Fiscal Limits, Revenue Structures, and Sovereign Debt Sustainability: Structural Evidence from MENA Economies *

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June 2026

Abstract

Assessing fiscal sustainability in emerging economies is complicated by limited tax capacity, volatile revenues, and persistent expenditure commitments. I adapt a nonlinear DSGE model with a state-dependent fiscal limit to quantify how fiscal-policy constraints and revenue structures shape the distribution of sovereign fiscal limits, comparing non-oil economies that rely primarily on taxation with oil exporters whose fiscal space depends partly on stochastic resource revenues. The model is calibrated for twelve MENA economies, spanning six non-oil-exporting and six oil-exporting countries. Key findings reveal that oil-exporting countries exhibit substantially larger fiscal space than non-oil-exporting countries, though each group faces distinct fiscal vulnerabilities. For oil exporters, large fiscal buffers are conditional on commodity revenues and can contract sharply under oil revenue shocks. For non-oil economies, productivity shocks are the dominant source of cyclical variation in fiscal space, while transfer dynamics and tax capacity are the key structural determinants. These results suggest that fiscal sustainability in emerging economies is shaped not only by current debt levels but also by the interaction between revenue structure, fiscal capacity, and expenditure commitments.

Keywords: Fiscal Limits, Debt Sustainability, Revenue Structures, Emerging Economies, MENA.

JEL classification: E62, H63, Q43.

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*I thank conference and seminar participants at the 2024 Bobst-AUB Research Day and the 2025 ERF Annual Conference for valuable comments. This research was supported by Bobst-AUB Research Grant Award Number 103586.

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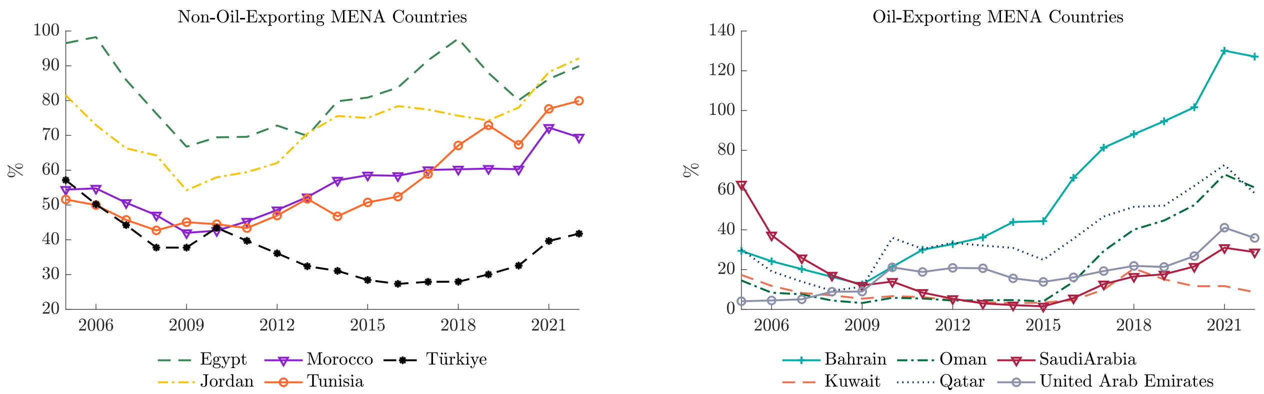
1 Introduction

Governments in emerging economies often confront large macroeconomic shocks alongside structural fiscal vulnerabilities that collectively put public debt sustainability at risk. These fiscal vulnerabilities include limited tax capacity, persistent expenditure commitments, and dependence on volatile revenue sources. Conventional debt-to-GDP ratios capture a government's current borrowing position but not its capacity to generate future surpluses under stress. A country with a moderate debt ratio can be highly vulnerable if its tax base is narrow or its revenues depend on commodity exports subject to large price swings. Fiscal limit models address this by linking sustainable debt to the present discounted value of future fiscal surpluses, making fiscal space a state-dependent quantity that varies with economic conditions, fiscal policy constraints, and revenue capacity. While this approach has yielded important insights for advanced economies, less is understood about how revenue structure shapes fiscal limits and fiscal space in economies where tax capacity is limited and government revenues are volatile.

The concept of structurally measuring the fiscal limit was formalized by Bi (2012), who derives stochastic fiscal limits endogenously from a dynamic Laffer curve in a non-linear DSGE model. Within this framework, the fiscal limit is defined as the present discounted value of all future possible fiscal surpluses at the revenue-maximizing tax rate, and its state-dependent nature implies that the probability of sovereign default varies with current economic conditions. Building on this framework, a growing literature has estimated fiscal limits for advanced economies, leaving open the question of how fiscal limits behave in settings characterized by limited tax capacity, large spending commitments, and dependence on resource revenues.

The MENA region provides a useful empirical setting for this analysis because it encompasses two distinct fiscal regimes within a shared geographic and institutional context: non-oil economies that rely primarily on tax revenues and oil exporters that depend heavily on commodity revenues. Both groups have experienced significant fiscal stress over the past decade. Non-oil economies were buffeted by political instability following the uprisings of the early 2010s, declining external revenues, and structural vulnerabilities including weak and inefficient tax systems and high public spending directed toward subsidies and transfers, placing additional strain on government budgets. Oil exporters saw their fiscal balances deteriorate sharply with the 2014 decline in oil prices and were further strained, alongside non-oil economies, by the COVID-19 pandemic. As a result, sovereign debt levels have risen substantially across the region (see Figure 1). This heterogeneity in revenue structures, combined with shared exposure to external shocks, makes MENA an informative laboratory for studying how fiscal limits and fiscal space vary across economies with fundamentally different government revenue bases.

Figure 1: Government Gross Debt as a Share of GDP



Source: IMF World Economic Outlook Database

This paper adapts the fiscal limit framework of Bi (2012) to study debt sustainability across twelve MENA economies. I extend the model to incorporate stochastic oil revenues for oil-exporting countries, allowing fiscal limits to vary with commodity revenue conditions alongside tax revenues, government purchases, and transfers. The model is calibrated for six non-oil-exporting economies, namely Egypt, Jordan, Lebanon, Morocco, Tunisia, and Türkiye, and six oil-exporting economies, namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. Using this framework, I examine (i) how macroeconomic and fiscal fundamentals shape country-specific fiscal space; (ii) how shocks to productivity, government purchases, and revenues affect the distribution of fiscal limits; and (iii) how fiscal policy choices regarding transfers and tax capacity alter debt sustainability prospects.

This paper makes four contributions to the literature. First, I extend the structural fiscal limit framework to accommodate economies with distinct revenue structures, differentiating between governments that rely primarily on distortionary taxation and those that supplement tax revenues with commodity revenues. This allows the model to capture how oil revenue volatility shapes fiscal space alongside tax capacity and expenditure dynamics. Second, I analyze how shocks to productivity, government purchases, and commodity revenues affect the distribution of fiscal limits, clarifying which shock types pose the greatest fiscal sustainability risks depending on a country's revenue base. Third, I examine how fiscal policy choices, specifically the path of government transfers and the level of tax capacity, shift the fiscal limit distribution and alter debt sustainability prospects. Fourth, I provide the first structural estimates of the full state-dependent fiscal limit distribution for twelve MENA economies, spanning both non-oil-exporting and oil-exporting countries, and use these to characterize fiscal space and sovereign default risk across two distinct fiscal regimes in the region.

This paper connects to three strands of the literature. The first is the state-dependent fiscal limits literature, originating with Bi (2012), who derives stochastic fiscal limits endogenously from a dynamic Laffer curve in a non-linear DSGE model. Bi and Traum (2012) extend this framework to estimate sovereign default risk for Greece and Italy, while Bi (2017) calibrates fiscal limits across a broader set of countries, showing that the United States and Japan have substantially more fiscal space than Italy and Greece. Related contributions estimate fiscal limits for a range of countries, including 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. While this literature has generated important insights for advanced economies, less is known about structural estimates of fiscal limits for economies where government revenues differ fundamentally in their composition and volatility.

The second strand examines fiscal sustainability in emerging and resource-dependent economies. Reinhart and Rogoff (2009) document recurring patterns of sovereign debt crises across a wide range of countries and historical episodes, showing that excessive debt accumulation and fiscal imbalances consistently precede debt distress. For resource-dependent economies, Ploeg (2011) surveys the macroeconomic and fiscal implications of natural resource wealth, highlighting the difficulty of converting volatile commodity revenues into stable fiscal positions, while Tazhibayeva et al. (2008) document pro-cyclical fiscal behavior in oil-exporting countries driven by oil revenue volatility. Within MENA, the fiscal sustainability literature has relied primarily on reduced-form approaches. Neaime (2010) and Neaime and Gaysset (2017) examine public debt sustainability in a selection of MENA economies using time series econometric tests; Sarangi and El-Ahmadieh (2017) and Mahmah and Kandil (2019) estimate fiscal reaction functions for Arab countries; and Khalladi (2019) adapts the fiscal fatigue framework of Ghosh et al. (2013) to estimate fiscal limits for a subset of MENA countries. Unlike the structural approach adopted here, fiscal fatigue models yield a single reduced-form point estimate of the fiscal limit rather than a state-dependent distribution, and do not permit analysis of how macroeconomic shocks or policy changes alter fiscal space. This paper contributes to this strand by providing structural estimates of the full state-dependent fiscal limit distribution, distinguishing between economies with tax-based and commodity-based revenue structures.

The third strand uses structural models to study fiscal sustainability and evaluate fiscal policy counterfactuals. Trabandt and Uhlig (2011) use a structural neoclassical model to compute Laffer curves and quantify the limits of tax-based fiscal adjustment across countries. Davig et al. (2011) examine how unsustainable fiscal trajectories interact with monetary policy and inflation in a general equilibrium framework with a fiscal limit, while Leeper et al. (2010) analyze the dynamics of fiscal financing, tracing how different combinations of tax and spending adjustments stabilize government debt. This approach, which asks how policy choices alter fiscal sustainability, remains relatively underdeveloped for emerging economies. This paper extends it to a setting in which governments must navigate structural fiscal constraints alongside the additional challenge of resource revenue uncertainty.

The analysis yields four main findings. First, oil-exporting economies exhibit substantially larger fiscal space than non-oil economies, consistent with the supplementary role of commodity revenues. However, this buffer is conditional on oil revenue levels and contracts sharply under adverse commodity shocks. Second, productivity shocks are the dominant source of cyclical variation in fiscal limits for non-oil economies, while oil-exporting economies are relatively resilient to productivity fluctuations but highly sensitive to oil revenue shocks. Third, non-stationary transfer dynamics can substantially reduce fiscal limits in the model, particularly in non-oil economies where transfers represent a large share of output. Fourth, tax capacity is a critical structural determinant of fiscal limits across both groups. Lower maximum tax rates substantially reduce fiscal space in non-oil economies and, to a lesser extent, in oil exporters whose resource revenues provide an additional buffer.

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 across MENA economies. The model extends the framework of Bi (2012) to incorporate distinct revenue structures, differentiating between non-oil-exporting economies that rely primarily on tax revenues and oil-exporting economies that additionally generate commodity revenues.

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 income 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. The household's labor supply decision determines the size of the tax base available to the government, while the default fraction Δ_t captures the wealth loss households bear when the government partially defaults, introducing a direct cost of sovereign default into household welfare.

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. Since tax revenues depend on labor income, fluctuations in A_t translate directly into changes in the government's revenue capacity, making productivity shocks a primary driver of fiscal space variation.

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:

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

For non-oil-exporting governments, fiscal sustainability depends entirely on the capacity to raise tax revenues and manage expenditures. As such, the breadth of the tax base and the level of tax capacity are the binding constraints on fiscal space.

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 modeled. 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. This feedback rule provides automatic stabilization by raising tax rates as debt accumulates, but fiscal adjustment is bounded above by the revenue-maximizing tax rate τ^{max}, which caps the government's capacity to service debt through taxation alone.[1]

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. The stationarity of government purchases implies that spending shocks generate temporary deviations from trend but do not independently threaten long-run fiscal sustainability.

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. The binary regime structure brackets transfer dynamics between two polar case, a stationary path and an explosive one. This provides a tractable characterization of the fiscal risks associated with

[1] Note that γ governs the responsiveness of tax rates to debt in equilibrium but does not enter the computation of the fiscal limit, which is evaluated at the revenue-maximizing tax rate τ^{max} rather than the feedback rule.

non-stationary transfer growth. This assumption aligns with the observation that several MENA countries have been transferring an increasing share of GDP from the government to households.[2]

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:

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

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

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

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

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

Laffer curve.[3] 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. Comparing equations (13) and (14), the addition of OR_{t+j} in the surplus expression expands the fiscal limit for oil-exporting economies relative to non-oil economies, but because oil revenues are stochastic, the size of this additional buffer is itself uncertain and state-dependent.

3 Country-Specific Distributions of Fiscal Limits

Fiscal limits are inherently country-specific since economies differ in their fiscal policy parameters, revenue structures, and levels of productivity (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, namely Egypt, Jordan, Lebanon, Morocco, Tunisia, and Türkiye, as well as for six oil-exporting MENA economies, namely 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^Z_{t+j} (and oil revenues OR_{t+j}, 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 M times and the conditional distribution $\mathcal{B}^*$ for a given initial state is

[3]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.

approximated using the simulated fiscal limits $\mathcal{B}_i^*$ ($i = 1, 2, \ldots, M$).[4] The cumulative density function (CDF) of this distribution allows the computation of 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.[5]

The steady-state productivity level and the total amount of time available for labor and leisure 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. This is broadly consistent with the long-lived nature of transfer and subsidy programs observed across MENA economies, where such regimes have historically persisted over extended periods.[6]

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

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

[6] The choice of $p_1^Z = p_2^Z = 0.95$ follows Bi (2012) and is standard in the fiscal limits literature. The main findings are qualitatively unchanged under alternative persistence values of $p_1^Z = p_2^Z = 0.90$, which implies average regime durations of 10 years. The direction and relative ranking of fiscal limit shifts across countries

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

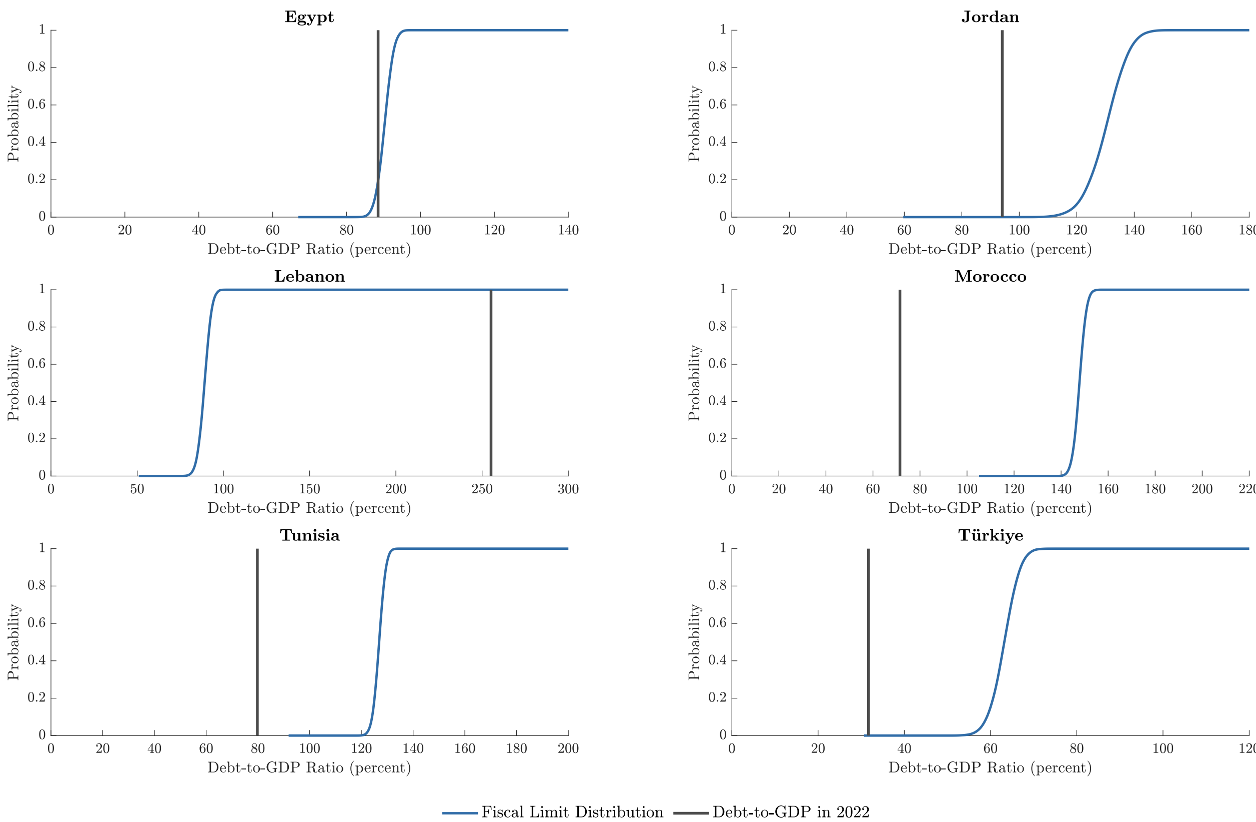
3.3 Estimated Fiscal Limits and Fiscal Space

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 2022 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% default probabilities. The results reveal a clear divergence between the

are robust to this variation, confirming that the results are not driven by the specific transition probability assumed.

two groups: oil-exporting economies exhibit substantially larger fiscal space than non-oil economies, reflecting the supplementary role of commodity revenues. Within each group, however, fiscal space varies considerably, driven by differences in tax capacity, expenditure commitments, discount factors, and, for oil exporters, the size of oil revenues relative to GDP.

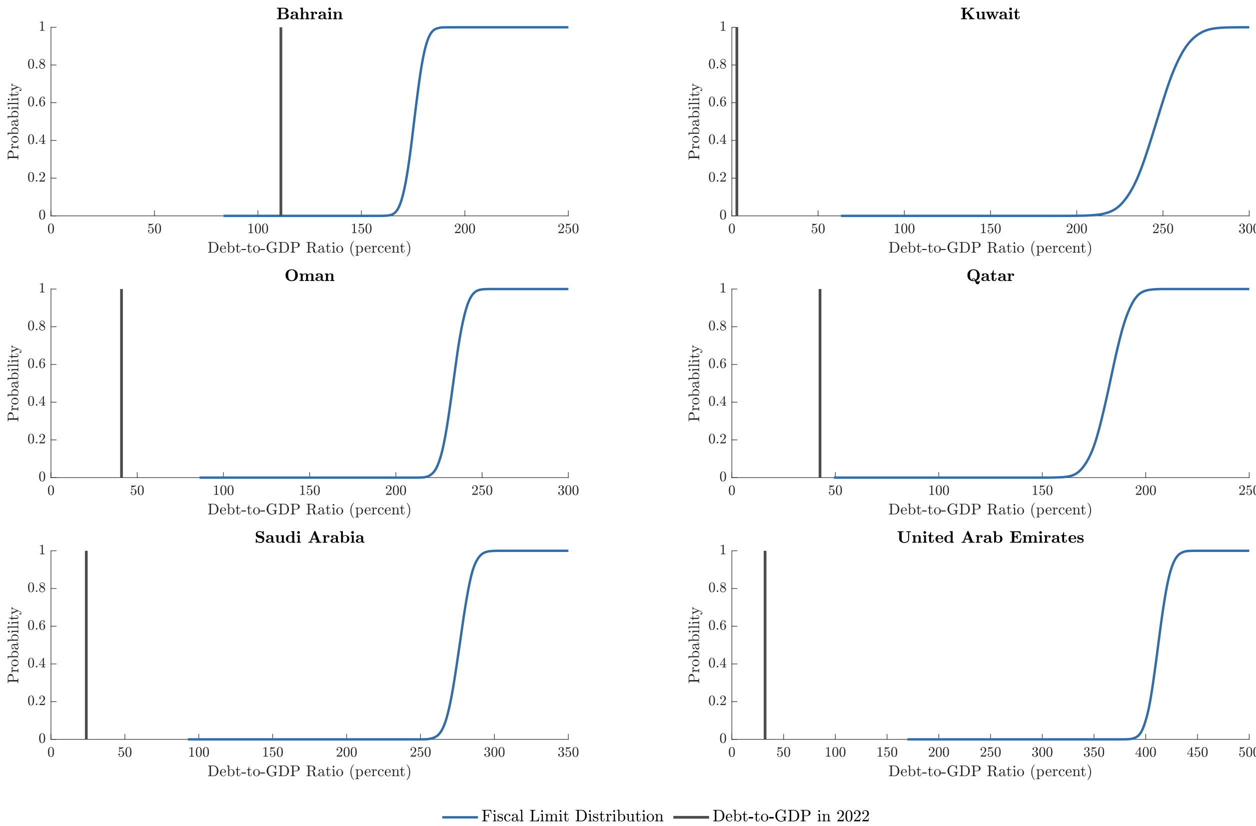
Figure 2: Baseline Distributions of Fiscal Limits for Non-Oil-Exporting MENA Economies



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).

Among non-oil-exporting economies, Lebanon and Egypt face the most severe fiscal constraints. Lebanon's 2022 debt-to-output ratio of 255.2% far exceeds its estimated fiscal limit of 83.1% at a 5% default probability, yielding a fiscal space of approximately -172 percentage points of GDP. This extreme vulnerability reflects the combination of a high transfer-to-output ratio ($Z/Y = 0.098$) and a relatively low discount factor ($\beta = 0.911$), both of which compress the present value of future surpluses. Having already defaulted on its sovereign debt, Lebanon would need to reduce its debt level to roughly one-third of

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).

its current value to restore fiscal sustainability. Egypt's position is only marginally better: its 2022 debt-to-output ratio of 88.5% sits very close to its estimated fiscal limit of 87.0%, leaving virtually no fiscal space. Egypt's high transfer burden (the largest Z/Y in the non-oil group at 0.109) and low discount factor ($\beta = 0.903$) together limit the government's capacity to generate future surpluses.

Jordan and Türkiye occupy a middle ground, with positive but limited fiscal space. Jordan's debt-to-output ratio stood at 94.1% in 2022, against a fiscal limit of 118.9% at a 5% default probability, yielding approximately 25 percentage points of fiscal space. This buffer reflects Jordan's relatively higher tax capacity which supports a broader revenue base despite the absence of oil revenues. Türkiye presents a different configuration: a low 2022 debt-to-output ratio of 31.7% yields approximately 26–28 percentage points of fiscal space, but this coexists with the lowest estimated fiscal limit in the non-oil group (58.1%

Table 2: Baseline Fiscal Space in MENA Economies

	Actual Debt-to-GDP (2022)	Fiscal Limit		Fiscal Space	
		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.

at 5% default probability). The low fiscal limit is driven primarily by the lowest discount factor across all twelve economies ($\beta = 0.883$), which sharply reduces the present value of future surpluses and makes Türkiye's fiscal buffer sensitive to changes in real interest rates or growth prospects.

Morocco and Tunisia exhibit the most robust fiscal positions in the non-oil group. Morocco's 2022 debt-to-output ratio of 71.5% implies a fiscal space exceeding 70 percentage points of GDP, the largest in the non-oil group. This reflects a combination of moderate government purchases ($G/Y = 0.204$) and a restrained transfer burden ($Z/Y = 0.078$), which together support a large maximum surplus capacity. Tunisia's fiscal space of approximately 44 percentage points stems from the lowest transfer-to-output ratio in the non-oil group ($Z/Y = 0.066$), which preserves fiscal capacity even as debt has risen to 79.8% of GDP. While both countries maintain meaningful fiscal buffers, the analysis shows that rising transfer paths can substantially erode fiscal limits, making continued expenditure restraint a key condition for sustaining these buffers.

Turning to oil-exporting economies, fiscal space varies considerably across the group, and oil revenue size relative to GDP emerges as the primary driver of cross-country differences. Bahrain is the clear outlier: its oil revenue ratio ($OR/Y = 0.213$) is the lowest in the oil-exporting group, and its fiscal space of approximately 57 percentage points is far smaller than that of other Gulf economies. Bahrain's 2022 debt-to-output ratio of 111.1% against a fiscal limit of 168.1% at 5% default probability underscores that commodity revenues alone do not guarantee fiscal resilience when they are modest relative to GDP.

At the other extreme of oil revenue intensity, Kuwait's OR/Y ratio of 0.492, the highest in the group, translates into a fiscal space exceeding 221 percentage points of GDP, supported by a 2022 debt-to-output ratio of only 2.9%. Oman and Qatar sit between Bahrain and Kuwait in terms of oil revenue ratios ($OR/Y = 0.320$ and 0.225, respectively) and exhibit correspondingly intermediate fiscal space. Oman's fiscal space of approximately 181 percentage points reflects strong oil revenues alongside a moderate debt level of 40.9% of GDP. Qatar's fiscal space of approximately 127 percentage points is somewhat lower despite a comparable debt level (42.6%), partly reflecting a lower tax capacity ($\tau = 0.196$, the lowest in the oil group), which constrains the non-oil component of the fiscal limit.

Saudi Arabia and the UAE exhibit the largest fiscal buffers in the sample, reflecting a confluence of factors rather than oil revenues alone. Saudi Arabia's fiscal space exceeds 240 percentage points, driven by high oil revenues ($OR/Y = 0.287$), a high discount factor ($\beta = 0.943$), and a low 2022 debt-to-output ratio of 23.9%. The UAE's fiscal space of approximately 364 percentage points reflects the combination of substantial oil revenues ($OR/Y = 0.301$), the highest discount factor across all twelve economies ($\beta = 0.949$), and the lowest transfer burden ($Z/Y = 0.051$). This combination of structural features places both economies in an exceptionally strong fiscal position, although the analysis confirms that this buffer remains sensitive to sustained deterioration in oil revenues.

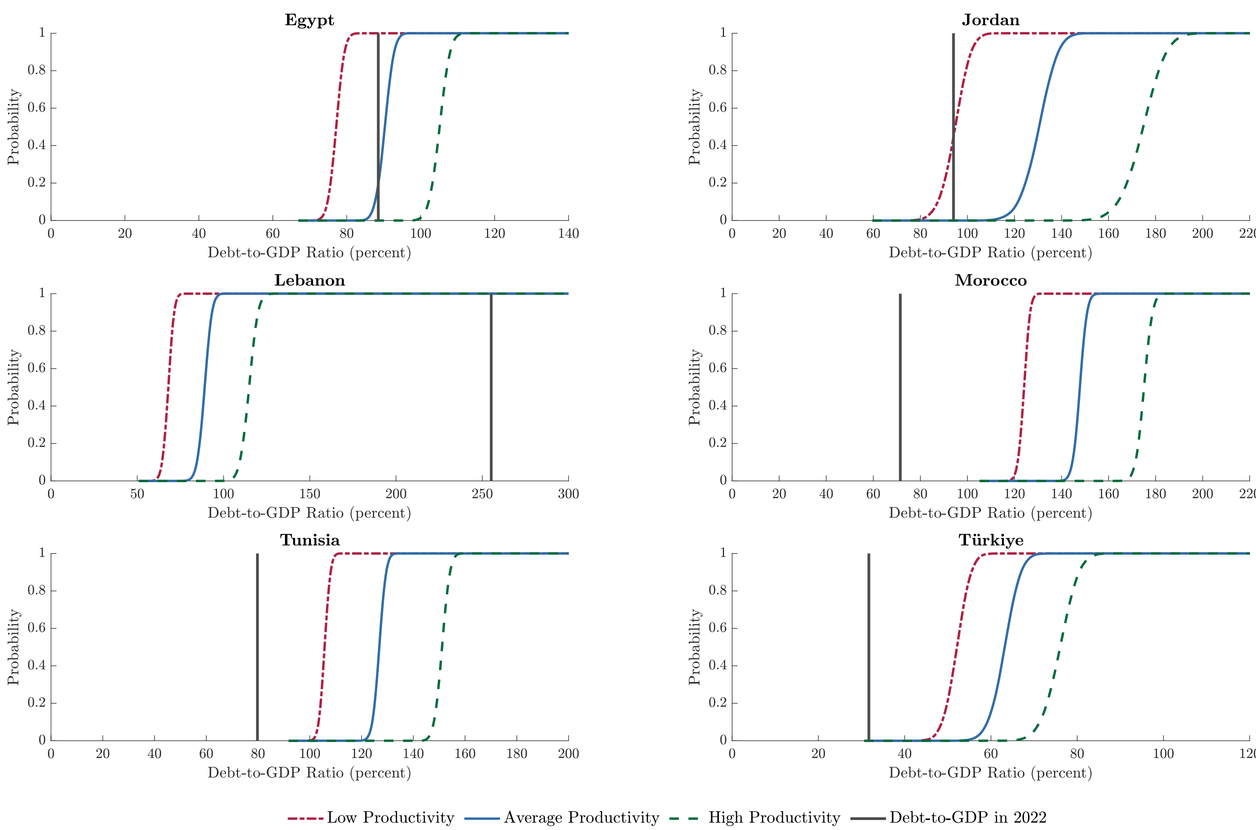
4 Macroeconomic Shocks and Fiscal Resilience

This section examines how macroeconomic shocks affect the distribution of fiscal limits across MENA economies. I consider three sources of variation that governments face exogenously: shocks to productivity, which operate through the tax base; shocks to government purchases, which compress future primary surpluses; and shocks to oil revenues, which alter the fiscal buffers available to oil-exporting economies.

4.1 Productivity Shocks

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, maximum tax revenues decrease with lower productivity, translating into a leftward shift in the fiscal limit distribution. 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.

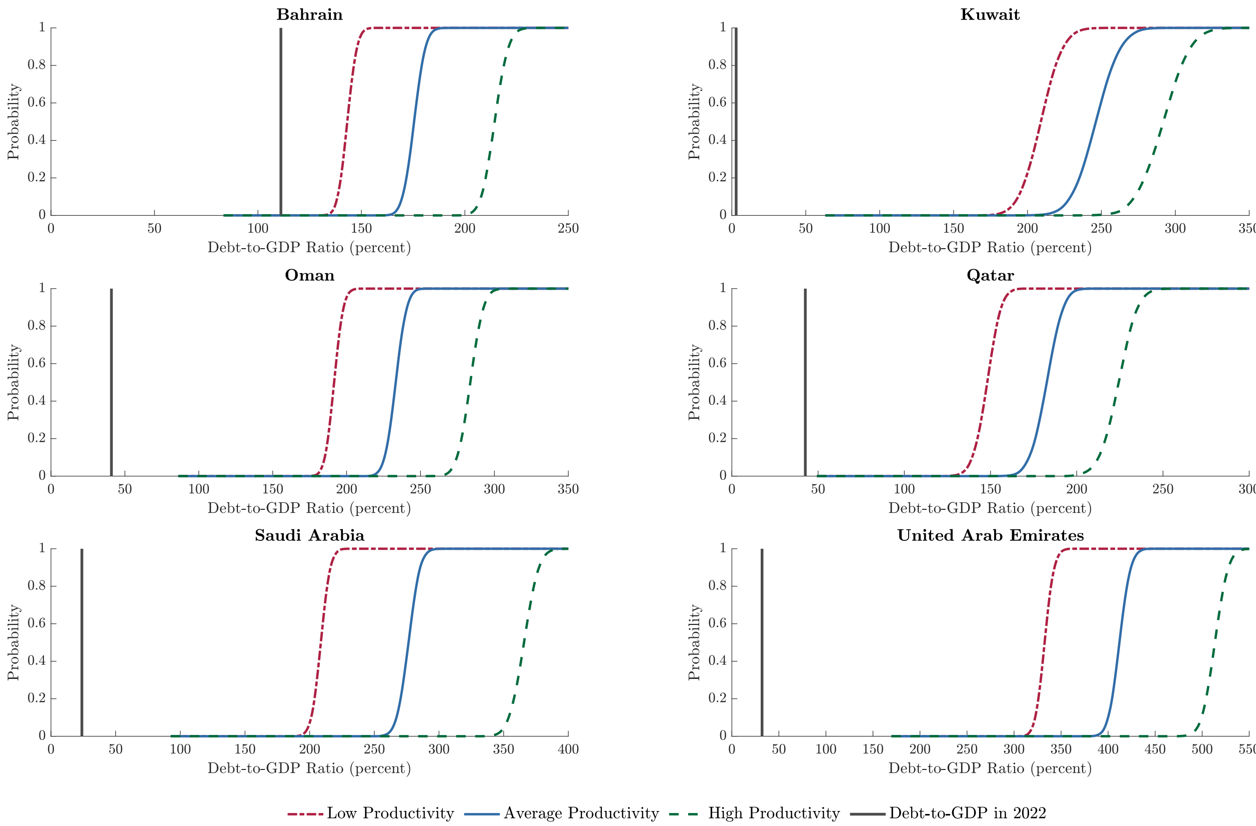
Figure 4: Fiscal Limits for Non-Oil-Exporting MENA Economies with Productivity Shocks



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).

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 fiscal space considerably and pose risks to public debt sustainability, particularly for countries

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).

with high debt-to-output ratios. Consistently low productivity levels in Egypt and Jordan would imply negative fiscal spaces (specifically, -14.3% for Egypt and -8.9% for Jordan) relative to their actual debt-to-output ratios in 2022. Under sustained negative productivity shocks, Egypt's probability of default rises to 100% in the model, up from 30% at average productivity levels. Similarly, Jordan's 2022 debt-to-output ratio implies an estimated default risk of around 40% at low productivity, compared with zero at average productivity levels. Egypt's acute sensitivity reflects its combination of the highest transfer burden in the non-oil group ($Z/Y = 0.109$) and the lowest discount factor ($\beta = 0.903$), both of which leave little room to absorb tax base contractions.

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. Positive productivity shocks increase Lebanon's fiscal limit to 107.7%, which is still

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. Low and high A refer to productivity levels that are four standard deviations below and above the steady-state value. Values are presented as percentages of GDP.

considerably lower than its actual debt-to-output ratio. These model-based results suggest that debt restructuring may be necessary to restore fiscal sustainability in Lebanon, alongside substantial productivity gains.

Morocco, Tunisia, and Türkiye maintain positive fiscal space across productivity scenarios, though with differing degrees of resilience shaped by their expenditure structures and fiscal limits. Despite a debt-to-GDP ratio of 71.5%, Morocco has solid fiscal space, ranging from 49.0% under low productivity to 98.8% under high productivity, supported by its relatively restrained transfer burden ($Z/Y = 0.078$). Tunisia displays moderate sensitivity to productivity shifts, with negative shocks potentially reducing its fiscal space to 23 percentage points of GDP, though its low transfer ratio ($Z/Y = 0.066$) provides some structural protection. Türkiye's fiscal space varies between 15.8% and 38.1% across productivity levels, with the narrow range reflecting its low fiscal limit driven by the lowest discount factor in the sample ($\beta = 0.883$).

For oil-exporting MENA economies, the size of the productivity shock varies in the range of 4.3%–6.7% (see Table 1). Although productivity shocks are larger than in their non-oil-exporting peers, the significant fiscal space supported by oil revenues makes these economies quite resilient. One exception is Bahrain, which displays more constrained fiscal space than the other oil-exporting countries: consistent negative productivity shocks reduce its fiscal limit to 137.1%, only 26 percentage points above its 2022 debt-to-output ratio, reflecting its lower oil revenue ratio ($OR/Y = 0.213$) relative to other Gulf economies. Kuwait, Oman, Qatar, Saudi Arabia, and the UAE demonstrate robust fiscal space that in essence reflects their stronger oil revenue base.[7] However, as shown below, shocks to oil revenues (either a decline in oil production or a fall in oil prices) would reduce the available fiscal space significantly.

4.2 Spending Pressures

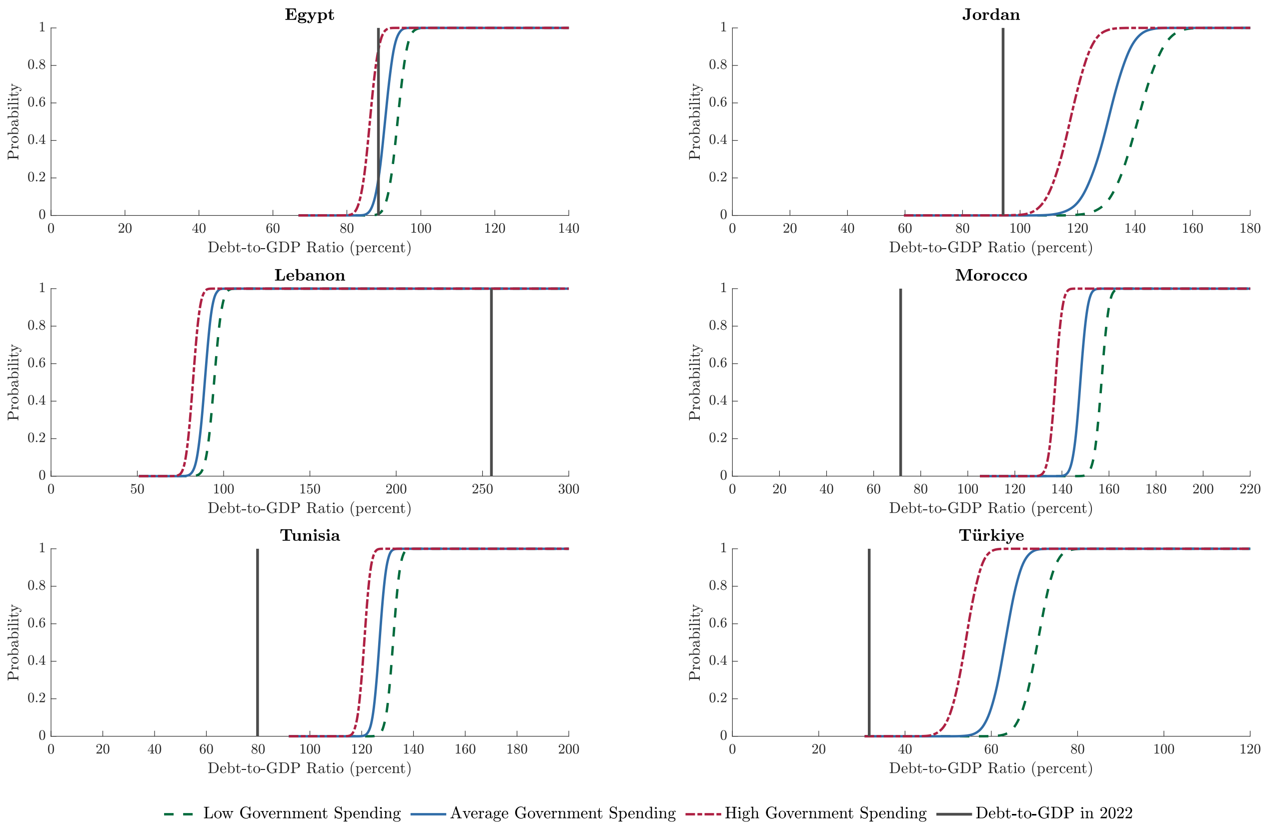
Changes in the level of government purchases also influence an economy's fiscal limit. When the government increases its purchases without a corresponding rise in revenues, its fiscal surplus falls each period and therefore significantly reduces the fiscal limit. Conversely, when government purchases are reduced, governments can sustain higher debt levels without hitting the fiscal limit, as lower spending increases future fiscal surpluses. 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 at low and high levels of government purchases is shown in Table 4.

Among non-oil-exporting MENA economies, Türkiye and Jordan exhibit the highest calibrated variance in the government purchases shock, making their fiscal limits particularly sensitive to spending fluctuations. While a negative shock to government spending expands the fiscal limit, positive shocks substantially reduce fiscal space: for Jordan, fiscal space drops from 24.8% in the baseline 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 more acute risk given its already limited baseline fiscal space, with fiscal space falling to −5.6% under high government spending, implying a positive probability of default.

Oil-exporting MENA economies face even larger shocks to government purchases,

[7] For Kuwait, the UAE, Qatar, and Saudi Arabia, sovereign wealth fund assets represent a substantial additional fiscal buffer beyond current oil revenue flows. To the extent that these assets could be drawn down to service debt, the model's fiscal space estimates represent conservative lower bounds for these economies.

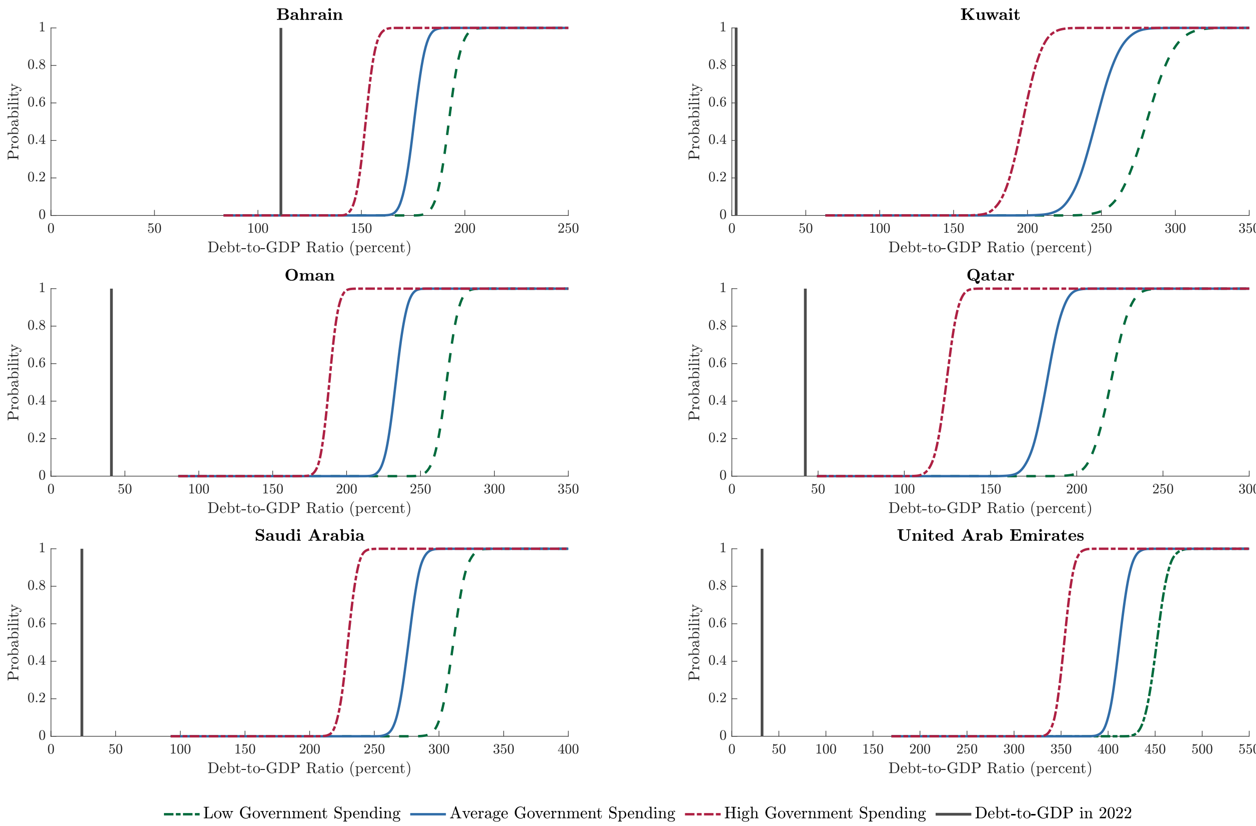
Figure 6: Fiscal Limits for Non-Oil-Exporting MENA Economies with Government Purchases Shocks



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).

with the shock size varying in the range 8%–13%. Consequently, their fiscal limits vary considerably with spending fluctuations. Qatar, which has the highest calibrated government purchases variance in the oil group, sees its fiscal limit fall from 205% under low government purchases to 115% under high government purchases. Oman's fiscal limit similarly varies from 257% to 180%, while Kuwait's falls from 255% to 179%. This suggests that even oil-exporting economies face meaningful fiscal risks from persistently high spending, underscoring that oil revenues do not fully insulate governments from expenditure pressures.

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).

4.3 Oil Revenue Volatility

In oil-exporting economies, shocks to oil revenues constitute a major additional source of variation in fiscal limits. 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 estimated fiscal space for each economy at low and high oil revenue levels, 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. With calibrated standard deviations of the oil revenue innovation σ^{OR} ranging from 15% to 20% of steady-state oil revenues (see Table 1), oil revenue uncertainty generates the largest shifts in the fiscal limit distribution among the three shock exercises. Bahrain, which carries the highest debt-to-output ratio among oil exporters and the lowest

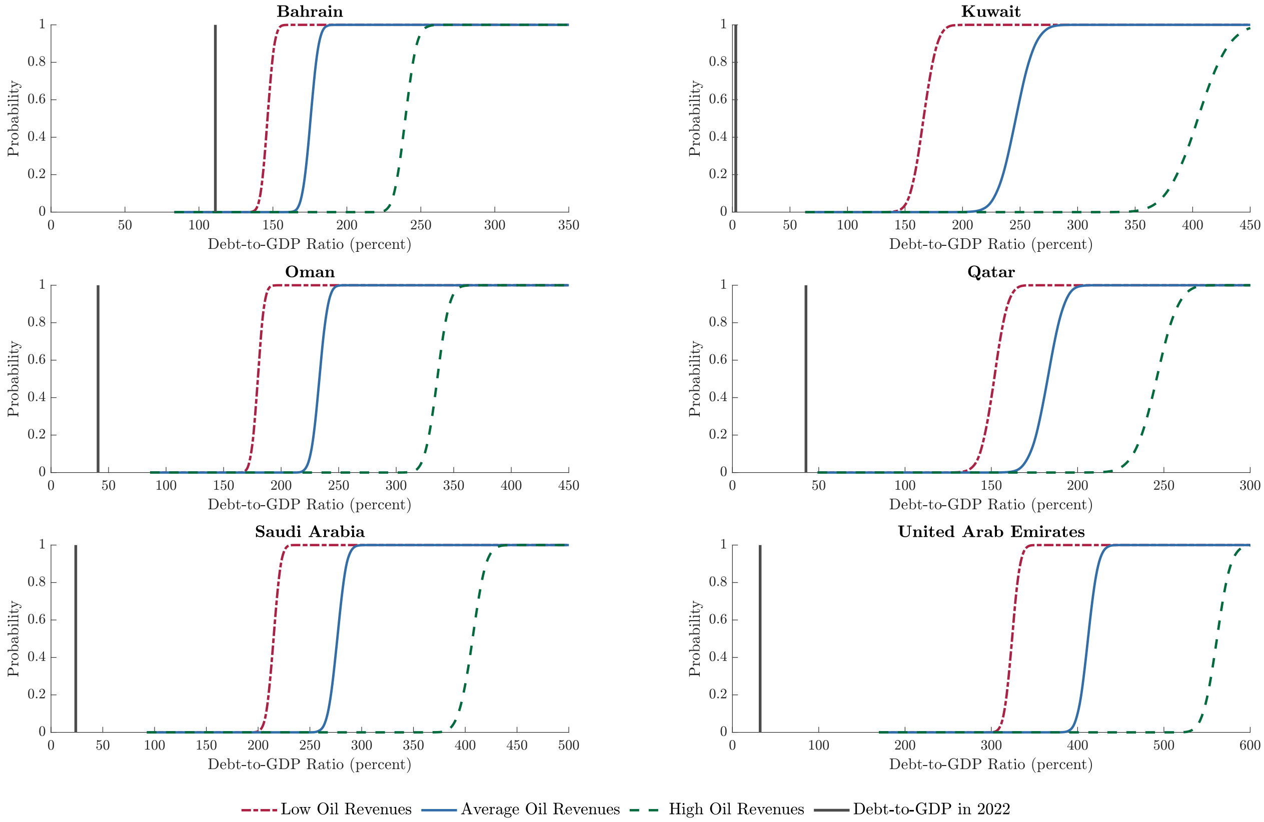
Table 4: Fiscal Space in MENA Economies with Government Purchases Shocks

	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. Low and high G refer to government purchases levels that are four standard deviations below and above the steady-state value. Values are presented as percentages of GDP.

oil revenue ratio ($OR/Y = 0.213$), sees its fiscal space fall to 29.2% under a low oil revenue scenario, the smallest buffer in the group. In Saudi Arabia, the fiscal limit ranges from 206% of GDP under low oil revenues to 389% of GDP under high oil revenues. Kuwait and the UAE, whose oil revenue ratios ($OR/Y = 0.492$ and 0.301, respectively) amplify the impact of any given percentage shock, exhibit the largest absolute swings: the fiscal limit reaches 369% of GDP for Kuwait and 595% of GDP for the UAE under high oil revenues, falling to 151% and 312%, respectively, under low oil revenues. These results confirm that oil revenues are the dominant driver of fiscal space in oil-exporting economies, but also the primary source of their fiscal vulnerability. The magnitude of these swings suggests that maintaining fiscal sustainability in resource-dependent economies may require explicit mechanisms to smooth oil revenue volatility over the commodity cycle, such as fiscal rules anchored to non-oil revenues or stabilization funds that buffer commodity downturns.

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).

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

	Actual Debt-to-GDP (2022)	Fiscal Limit		Fiscal Space	
		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. Low and high *OR* refer to oil revenue levels that are four standard deviations below and above the steady-state value. Values are presented as percentages of GDP.

5 Policy Counterfactuals: Transfers and Tax Capacity

While Section 4 examined how exogenous macroeconomic shocks shift the fiscal limit distribution, this section considers two policy-relevant counterfactuals that governments can, in principle, influence: the path of government transfers and the level of tax capacity. Both are shown to be critical structural determinants of fiscal space, particularly for non-oil-exporting economies.

5.1 Non-Stationary Transfer Growth

The baseline specification abstracts from stochastic variation in government transfers and assumes these transfers are fixed at their steady-state level. Here, I explore the impact of potentially explosive transfers on the fiscal limit distribution, motivated by the observation that transfer and subsidy programs in several MENA economies have grown persistently over time, raising concerns about long-run fiscal sustainability.

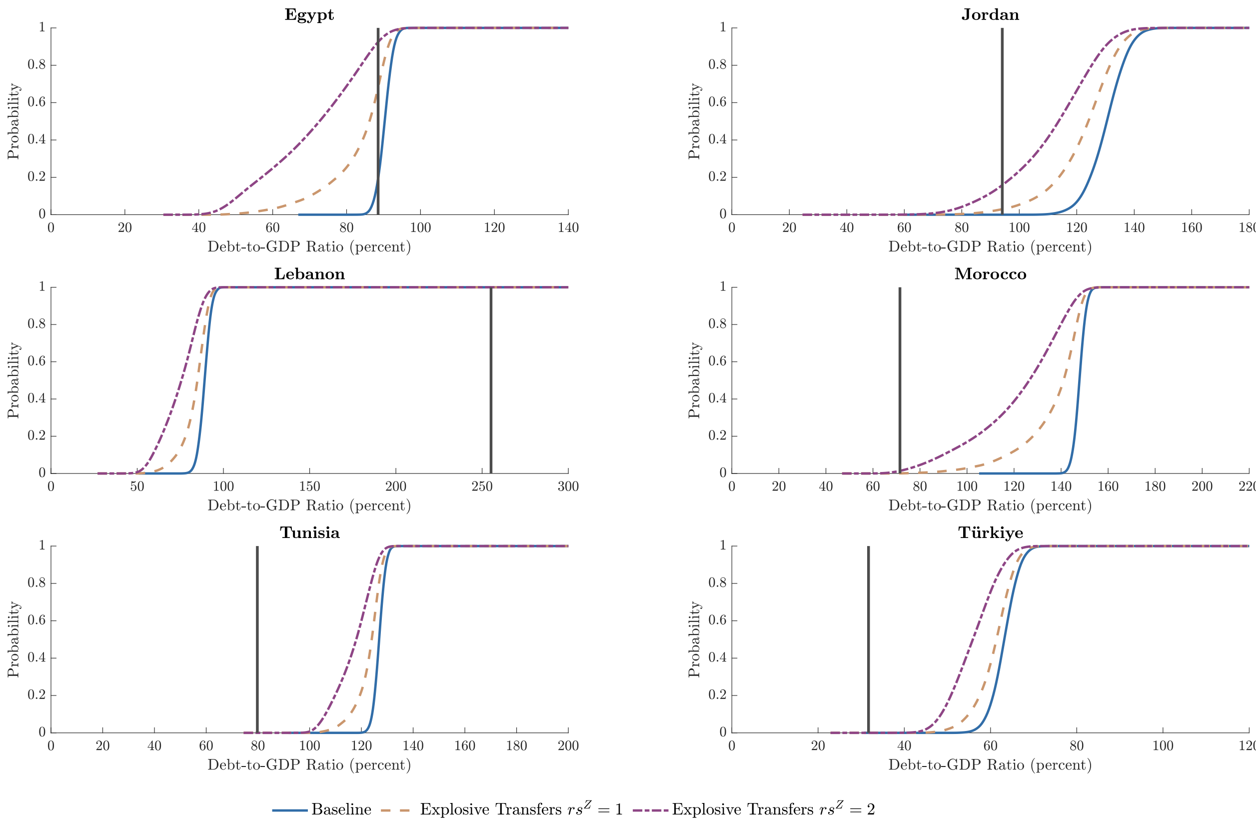
Table 6: Fiscal Space in MENA Economies with Explosive Government Transfers

	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.

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

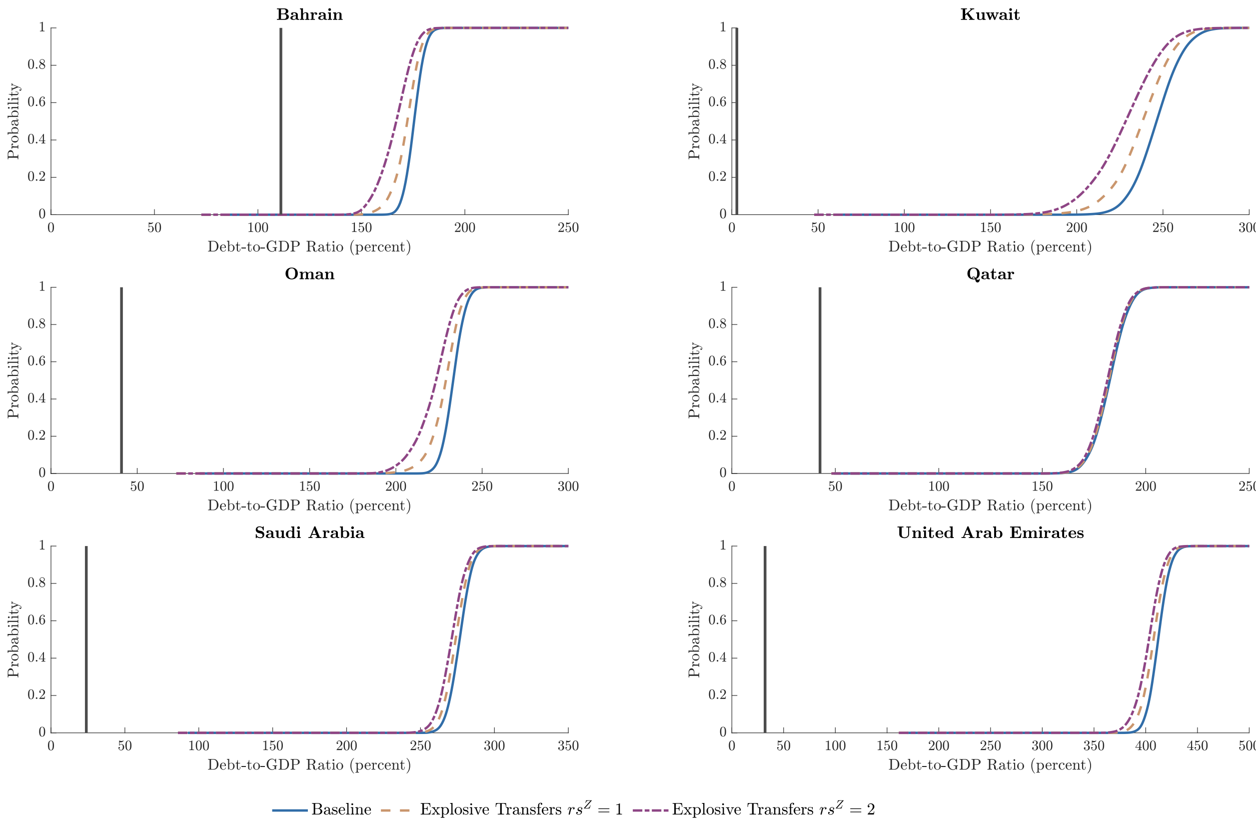
Figure 9: Fiscal Limits for Non-Oil-Exporting MENA Economies with Explosive Government Transfers



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.

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 larger portion of fiscal spending, as these 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 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.

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.

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

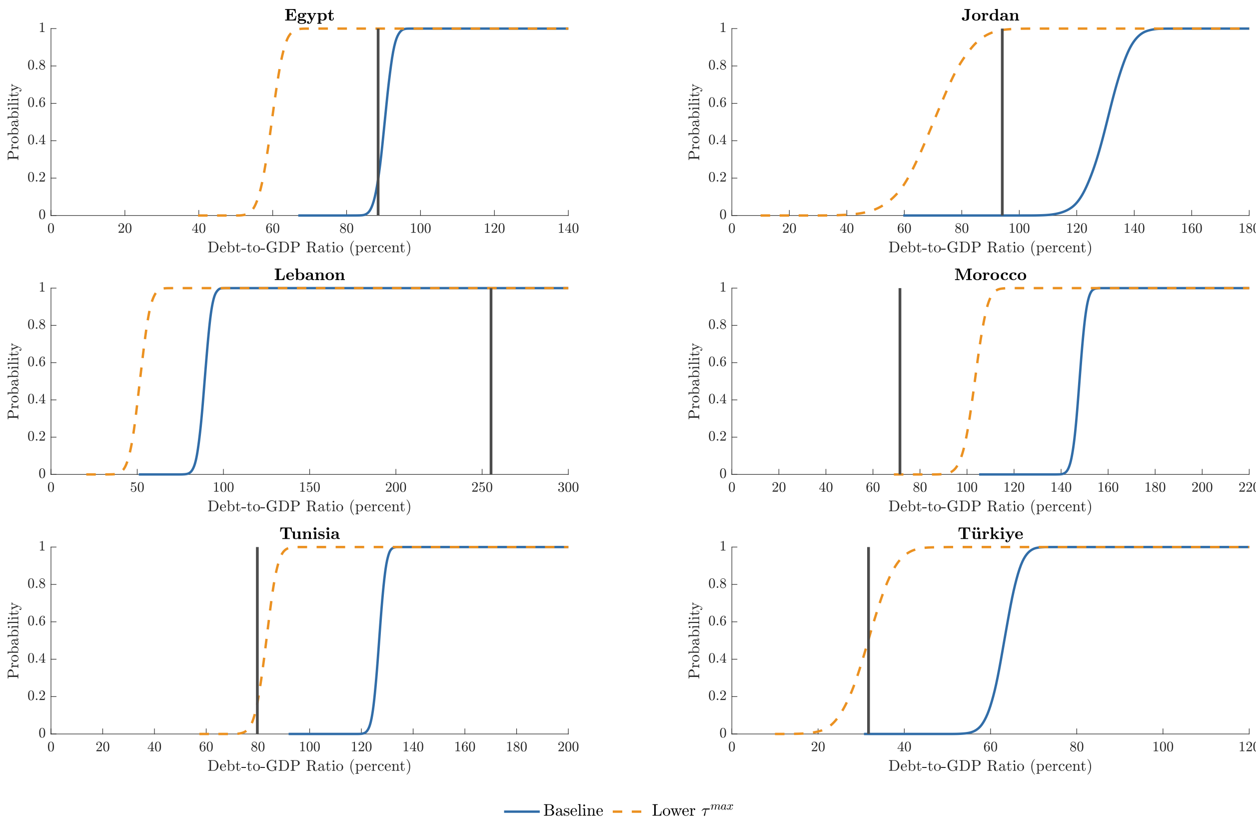
Among non-oil-exporting economies, Egypt, Jordan and Morocco stand out due to the size of government transfers as a share of GDP and their estimated growth rates. In Egypt, estimated steady-state lump-sum transfers account for 11% of GDP and grow at an estimated average annual growth rate of 3%. Consequently, 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 sustainability 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 from 72.2% of GDP under the baseline scenario to just 9.3% when transfers are explosive. These results suggest that transfer growth plays a significant role in shaping fiscal sustainability in non-oil-exporting MENA countries within the model, with the potential to erode substantial fiscal buffers within a single explosive regime episode.

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 The Laffer Curve Constraint

Raising tax rates does not guarantee an increase in government revenues, as higher taxes can disincentivize households from supplying labor. As such, a higher income tax rate reduces disposable income, which may lead to a decrease in 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-shaped relationship between tax rates and government revenues.

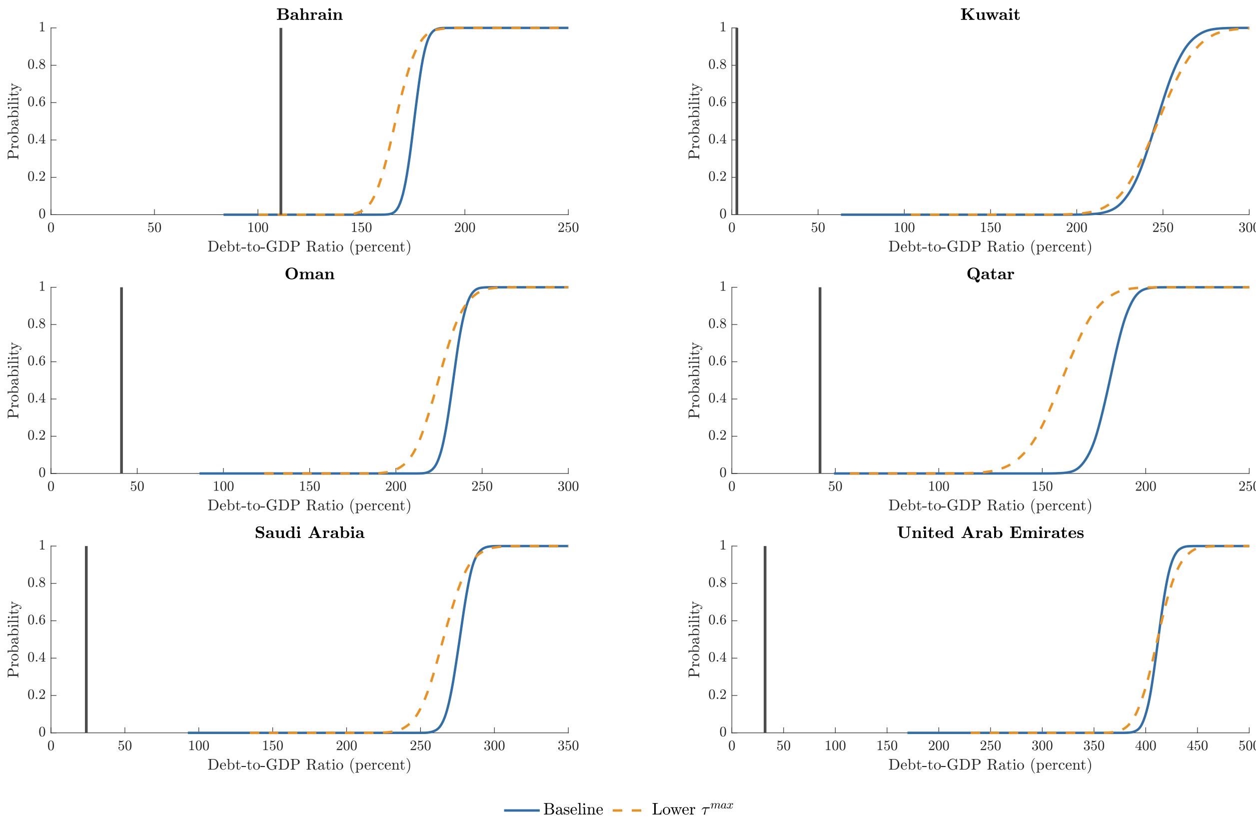
Figure 11: Fiscal Limits for Non-Oil-Exporting MENA Economies with Lower Maximum Tax Rate



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 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 reaches 60%–70%. Achieving this 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. In this counterfactual, I set the maximum tax rate to 45%, a value above any tax-to-GDP ratio observed in the sample (the highest is 31.1% for Türkiye) but well below the estimated Laffer peak, representing a plausible upper bound for politically sustainable tax

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.

capacity. 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 fiscal limits significantly. The fiscal limit consistent with a 5% default probability drops from 86.9% to 55.1% in Egypt and from 118.9% to 52.1% in Jordan, rendering their actual debt levels unsustainable. Tunisia and Türkiye similarly experience declines in fiscal space to −2.4% and −8.6%, respectively. Morocco is the only non-oil-exporting economy that maintains a positive fiscal space (24.6%) under the lower tax rate, reflecting its more

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

	Actual Debt-to-GDP	Fiscal Limit		Fiscal Space	
	(2022)	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
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.

restrained expenditure structure. These findings confirm that tax capacity is a binding constraint on fiscal space in non-oil economies: without the ability to raise revenues toward a meaningful maximum, non-oil governments must rely entirely on expenditure restraint to maintain debt sustainability.

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 do not fall considerably and their debt levels remain sustainable.

6 Conclusion

This paper examines how revenue structures shape fiscal limits and sovereign debt sustainability in emerging economies. Using a state-dependent fiscal limit framework calibrated to twelve MENA economies spanning two distinct fiscal regimes, I compare non-oil-exporting economies that rely primarily on distortionary taxation with oil-exporting economies whose fiscal capacity is supplemented by commodity revenues.

Four findings emerge. First, revenue structure is a fundamental determinant of fiscal space: oil-exporting economies exhibit substantially larger fiscal buffers than non-oil economies, though these buffers remain conditional on commodity revenues and contract sharply under adverse shocks. Second, the dominant source of fiscal limit variation differs systematically across revenue regimes: productivity shocks are the dominant source of cyclical fiscal vulnerability in tax-dependent economies, while oil revenue shocks play a comparable role in resource-dependent economies. Third, transfer dynamics can substantially erode fiscal space, particularly in economies with large and persistent transfer commitments where spending growth directly compresses potential future surpluses. Fourth, tax capacity sets a structural ceiling on debt sustainability, making it a binding constraint especially for non-oil economies without access to resource revenues.

More broadly, the results suggest that fiscal sustainability cannot be assessed solely through observed debt ratios. Economies with similar levels of public debt may face markedly different default risks because their capacity to generate future fiscal surpluses depends on fundamentally different revenue structures and fiscal constraints. For policymakers, the findings suggest that improving fiscal resilience may require more than reducing debt ratios. In non-oil economies, strengthening tax systems and containing the growth of transfer commitments can substantially expand fiscal space, particularly in countries where current debt levels leave little margin for adverse shocks. In oil-exporting economies, maintaining fiscal sustainability may require reducing dependence on volatile commodity revenues and broadening non-oil revenue sources, since large fiscal buffers can contract sharply under commodity downturns.

Several limitations of the current framework point to avenues for future research. The model treats oil revenues as a stochastic flow accruing to the government, without capturing the stock of accumulated financial assets held in sovereign wealth funds. For GCC economies such as Kuwait, the UAE, Saudi Arabia, and Qatar, large sovereign wealth fund assets represent an additional fiscal buffer beyond current oil revenue flows; to the extent that these assets could be drawn down to service debt, the model may provide conservative estimates of fiscal limits for these economies. Additionally, the model does not distinguish between debt denominated in foreign and domestic currency, a distinction that matters for countries unable to borrow in their own currency given that exchange rate fluctuations influence debt sustainability. The analysis could also be enriched by explicitly integrating institutional and governance factors such as inefficient tax collection, widespread tax evasion, and large informal sectors, which are currently captured only in reduced form via the lower maximum tax rate. The current model also 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. Finally, incorporating elements such as rollover risks and interest rate shocks would allow the framework to capture short-term fiscal vulnerabilities alongside the long-horizon perspective adopted here.

References

Andrés, J., Burriel, P., and Shen, W. (2020). Debt Sustainability and Fiscal Space in a Heterogeneous Monetary Union: Normal Times vs the Zero Lower Bound. *Banco de Espana Working Paper*.

Bi, H. (2012). Sovereign Default Risk Premia, Fiscal Limits, and Fiscal Policy. *European Economic Review*, 56(3):389–410.

Bi, H. (2017). Fiscal Sustainability: A Cross-Country Analysis. *Economic Review*, 102(4).

Bi, H., Shen, W., and Yang, S. (2016). Fiscal Limits in Developing Countries: A DSGE Approach. *Journal of Macroeconomics*, 49:119–130.

Bi, H. and Traum, N. (2012). Estimating Sovereign Default Risk. *American Economic Review*, 102(3):161–66.

Coimbra, N. (2020). Sovereigns at Risk: A Dynamic Model of Sovereign Debt and Banking Leverage. *Journal of International Economics*, 124.

Davig, T., Leeper, E. M., and Walker, T. B. (2011). Inflation and the Fiscal Limit. *European Economic Review*, 55(1):31–47.

Ghosh, A. R., Kim, J. I., Mendoza, E. G., Ostry, J. D., and Qureshi, M. S. (2013). Fiscal Fatigue, Fiscal Space and Debt Sustainability in Advanced Economies. *The Economic Journal*, 123(566):F4–F30.

Hürtgen, P. (2021). Fiscal Space in the COVID-19 Pandemic. *Applied Economics*, 53(39):4517–4532.

Hürtgen, P. and Rühmkorf, R. (2014). Sovereign Default Risk and State-Dependent Twin Deficits. *Journal of International Money and Finance*, 48:357–382.

Khalladi, H. B. H. (2019). Fiscal Fatigue, Public Debt Limits and Fiscal Space in Some MENA Countries. *Economics Bulletin*, 39(2):1005–1017.

Leeper, E. M., Plante, M., and Traum, N. (2010). Dynamics of Fiscal Financing in the United States. *Journal of Econometrics*, 156(2):304–321.

Mahmah, A. E. and Kandil, M. E. (2019). The Balance between Fiscal Consolidation and Non-oil Growth: The Case of the UAE. *Borsa Istanbul Review*, 19(1):77–93.

Neaime, S. (2010). Sustainability of MENA Public Debt and the Macroeconomic Implications of the Recent Global Financial Crisis. *Middle East Development Journal*, 2(02):177–201.

Neaime, S. and Gaysset, I. (2017). Sustainability of Macroeconomic Policies in Selected MENA Countries: Post Financial and Debt Crises. *Research in International Business and Finance*, 40:129–140.

Ploeg, F. v. d. (2011). Natural Resources: Curse or Blessing? *Journal of Economic Literature*, 49(2):366–420.

Reinhart, C. M. and Rogoff, K. S. (2009). *This Time Is Different: Eight Centuries of Financial Folly*. Princeton University Press.

Sarangi, N. and El-Ahmadieh, L. (2017). Fiscal Policy Response to Public Debt in the Arab Region. *Economic and Social Commission for Western Asia (ESCWA)*.

Tazhibayeva, K., Ter-Martirosyan, A., and Husain, A. (2008). Fiscal Policy and Economic Cycles in Oil-Exporting Countries. *IMF Working Paper*.

Trabandt, M. and Uhlig, H. (2011). The Laffer Curve Revisited. *Journal of Monetary Economics*, 58(4):305–327.