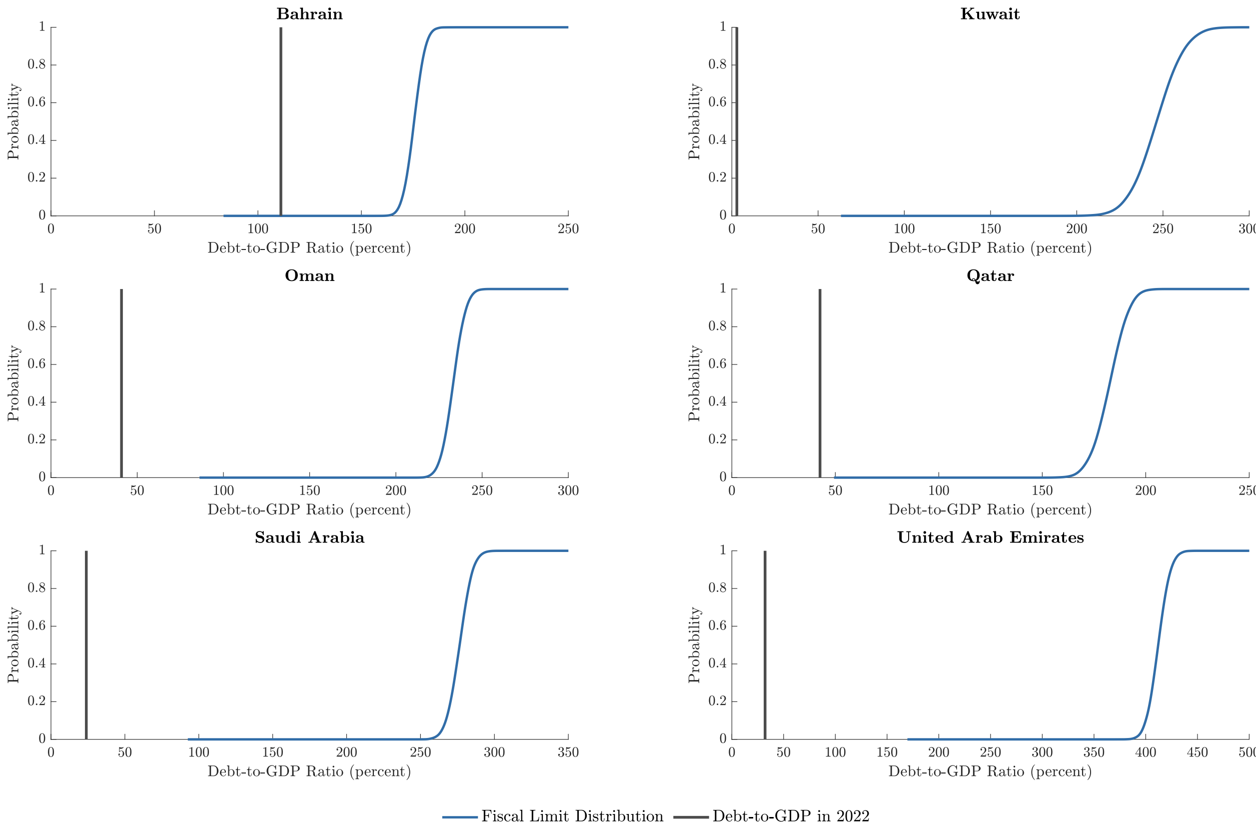


Note: Each entry plots the state-dependent cumulative density functions of the fiscal limit as a percentage of steady-state output assuming average level of productivity and government purchases prevails (blue curve) and the actual debt-to-output ratio in 2022 (grey line).

very close to its estimated fiscal limit (86.9% at 5% default probability). This suggests that Egypt has very limited room for issuing further debt without compromising its fiscal stability. Compared to Egypt, Jordan has a larger fiscal space: the 2022 debt-to-output ratio stood at 94.1% and fiscal limit is estimated at 118.9% at 5% default probability. This gives Jordan a fiscal space that is just short of 25 percentage points of its GDP.

Among the non-oil-exporting MENA countries, Lebanon stands out with an exceptionally high debt-to-output ratio, which, in 2022, far exceeded its sustainable fiscal limits of 83.1% and 86.2% at 5% and 20% default probabilities, respectively. Having already defaulted on its sovereign debt, Lebanon's fiscal space is effectively negative and its debt-to-output ratio needs to be reduced to roughly a third of its current level. Lebanon's fiscal position has been worsened by political instability, the contraction of the economy, and rising government transfers. As such, there is a dire need for restructuring in Lebanon to

Figure 3: Baseline Distributions of Fiscal Limits for Oil-Exporting MENA Economies



Note: Each entry plots the state-dependent cumulative density functions of the fiscal limit as a percentage of steady-state output assuming average level of productivity and government purchases prevails (blue curve) and the actual debt-to-output ratio in 2022 (grey line).

bring the sovereign debt level below the estimated threshold. Morocco, on the contrary, is in a better fiscal position with its 2022 debt-to-output ratio at 71.5% and fiscal limits around 140.3% and 143.5% at 5% and 20% default probabilities, respectively. Morocco's fiscal space is above 70 percentage points of its GDP which indicates good debt sustainability given its relatively restrained public spending and sound tax base.

Tunisia's debt-to-output ratio stood at 79.78% in 2022 and its estimated fiscal limit is around 143.67% at 5% default probability, translating into a fiscal space of approximately 44 percentage points of its GDP. While this fiscal buffer offers some protection against immediate default risk, Tunisia's economic vulnerabilities and rising levels of sovereign debt may hinder fiscal sustainability. Similarly, Türkiye's fiscal position appears relatively sustainable, with a 2022 debt-to-GDP ratio of 31.7% and estimated fiscal limits at 58.1%, and 60.4% for both 5% and 20% probabilities of default, respectively. This gives Türkiye 26-28

Table 2: Baseline Fiscal Space in MENA Economies

	Actual Debt-to-GDP	Fiscal Limit		Fiscal Space	
	(2022)	5% Default	20% Default	5% Default	20% Default
Non-Oil-Exporting MENA Countries					
Egypt	88.53	86.98	88.45	-1.55	-0.08
Jordan	94.09	118.90	124.61	24.81	30.52
Lebanon	255.18	83.05	86.16	-172.13	-169.02
Morocco	71.48	143.67	145.87	72.19	74.39
Tunisia	79.78	123.40	124.96	43.62	45.18
Türkiye	31.70	58.09	60.43	26.39	28.73
Oil-Exporting MENA Countries					
Bahrain	111.10	168.09	171.97	56.99	60.87
Kuwait	2.90	224.49	235.24	221.59	232.34
Oman	40.90	223.12	228.26	182.22	187.36
Qatar	42.60	169.28	176.17	126.68	133.57
Saudi Arabia	23.90	264.69	270.40	240.79	246.50
United Arab Emirates	32.10	396.41	403.95	364.31	371.85

Note: Fiscal space, defined as the difference between a country's fiscal limit and its actual debt-to-GDP ratio, is shown under two default probabilities: 5% and 20%. Values are presented as percentages of GDP.

percentage points of fiscal space and suggests manageable risk of default under current conditions. However, maintaining this buffer will require prudent debt management as Türkiye's fiscal limit is relatively low compared with other countries, reflecting high debt servicing costs due to elevated real interest rate.

Turning to oil-exporting MENA countries, the fiscal space is generally larger with oil revenues providing a buffer against default risk,. However, as shown in the next section, that, in turn, increases vulnerability to fluctuations in oil prices. Bahrain's fiscal space is lower than that of other oil-exporting economies, as its oil revenues are smaller, averaging 21% of GDP while those for some other oil-exporting countries typically range between 30% and 50% of GDP. Bahrain's 2022 debt-to-output ratio stood at 111.1%, and its estimated fiscal limit is around 168.1% for a 5% default probability. The estimated fiscal space for Kuwait is much larger and stands at about 222 percentage points of its GDP. Through conservative fiscal policies and large oil revenues, Kuwait has recorded a very low debt-to-output ratio of only 2.90% in 2022.

Both Oman and Qatar have substantial fiscal space. Oman recorded a 40.9% debt-to-output ratio in 2022 and its estimated fiscal space stands at around 181 percentage points of its GDP. Similarly, Qatar, with a 2022 debt-to-output ratio of 42.6%, has an estimated fiscal limit of around 169.3% at a 5% default probability. However, it is important to note that both countries depend heavily on oil revenues for financing their fiscal spending. This highlights the importance of diversifying their economies to ensure long-term fiscal sustainability and reduce their exposure to commodity price fluctuations.

Saudi Arabia has ample fiscal space as its 2022 debt-to-output ratio stood at 23.9%, with fiscal limits standing at 264.7% at 5% default probability. Another country that stands very close in terms of fiscal resilience is the United Arab Emirates with a 2022 debt-to-output ratio of 32.10% while its estimated fiscal limit is 403.9% at 5% default probability. Saudi Arabia and United Arab Emirates' fiscal strength reflects their oil wealth and prudent fiscal management and both countries succeeded at maintaining low and sustainable debt-to-output levels.

4 Shocks to Debt Sustainability

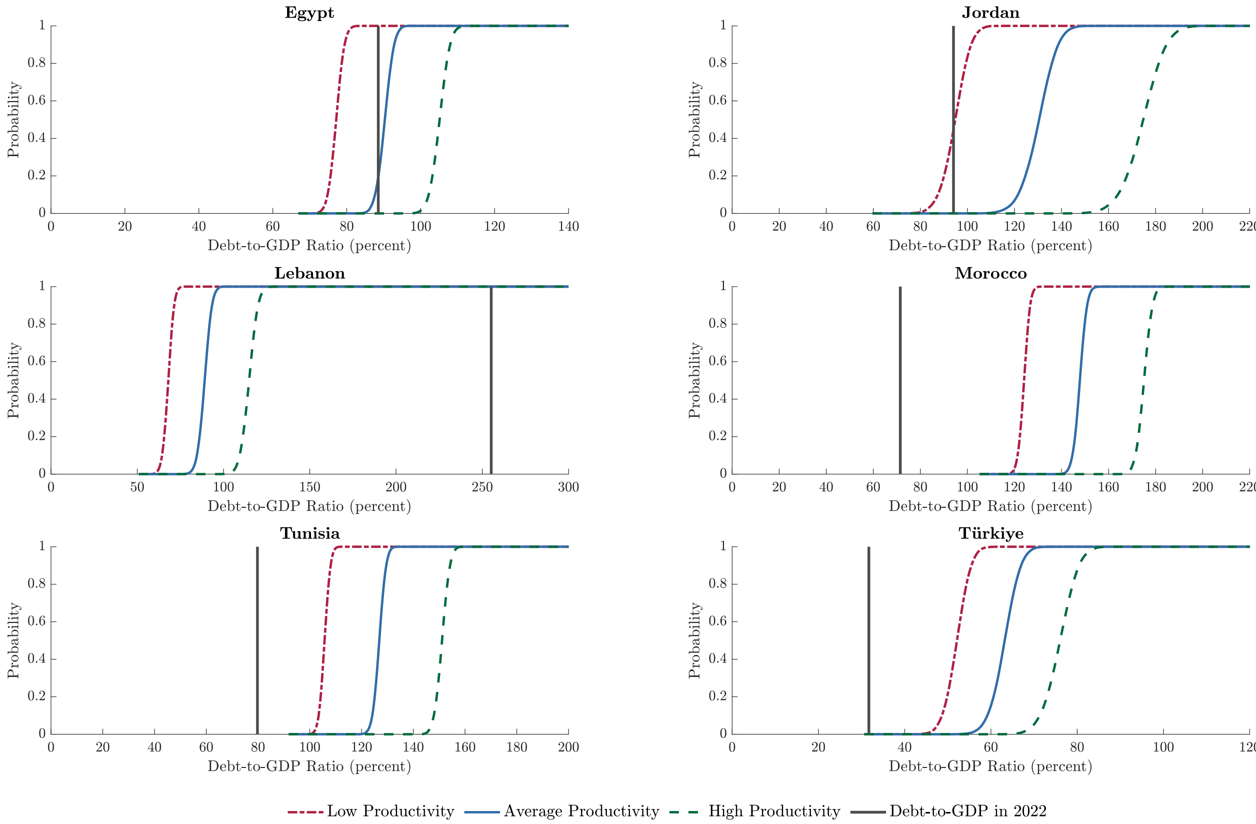
In this section, I analyze how shocks to productivity, government purchases and oil revenues affect fiscal sustainability across MENA economies.

4.1 Shocks to Productivity

Changes in economic conditions can shift an economy's Laffer curve. For instance, higher productivity increases the tax base and raises the maximum revenue the government collects which translates into an increase in the fiscal limit. Similarly, the maximum tax revenues decrease with lower production, translating into a leftward shift in the fiscal limit distribution. Here, I assess how shocks to productivity influence debt sustainability in the economies under study. Figure 4 and Figure 5 plot the state-dependent fiscal limit distributions under different productivity levels for the non-oil- and oil-exporting MENA economies, respectively. Table 3 presents the estimated fiscal space conditional on a 5% default probability for these economies at low and high productivity levels.

For non-oil-exporting MENA economies, the size of the productivity shock varies in the range of 2.8%-4.5% (see Table 1). Negative productivity shocks can reduce the fiscal space considerably and thus pose risks to public debt sustainability, particularly for countries with high debt-to-output ratios. For instance, consistently low productivity levels in Egypt and Jordan would imply negative fiscal spaces – specifically, -14.3% for Egypt and

Figure 4: Fiscal Limits for Non-Oil-Exporting MENA Economies with Productivity Shocks

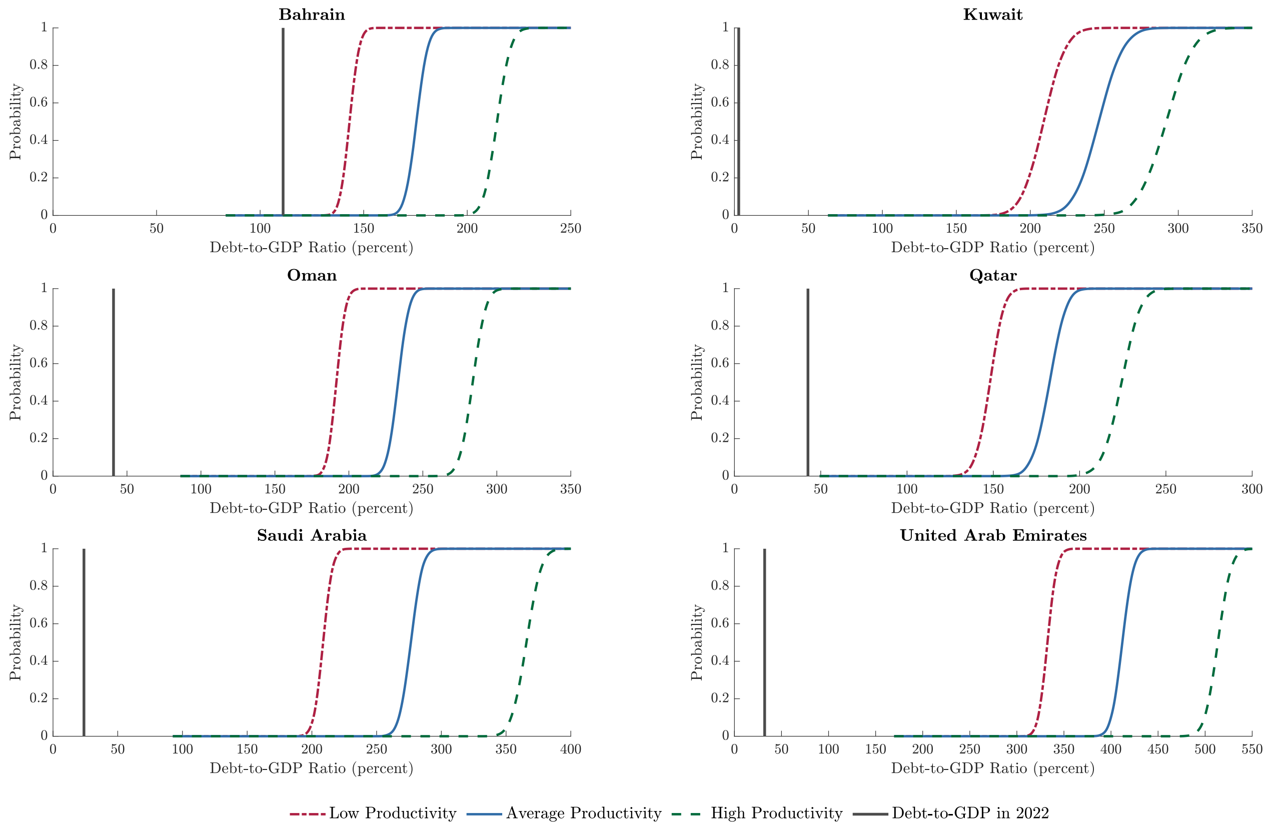


Note: Each entry plots the state-dependent cumulative density functions of the fiscal limit as a percentage of steady-state output under different productivity levels and the actual debt-to-output ratio in 2022 (grey line).

-8.9% for Jordan – relative to their their actual debt-to-output ratios in 2022. Under sustained negative productivity shocks, Egypt's probability of default rises to 100%, up from 30% default probability at average productivity levels. Similarly, Jordan's 2022 debt-to-output ratio implies an estimated risk of default of around 40% at low levels of productivity, compared with a zero default probability at average productivity levels. This shows that Egypt and Jordan's debt sustainability is highly vulnerable to economic downturns.

For Lebanon, the exceptionally high debt-to-output ratio, implies the country remains constrained and its current debt level unsustainable even with consistently high productivity levels. Positive productivity shocks increase Lebanon's fiscal limit to 107.7% which is still considerably lower than its actual debt-to-output ratio. This highlights a clear case for debt restructuring in Lebanon along with the need for substanatial gains in productivity to get close to a path of sustainable debt.

Figure 5: Fiscal Limits for Oil-Exporting MENA Economies with Productivity Shocks



Note: Each entry plots the state-dependent cumulative density functions of the fiscal limit as a percentage of steady-state output under different productivity levels and the actual debt-to-output ratio in 2022 (grey line).

Morocco, Tunisia and Türkiye are susceptible to shocks in productivity and display different degrees of fiscal resilience. Despite a debt-to-GDP ratio of 71.5%, Morocco has solid fiscal space which ranges from 49.0% under low productivity levels to 98.8% under high productivity levels. Tunisia displays moderate sensitivity to shifts in productivity, with negative productivity shocks potentially reducing its fiscal space to 23 percentage points of its GDP and jeopardizing its fiscal sustainability if debt growth is not managed. Türkiye's fiscal space varies between 15.8% to 38.1% under different levels of productivity.

For oil-exporting MENA economies, the size of the productivity shock varies in the range of 4.3%-6.7% (see Table 1). Although the size of productivity shocks is larger than in their non-oil exporting peers, oil-exporting economies' significant fiscal space supported by oil revenues suggests that they are quite resilient against productivity shocks. One exception is Bahrain which displays more constrained fiscal space than the other oil-

Table 3: Fiscal Space in MENA Economies with Productivity Shocks

	Actual Debt-to-GDP (2022)	Fiscal Limit		Fiscal Space	
		Low A	High A	Low A	High A
Non-Oil-Exporting MENA Countries					
Egypt	88.53	74.21	101.34	-14.32	12.81
Jordan	94.09	85.21	160.41	-8.88	66.32
Lebanon	255.18	63.39	107.66	-191.79	-147.52
Morocco	71.48	120.50	170.26	49.02	98.78
Tunisia	79.78	102.82	147.10	23.04	67.32
Türkiye	31.70	47.50	69.75	15.80	38.05
Oil-Exporting MENA Countries					
Bahrain	111.10	137.05	206.24	25.95	95.14
Kuwait	2.90	189.56	267.48	186.66	264.58
Oman	40.90	183.24	272.00	142.34	231.10
Qatar	42.60	136.89	209.25	94.29	166.65
Saudi Arabia	23.90	198.64	350.42	174.74	326.52
United Arab Emirates	32.10	319.39	494.97	287.29	462.87

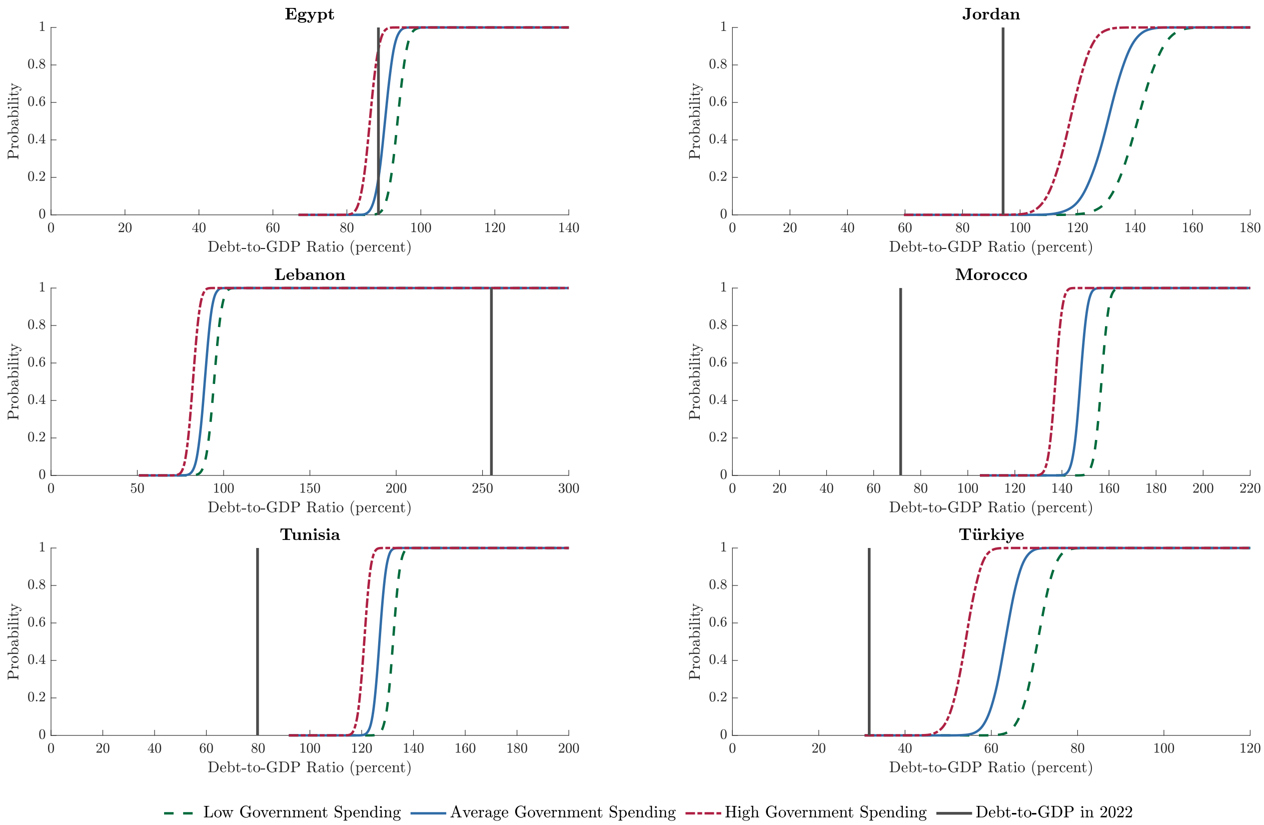
Note: Fiscal space, defined as the difference between a country's fiscal limit and its actual debt-to-GDP ratio, is shown under a 5% default probability for low and high productivity levels. Values are presented as percentages of GDP.

exporting countries, where consistent negative productivity shocks are estimated to reduce its fiscal limit to 137.1%, only 26 percentage points above its 2022 debt-to-output ratio. Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates demonstrate robust fiscal space, which in essence reflects their strong oil revenue base. However, as shown below, shocks to oil revenues – either decline in oil productivity or fall is oil prices – would reduce the available fiscal space significantly.

4.2 Shocks to Government Purchases

Changes in the level of government purchases also influence an economy's fiscal limit. When the government increases its purchases without a corresponding rise in revenues, its fiscal surplus falls at each period and, therefore, significantly decreasing the fiscal limit. Conversely, when government purchases are reduced, governments can sustain higher debt levels without hitting the fiscal limit, as lower spending increases future fiscal surplus. Figure 6 and Figure 7 plot the state-dependent fiscal limit distributions under different levels of government purchases for non-oil- and oil-exporting MENA economies, respectively. The estimated fiscal space conditional on a 5% default probability for these economies at low and high levels of government purchases is shown in Table 4.

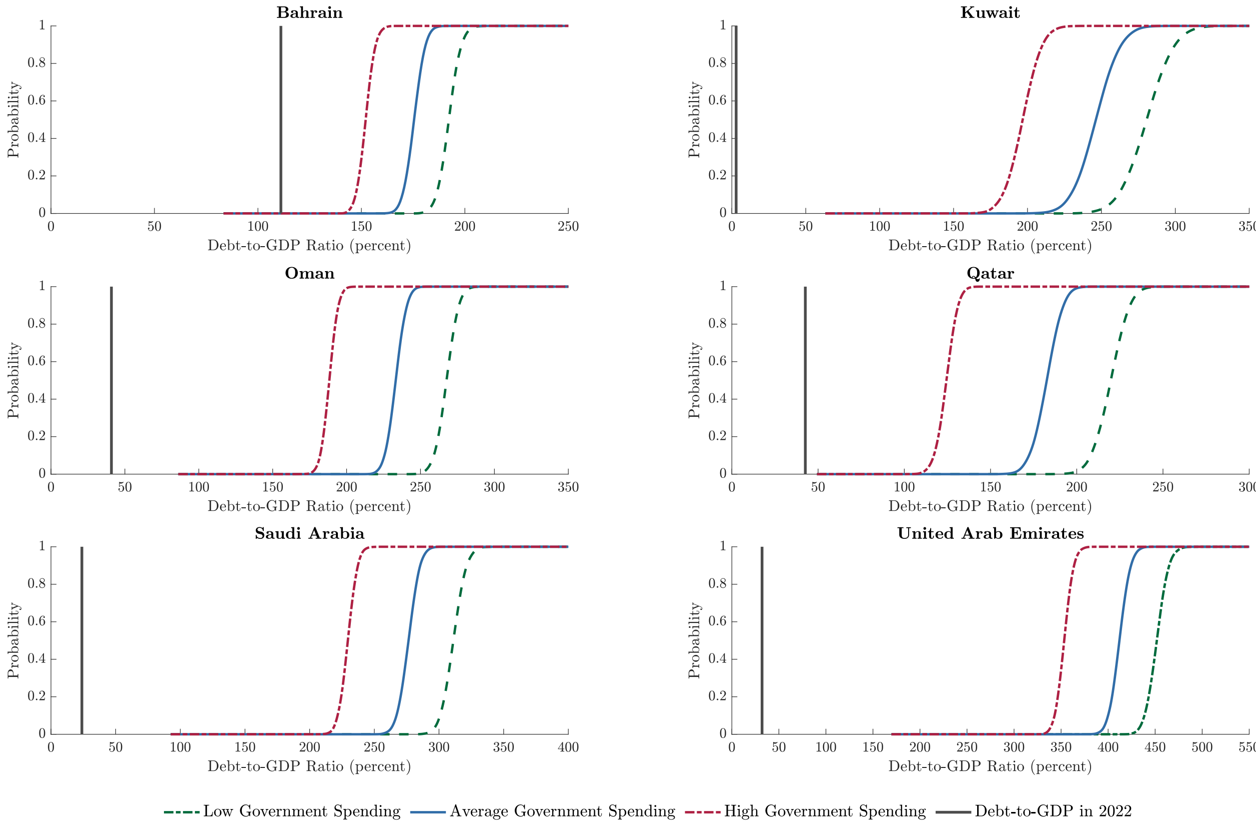
Figure 6: Fiscal Limits for Non-Oil-Exporting MENA Economies with Government Purchases Shocks



Note: Each entry plots the state-dependent cumulative density functions of the fiscal limit as a percentage of steady-state output under different government purchases levels and the actual debt-to-output ratio in 2022 (grey line).

Among non-oil-exporting MENA economies, Türkiye and Jordan exhibit the highest calibrated variance in the government purchases shock. This variance suggests that while a negative shock to government spending would expand the fiscal limit, positive shocks substantially reduce fiscal space. Specifically, for Jordan, the fiscal space drops from 24.8% in the baseline scenario to 13.1% under high government purchases, while for Türkiye, it declines from 26.4% to 17.1%. In Egypt, a positive spending shock poses a significant risk to debt sustainability, as fiscal space falls to -5.6% under high government spending. This decline reflects Egypt's already limited fiscal space in the baseline scenario, which makes its fiscal stability vulnerable to increased government expenditures. These results emphasize the importance of spending adjustments in preserving fiscal health in these

Figure 7: Fiscal Limits for Oil-Exporting MENA Economies with Government Purchases Shocks



Note: Each entry plots the state-dependent cumulative density functions of the fiscal limit as a percentage of steady-state output under different government purchases levels and the actual debt-to-output ratio in 2022 (grey line).

economies.

Oil-exporting MENA economies face even larger shocks to government purchases with the shock size varying in the range 8% - 13%. Consequently, their fiscal limit varies considerably with shocks to government spending levels. For instance, Qatar's fiscal limit is reduced from 205% under low government purchases to 115% under high government purchases, while Oman's fiscal limit varies from 257% when government purchases are maintained at a low level to 180% when government spending is high. Kuwait is also characterized by a high variance in government spending which translates into a fiscal limit that falls from 255% under low government purchases to 179% under high government purchases. This reveals that even oil-exporting economies can face potential risks from persistently high spending, particularly if oil revenues fluctuate.

Table 4: Fiscal Space in MENA Economies with Government Purchases Shocks

	Actual Debt-to-GDP (2022)	Fiscal Limit		Fiscal Space	
		Low G	High G	Low G	High G
Non-Oil-Exporting MENA Countries					
Egypt	88.53	90.26	82.96	1.73	-5.57
Jordan	94.09	128.83	107.17	34.74	13.08
Lebanon	255.18	88.33	76.79	-166.85	-178.39
Morocco	71.48	152.45	133.19	80.97	61.71
Tunisia	79.78	128.35	117.40	48.57	37.62
Türkiye	31.70	65.36	48.84	33.66	17.14
Oil-Exporting MENA Countries					
Bahrain	111.10	184.25	146.11	73.15	35.01
Kuwait	2.90	255.39	178.81	252.49	175.91
Oman	40.90	256.56	180.03	215.66	139.13
Qatar	42.60	205.11	114.83	162.51	72.23
Saudi Arabia	23.90	297.71	219.60	273.81	195.70
United Arab Emirates	32.10	435.19	339.86	403.09	307.76

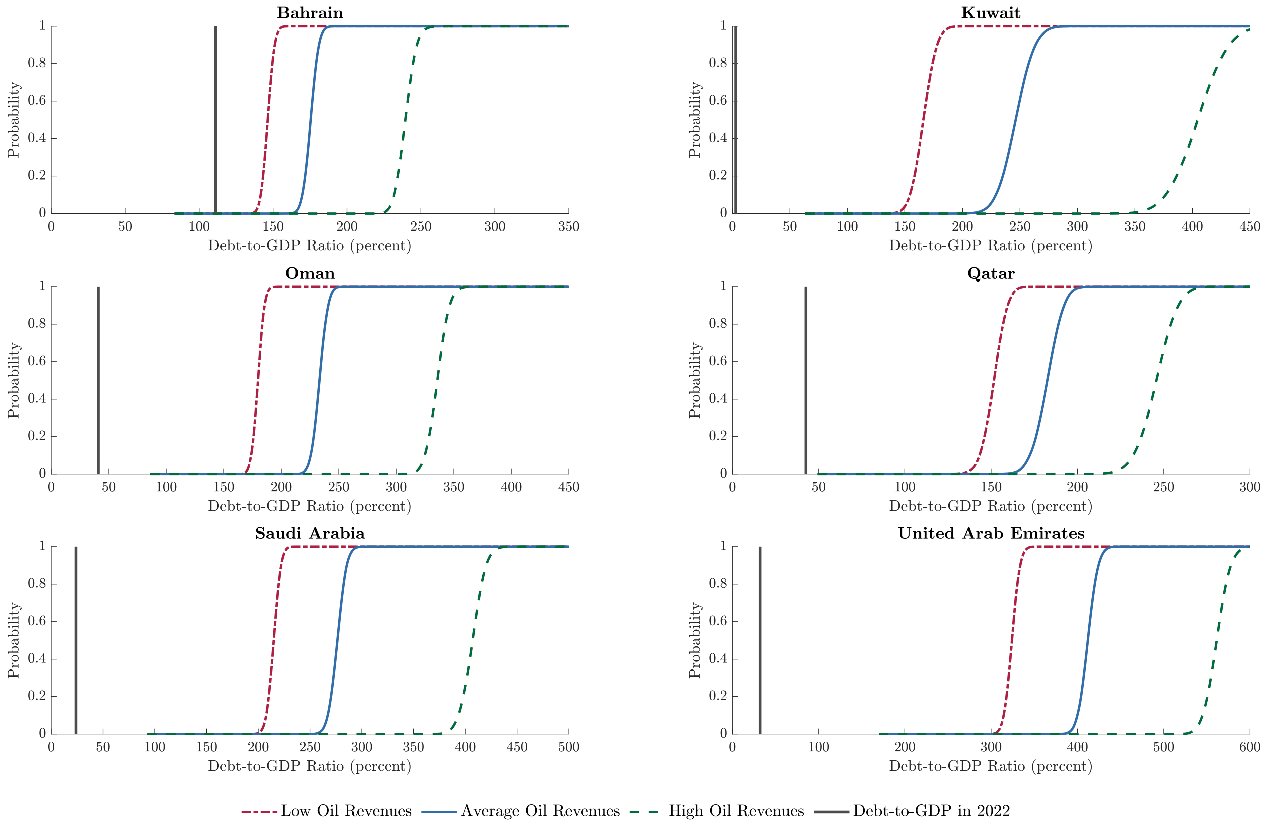
Note: Fiscal space, defined as the difference between a country's fiscal limit and its actual debt-to-GDP ratio, is shown under a 5% default probability for low and high government purchases levels. Values are presented as percentages of GDP.

4.3 Shocks to Oil Revenues

In oil-exporting economies, shocks to oil revenues constitute an additional and major source of variation in their fiscal limits, as these economies depend heavily on oil income to sustain their fiscal positions. Figure 8 plots the state-dependent fiscal limit distributions under different levels of oil revenues for oil-exporting MENA economies and Table 5 shows the impact of low and high oil revenues on the fiscal space for each economy conditional on a 5% default probability.

Oil revenue shocks are driven by fluctuations in both the price of oil and the quantity of oil produced. The estimated size of the oil revenue shock varies in the range of 15%-20% which makes the fiscal state of oil-exporting MENA economies highly exposed to changes in energy market conditions. Bahrain, which starts off with a higher level of actual debt, would experience a reduction in its fiscal space to 29.3% only in a low oil revenues scenario. In Saudi Arabia the fiscal limit ranges from 205% of GDP under a low oil revenue scenario to 389% GDP under a high oil revenue scenario. Kuwait and the United Arab Emirates' fiscal limits are also highly sensitive to generated oil revenues. When the shock to oil revenues is positive, the fiscal limit reaches 369% of GDP for Kuwait and 594% of

Figure 8: Fiscal Limits for Oil-Exporting MENA Economies with Oil Revenue Shocks



Note: Each entry plots the state-dependent cumulative density functions of the fiscal limit as a percentage of steady-state output under different oil revenue levels and the actual debt-to-output ratio in 2022 (grey line).

GDP for the United Arab Emirates. Conversely, negative shocks to oil revenues reduces the fiscal limit to 151% in Kuwait and 312% in the United Arab Emirates. As such, oil-exporting economies heavily rely on revenues from oil exports for sustaining large fiscal buffers which makes their fiscal stability tied to the dynamics of the global energy market.

Table 5: Fiscal Space in MENA Economies with Oil Revenue Shocks

	Actual Debt-to-GDP	Fiscal Limit		Fiscal Space	
	(2022)	Low *OR*	High *OR*	Low *OR*	High *OR*
Bahrain	111.10	140.29	229.51	29.19	118.41
Kuwait	2.90	151.27	368.92	148.37	366.02
Oman	40.90	172.31	321.52	131.41	280.62
Qatar	42.60	141.02	227.85	98.42	185.25
Saudi Arabia	23.90	205.63	389.16	181.73	365.26
United Arab Emirates	32.10	311.85	594.61	279.75	562.51

Note: Fiscal space, defined as the difference between a country's fiscal limit and its actual debt-to-GDP ratio, is shown under a 5% default probability for low and high oil revenue levels. Values are presented as percentages of GDP.

5 Alternative Distributions of Fiscal Limits

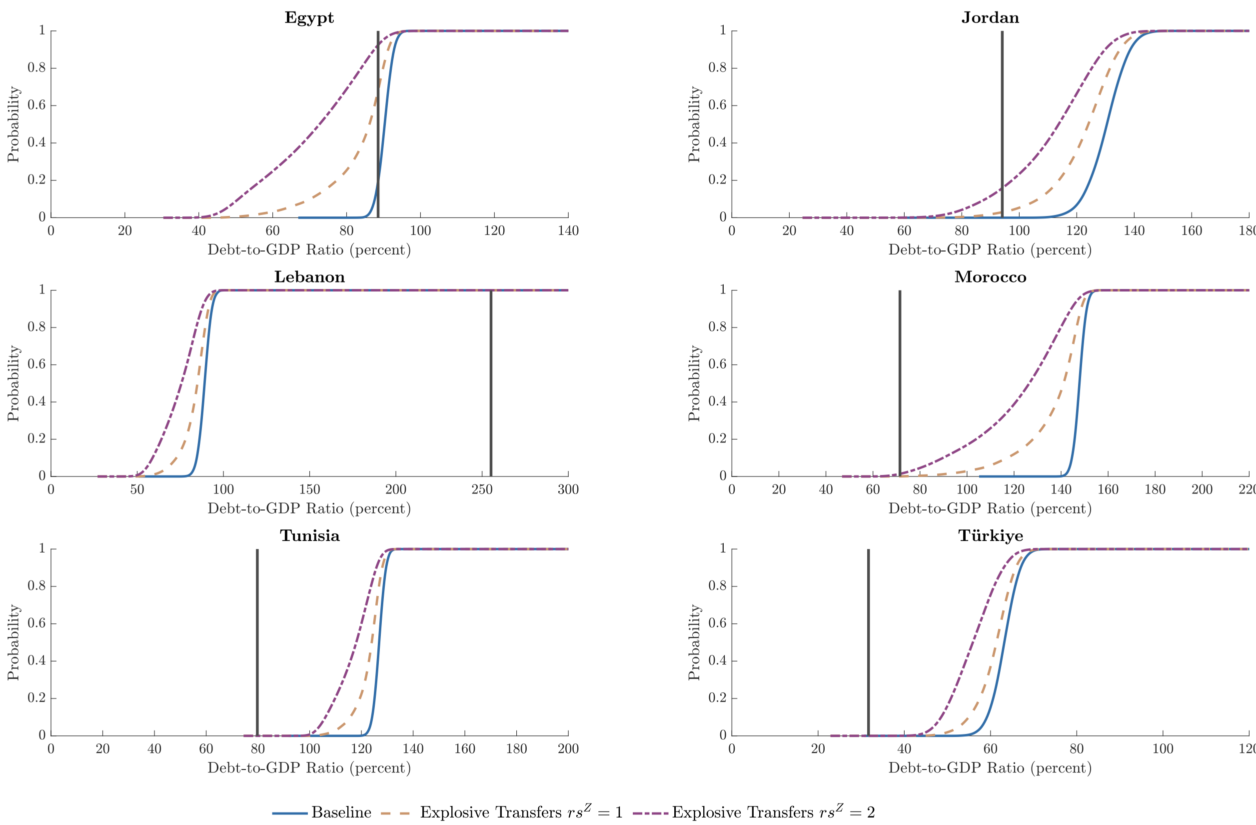
The distribution of the fiscal limits depends on the underlying macroeconomic fundamentals. Here, I examine how the distribution changes under two alternative specifications of the model: explosive government transfers and a lower maximum tax rate.

5.1 Explosive Government Transfers

The baseline specification abstracts from stochastic variation in government transfers and assumes that these transfers are fixed at their steady-state level. Now I explore the impact of potentially explosive transfers.

In this specification, lump-sum transfers follow the Markov regime-switching process specified in Equation (10), with one regime being stationary while the other explosive. Forward-looking agents may still purchase government debt even with growing transfers if they expect the regime to revert to a stable one in the near future. However, if transfers stay in the explosive regime for long, the government's fiscal surpluses are reduced for extended periods, resulting in a lower fiscal limit. This is especially true in countries where government transfers constitute a bigger portion of fiscal spending and so they face a significantly higher default probability when transfers are non-stationary. Figure 9 and Figure 10 plot the state-dependent fiscal limit distributions for non-oil-exporting and oil-exporting MENA economies, respectively, under three specifications: (i) the baseline specification where government transfers are assumed to be fixed, (ii) the specification with explosive transfers when the current transfers are in the stationary regime, and (iii) the

Figure 9: Fiscal Limits for Non-Oil-Exporting MENA Economies with Explosive Government Transfers

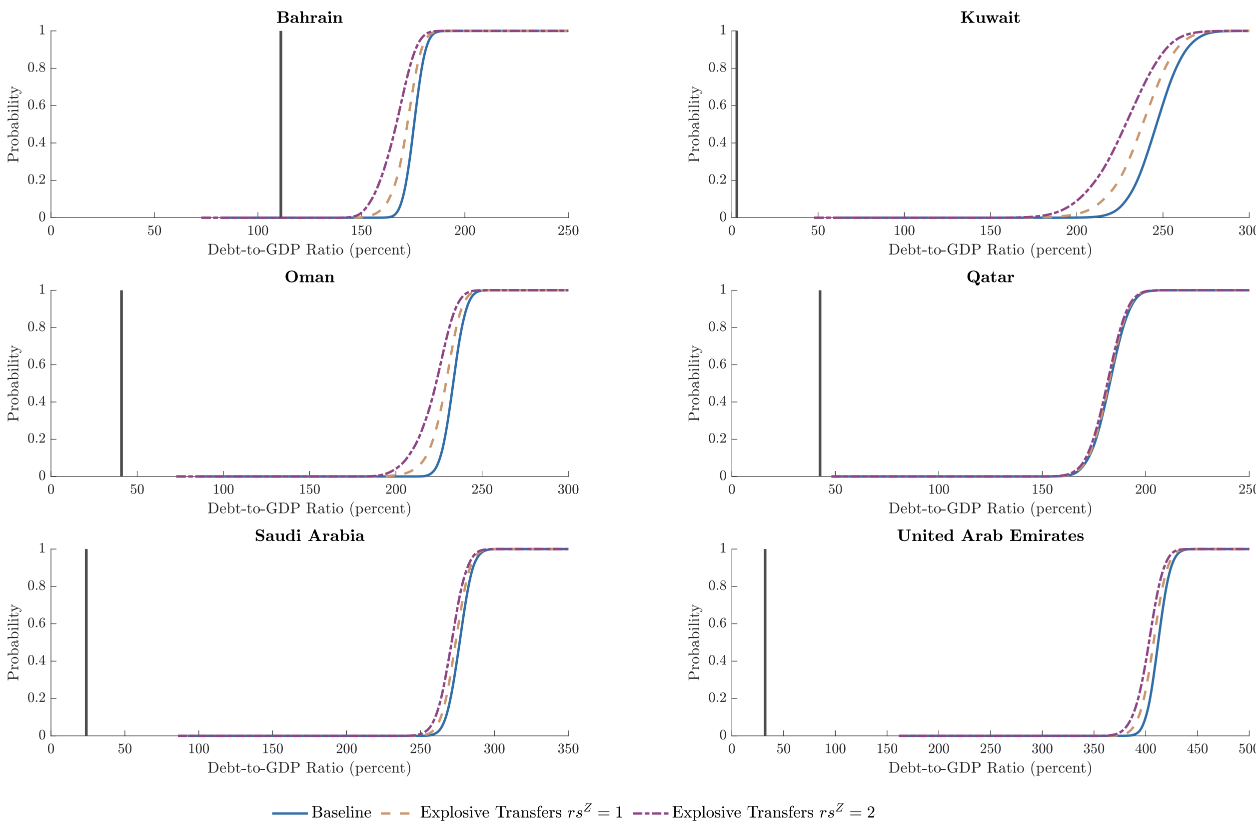


Note: Each entry plots the state-dependent cumulative density functions of the fiscal limit as a percent of steady-state output. The plots compare three scenarios: the baseline case, the case with explosive transfers under a stationary regime for current transfers, and the case with explosive transfers under a non-stationary regime for current transfers.

specification with explosive transfers when the current transfers are in the non-stationary regime. Table 6 also shows the estimated fiscal space conditional on a 5% default probability for these economies under the three specifications.

In general, when current transfers are in the stationary regime, the fiscal limit distribution exhibits flatter tails compared to the baseline specification. This occurs because even when in the stationary regime, there is a possibility – guided by the regime persistence parameter p_1^Z – that transfers may transition to the non-stationary regime in the future. Such a switch implies that future surpluses may be significantly lower than those in the baseline. The tails of the fiscal limit distribution are even flatter when current transfers are in the non-stationary regime, reflecting that the government is more constrained in its ability to service its debt. The parameter governing transfer growth, μ^Z also affects

Figure 10: Fiscal Limits for Oil-Exporting MENA Economies with Explosive Government Transfers



Note: Each entry plots the state-dependent cumulative density functions of the fiscal limit as a percent of steady-state output. The plots compare three scenarios: the baseline case, the case with explosive transfers under a stationary regime for current transfers, and the case with explosive transfers under a non-stationary regime for current transfers.

the fiscal limit distribution, with the fiscal limit being lower the higher the growth rate of transfers growth when in the non-stationary regime.

Among non-oil-exporting economies, Egypt, Jordan and Morocco stand out due to the size of government transfers as a share of GDP and their estimated growth rates. In Egypt, estimated steady-state lump-sum transfers account for 11% of GDP and grow at an estimated average annual growth rate of 3%. Consequently, the fiscal limit in Egypt under a 5% default probability is significantly reduced from 86.9% of GDP in the baseline specification to 63.5% in the explosive regime when current transfers are stationary, and further to 47.6% when current transfers are non-stationary. In Jordan, government transfers represent 7.5% of GDP, with an average annual growth rate of 2.6%. While current sovereign debt is sustainable under the baseline scenario with fixed government transfers, debt sus-

Table 6: Fiscal Space in MENA Economies with Explosive Government Transfers

	Actual Debt-to-GDP	Fiscal Limit			Fiscal Space		
	(2022)	Baseline	$rs^Z = 1$	$rs^Z = 2$	Baseline	$rs^Z = 1$	$rs^Z = 2$
Non-Oil-Exporting MENA Countries							
Egypt	88.53	86.98	63.48	47.62	-1.55	-25.05	-40.91
Jordan	94.09	118.90	99.39	81.46	24.81	5.30	-12.63
Lebanon	255.18	83.05	68.01	55.71	-172.13	-187.17	-199.47
Morocco	71.48	143.67	107.69	80.76	72.19	36.21	9.28
Tunisia	79.78	123.40	112.29	103.83	43.62	32.51	24.05
Türkiye	31.70	58.09	52.70	46.81	26.39	21.00	15.11
Oil-Exporting MENA Countries							
Bahrain	111.10	168.09	160.33	152.14	56.99	49.23	41.04
Kuwait	2.90	224.49	208.66	193.67	221.59	205.76	190.77
Oman	40.90	223.12	212.36	201.30	182.22	171.46	160.40
Qatar	42.60	169.28	168.77	167.89	126.68	126.17	125.29
Saudi Arabia	23.90	264.69	260.83	256.90	240.79	236.93	233.00
United Arab Emirates	32.10	396.41	388.64	381.50	364.31	356.54	349.40

Note: Fiscal space, defined as the difference between a country's fiscal limit and its actual debt-to-GDP ratio, is shown under a 5% default probability. Values are presented as percentages of GDP.

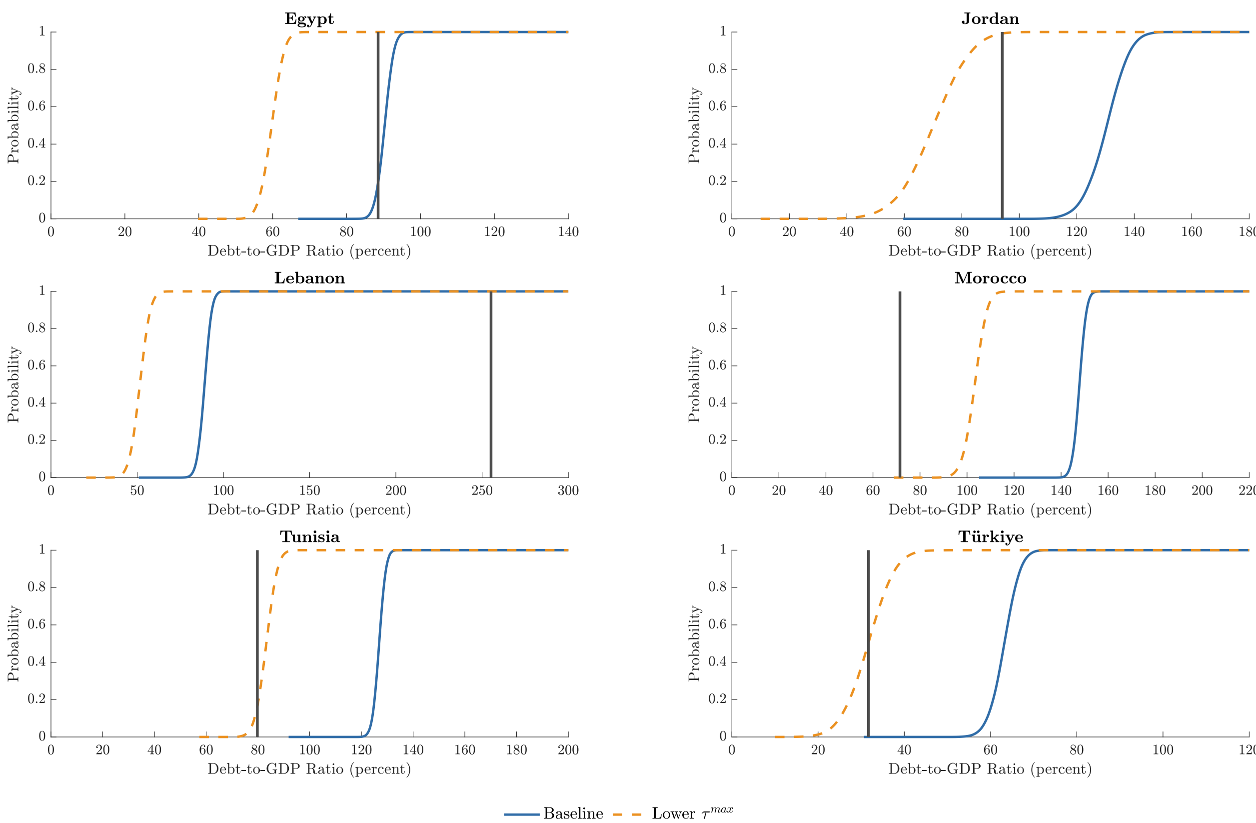
tainability becomes a concern in the explosive transfers scenario and the fiscal space falls to 5.3% of GDP when current transfers are stationary and to -12.6% when current transfers are non-stationary. For Morocco, lump-sum transfers are estimated to grow at an average annual rate of 3.4% reducing its fiscal space falls from 72.2% of GDP under the baseline scenario to just 9.3% when transfers are explosive. Since transfer growth is ultimately a policy decision, the governments of non-oil-exporting MENA counties should take proactive measures to address the growth in transfers to mitigate the risks on their debt sustainability.

Among oil-exporting economies, Kuwait exhibits the highest government transfers to output ratio at 11.5%, while Oman has the highest average annual growth rate of transfers at 3.2%. As a result, Kuwait's fiscal limit decreases from 224.5% of GDP under the baseline specification to 193.7% of GDP under the specification with explosive transfers. Similarly, Oman's fiscal limit falls from 223.1% to 201.3%. For other oil-exporting economies, lump-sum transfers constitute smaller fractions of GDP and grow at slower rates compared to non-oil-exporting economies. This positions them advantageously, particularly when combined with the revenue buffer from oil exports. Consequently, even under the specification with explosive transfers, the fiscal space for these economies is only modestly reduced and poses no significant threat to debt sustainability.

5.2 Lower Maximum Tax Rate

Raising tax rates does not guarantee an increase government revenues, as higher taxes can disincentivize households from supplying work. As such, a higher income tax rate reduces disposable income, which may lead to a decrease on labor supply, leading to an ambiguous impact on tax revenues. Typically, higher tax rates boost revenues when initial rates are low and reduce revenues when rates are high. This phenomenon is captured by the Laffer curve; an inverted U-shape relationship between tax rates and government revenues.

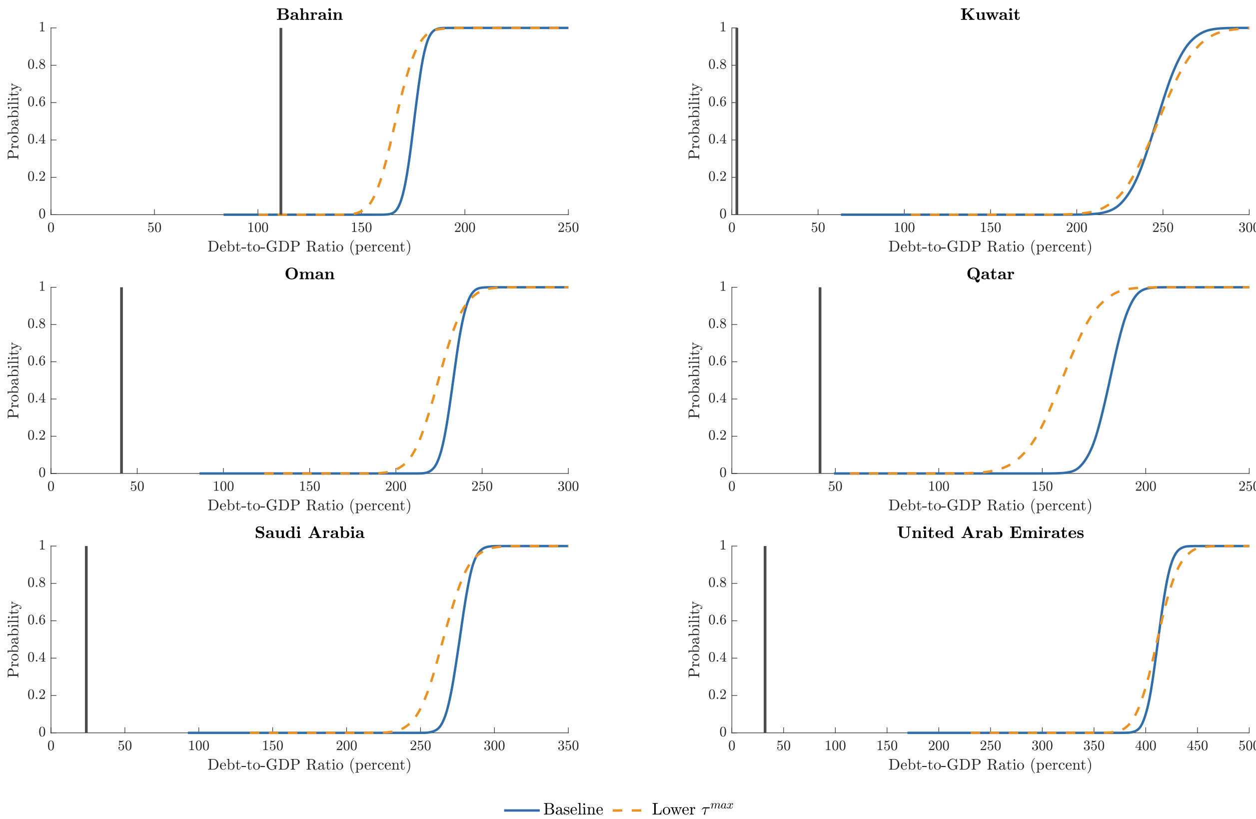
Figure 11: Fiscal Limits for Non-Oil-Exporting MENA Economies with Lower Maximum Tax Rate



Note: Each entry plots the state-dependent cumulative density functions of the fiscal limit as a percent of steady-state output. The plots compare two scenarios: the baseline case and the case with a lower maximum tax rate.

In calculating the fiscal limit in the baseline specification, I assume that the governments raise the tax rate to the peak of their Laffer curves. The estimated Laffer curves for the economies considered peak when the tax rate reached 60% - 70%. Achieving this

Figure 12: Fiscal Limits for Oil-Exporting MENA Economies with Lower Maximum Tax Rate



Note: Each entry plots the state-dependent cumulative density functions of the fiscal limit as a percent of steady-state output. The plots compare two scenarios: the baseline case and the case with a lower maximum tax rate.

range of tax rates would be politically challenging, if not infeasible, in the MENA countries considered where the average tax rate ranges between 5% and 30%. As such, the fiscal limits in the baseline specification likely overestimate the fiscal space available to these countries. Here, I assume that governments do not set the tax rate to the peak of the Laffer curve but instead fix the maximum tax rate at 45%. Figure 11 and Figure 12 plot the state-dependent fiscal limit distributions for non-oil-exporting and oil-exporting MENA economies, respectively, under two specifications: (i) the baseline specification where tax rates are set at the peak of the Laffer curve and (ii) the specification with a lower maximum tax rate of 45%. Table 7 also shows the estimated fiscal space conditional on a 5% default probability for these economies under the two specifications.

In non-oil-exporting MENA economies, reducing the maximum tax rate diminishes their fiscal limit significantly. For instance, the fiscal limit consistent with a 5% default

Table 7: Fiscal Space in MENA Economies with Lower Maximum Tax Rate

	Actual Debt-to-GDP (2022)	Fiscal Limit		Fiscal Space	
		Baseline	Lower τ^{max}	Baseline	Lower τ^{max}
Non-Oil-Exporting MENA Countries					
Egypt	88.53	86.98	55.11	-1.55	-33.42
Jordan	94.09	118.90	52.10	24.81	-41.99
Lebanon	255.18	83.05	43.55	-172.13	-211.63
Morocco	71.48	143.67	96.09	72.19	24.61
Tunisia	79.78	123.40	77.41	43.62	-2.37
Türkiye	31.70	58.09	23.07	26.39	-8.63
Non-Oil-Exporting MENA Countries					
Bahrain	111.10	168.09	153.48	56.99	42.38
Kuwait	2.90	224.49	218.10	221.59	215.20
Oman	40.90	223.12	204.71	182.22	163.81
Qatar	42.60	169.28	135.17	126.68	92.57
Saudi Arabia	23.90	264.69	242.86	240.79	218.96
United Arab Emirates	32.10	396.41	384.67	364.31	352.57

Note: Fiscal space, defined as the difference between a country's fiscal limit and its actual debt-to-GDP ratio, is shown under a 5% default probability. Values are presented as percentages of GDP.

probability drops from 86.9% to 55.1% in Egypt and from 118.9% to 52% in Jordan, rendering their actual debt levels unsustainable. The same is true for Tunisia and Türkiye which experience declines in their fiscal space to -2.4% and -8.6%, respectively. In contrast, Morocco benefits from a higher fiscal space in the baseline specification, so it is the only non-oil-exporting MENA economy that maintains a positive fiscal space of 24.6% when the maximum tax rate is lowered. These findings underscore the importance of sound fiscal management in non-oil-exporting MENA economies. Without the capacity to raise taxes, these economies must prioritize curbing government purchases and transfers to keep their debt sustainable.

In oil-exporting MENA economies, fiscal space is also reduced when the maximum tax rate is lowered. However, given that the bulk of government resources are generated through revenues from oil exports, these economies' fiscal limits don't fall considerably and their debt levels remain sustainable.

6 Conclusion

The unprecedented socio-economic and political shocks of the last decade have impacted fiscal sustainability in the MENA region. This paper estimates the county-specific distributions of fiscal limits for non-oil-exporting and oil-exporting economies in the MENA region. A non-linear DSGE model is employed and calibrated to each country's economic fundamentals, productivity, and fiscal policies. The findings reveal that non-oil-exporting MENA economies face tight fiscal spaces, highlighting the importance of fiscal reforms targeted at revenue generation and expenditure control in order to sustain their current debt levels. Specifically, for countries like Egypt and Lebanon, with unsustainable debt levels and limited or negative fiscal spaces, sovereign debt restructuring and fiscal discipline are essential. Meanwhile, oil-exporting MENA economies possess substantial fiscal buffers, mainly due to oil revenues. However, these large fiscal limits come with an inherent exposure to volatility in oil prices. As such, these economies should prioritize economic diversification away from oil to ensure non-oil revenue sources than could help mitigate the negative impact of commodity price shocks on fiscal balances.

There are questions that I leave for future research. First, the model does not distinguish between debt denominated in foreign and domestic currency. This distinction is important especially for countries that are unable to borrow in their own currency, as fluctuations in exchange rates would influence debt sustainability. Distinguishing between domestic and foreign debt would provide a more comprehensive understanding of debt sustainability dynamics. Second, the analysis could be enriched by explicitly integrating institutional and governance factors into the model. Developing economies often face challenges such as inefficient tax collection, widespread tax evasion, and large informal sectors. While these issues are captured in reduced-form via a lower maximum tax rate in the current version of the model, modelling them explicitly is a worthwhile avenue for future research. Third, the current model abstracts from the roles of a monetary authority and a financial sector in financing government borrowing. Future research could explore the interactions between monetary and fiscal policies, as well as the role of financial intermediaries, in shaping debt sustainability.

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