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Sovereign Debt and Macroeconomic Stability: Considering the Threshold Effect of Governance

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Abstract

This study examines whether institutional quality conditions the relationship between sovereign debt and macroeconomic stability using panel data for 120 developed and developing countries over 2004-2022. Macroeconomic stability is measured using a composite index constructed by principal component analysis (PCA) from the budget deficit, real interest rate, unemployment rate, annual inflation rate, and nominal exchange rate. Baseline dynamic-panel estimates indicate a negative association between sovereign debt and macroeconomic stability, while institutional quality is positively associated with stability. The interaction specification indicates that the marginal association between debt and stability varies with governance. Estimates from the dynamic panel-threshold model of Seo and Shin (2016) identify a governance threshold: the estimated debt coefficient is negative below the threshold and positive above it. These results suggest that the relationship between sovereign debt and macroeconomic stability is conditional on institutional quality. The interpretation of the threshold is specific to the governance index and sample used in this study.

Keywords

Institutional Quality, Macroeconomic Stability, Sovereign Debt, Threshold Effect, Governance

1. Introduction

For several decades, sovereign debt has been considered an instrument of political and economic governance of any country. Some authors have shown that better management and use of debt is a source of wealth creation and promotes economic growth and social well-being. We can mention (Gómez-Puig and Sosvilla-

Rivero, 2018; Oyadeyi et al., 2024). In some cases, the massive use of debt can be a threat to economic growth and development. As a result, countries ensure that they have a sustainable debt capable of making up their deficit in terms of needs. Several developed and developing countries are continuously resorting to the urgent needs generated by the shocks due to the Covid-19 pandemic, climate change and also the crisis in Ukraine. Law et al. (2021) have shown that the large accumulation of sovereign debt to maintain fiscal stability in developed economies influences emerging market economies. Indeed, that analysis shows that the effect of debt on economies can be mitigated and controversial depending on the weight, the composition of the debt and the level of economic development and production of the country. Elmendorf and Mankiw (1999). Massive debt can dampen the positive effects of countercyclical fiscal policies (Aghion and Kharroubi, 2007), reduce capital accumulation (Baldacci and Kumar, 2010), reduce the consumption of renewable energy (Hashemizadeh et al., 2021), Increasing inflation (Maitra, 2019; Aimola and Odhiambo, 2021), weakening household spending and entrepreneurship development (Cumming and Hubert, 2022) and thus take account of higher macroeconomic volatility (Zouhaier and Fatma, 2014). Since debt is an instrument of budgetary balance, several studies suggest that there is a non-linear relationship between debt and economic stability (Law et al., 2021; Brida et al., 2017). We can cite as an example the work of Reinhart and Rogoff (2010) showing that "Public debt and real GDP growth are low for debt-to-GDP ratios below a threshold of 90% of GDP. Above 90%, median growth rates drop by 1% and average growth decreases significantly." Some work such as Herndon et al. (2014), Law et al. (2021) and Brida et al. (2017) show that there is a debt threshold effect on economic growth.

When it comes to the proper management of government financial resources, institutional quality plays a crucial role as an instrument for the proper use of debt and a better allocation of the fruits of growth. These authors Nguyen and Luong (2021) have shown that institutional quality makes it possible to manage debt well in an economy. These arguments have been confirmed by (Wang et al., 2021). Policymakers, in seeking rent, can further encourage excessive capital investment, which is a source of massive debt growth (Owusu-Nantwi and Owusu-Nantwi, 2023).

Similarly, Sani et al. (2019) and Wang et al. (2021) found that better institutional quality ensures an effective relationship between debt and economic performance. Oatley (2010), Kirch and Terra (2012), Alfaro et al. (2008) and Öztekin (2015) concluded that the country's political institutions and external debt policy are closely linked, and they find that economies with a higher level of institutional quality have a faster and more effective debt adjustment capacity. Similarly, a higher level of institutional quality, as demonstrated by Tarek and Ahmed (2017) and Kim et al. (2017), can help countries manage debt more effectively by reducing borrowing costs, limiting financial risks, and fostering local debt markets. Kemoe and Lartey (2022) found that countries with a high level of institutional qual-

ity can use public debt more effectively and reasonably to finance productive investments and public services, while countries with a low level of institutional quality may face corruption and mismanagement of public resources.

Several countries in the Middle East and North Africa (MENA) such as Tunisia, Egypt, and Lebanon, and other developing countries, including Sri Lanka, Pakistan, Zambia, Ghana, El Salvador, and Kenya, are facing a debt crisis, which is also expected to have a significant impact on the macroeconomic stability of these countries. In addition, in the context of these countries, there is a notable concern about their institutional qualities, so there is a need to study the effect of the mediating role of institutional quality in the relationship between debt and macroeconomic stability.

Thus, our study aims to investigate the mediating role of institutional quality in the relationship between debt and macroeconomic stability. The results reveal that the quality of governance acts as a catalyst for macroeconomic stability in the countries in our sample. Based on the results of a dynamic threshold panel model, we can conclude that below the minimum threshold of institutional quality, the impact of sovereign debt on macroeconomic stability is negative, and above this threshold, the effect is positive.

As for the contribution of our study, first, it is one of the first studies between sovereign debt and macroeconomic stability that considers the threshold effect in dynamic panel proposed by Seo and Shin (2016). This choice of this model by Seo and Shin (2016) is more robust than those of Hansen (1999) and Kremer et al. (2013) because the dynamic panel model with threshold effect of Seo and Shin (2016) solves potential problems of endogeneity of control variables by allowing the identification of an endogenous threshold.

Secondly, our contribution can also be seen through the diversity of the characteristics of the economies in our sample of 120 countries (level of economic development, different economic structures, different cultural diversity and different government policies, etc.). This consideration of this diversity in the sample emphasizes the heterogeneity within the units of our sample, which is a crucial aspect in such a study. It is in this sense that our study makes a second original contribution by building on this robustness. The central assumption that underpins our study is that sovereign debt certainly improves macroeconomic stability, but below a certain threshold of institutional quality. Indeed, regardless of the country's level of development, there is a minimum governance threshold that improves the relationship between sovereign debt and macroeconomic stability.

The rest of our work is as follows: in section 2 we discuss the literature review, section 3 considers the description of the data and variables, the estimation methods in section 4, then the results and discussions in section 5 and finally we conclude and list some economic implications in section 6.

2. Literature Review

In this literature review, we focus on the link between sovereign debt and growth

on the one hand, and on the relationship between debt and macroeconomic stability on the other, taking governance into account.

Several authors have studied the link between debt and economic growth and have found that external debt shocks are detrimental to economic development and long-term investment, as can be found in Onafowora and Owoye (2019). As for Burhanudin et al. (2017), they found a positive long-term relationship between debt and economic growth. Chudik et al. (2017) found that there is no threshold effect between debt and economic growth. In one of his studies found that the reduction of external debt stimulates economic growth in developing countries. In addition, Shkolnyk and Koilo (2018) showed that external debt affects a country's economic growth but in a non-linear way. As for the threshold effect analysis, Presbitero (2012) found that sovereign debt has a negative impact on economic growth below 90% of the debt-to-GDP ratio and beyond this threshold the effect is no longer significant.

Still in the same vein, authors such as Lee et al. (2017) found that the debt threshold is 30%, that above this threshold growth decreases significantly. As for Baharumshah et al. (2017), they found that debt is inversely related to economic growth above a certain threshold (more than 55% of GDP). Siddique et al. (2016) showed that in the long run and beyond a certain level of debt, debt leads to negative economic growth and current account deficits due to low investment efficiency, low productivity of factors of production such as capital and labor. On the other hand, considering the aspect of institutional quality, the relationship between debt and economic growth is studied by some authors with different results. Kourtellos et al. (2013) found that there is strong evidence of sovereign debt threshold effects on growth as a function of the level of democracy. Presbitero (2008) confirms that institutions and policies influence the relationship between debt and growth and external debt is considered inefficient for countries with weak institutions.

The effect of public debt on economic growth is determined by the level of institutional quality and the amount of public debt, confirms Sani et al. (2019) and Mensah et al. (2018). Authors González-Fernández and González-Velasco (2014) found that debt levels rise faster in a country with higher levels of corruption.

Rogoff (2020) notes that high public debt following a political impasse and weak leadership make debt management vulnerable. Aziz (2022) has shown that institutional quality moderates economic stability. Finally, the relationship between debt and macroeconomic stability was discussed. Sutherland and Hoeller (2012) found that excessive debt shocks affect macroeconomic stability. In the short term, the stability of the economy is negatively and significantly affected by debt servicing (Onyele and Nwadike, 2021). Also, the macroeconomic system will be unstable, with a lower growth rate and a higher debt burden Jarsulic (1990) and Kameda and Nakata (2005).

In view of the literature review, several results show that there is a non-linear effect and a threshold effect between debt and economic growth. We can cite one

of the pioneering works by Reinhart and Rogoff (2010). They have shown that there is a non-linear relationship between sovereign debt and economic growth. Reinhart and Rogoff (2010) worked over a long period of 200 years and on a set of 44 countries, concluding that a high level of sovereign debt has a negative impact on economic growth. They came to the conclusion that the median growth rate would decrease by 1% if the debt-to-GDP ratio was above 90%. These results have been criticized and questioned by Herndon et al. (2014): according to these authors, the growth rate increases to 2.2% rather than decreasing by 1% when the debt-to-GDP ratio is above 90%. In addition, by emphasizing the mediating role of institutional quality in the relationship between sovereign debt and economic growth, several results have shown that institutional quality occupies a crucial place in the relationship between debt and growth, such as Teles and Mussolini (2014), Presbitero (2012), Yolcu Karadam (2018) and Law et al. (2021). Browsing the literature review, she informs us that there are several studies that have been carried out between sovereign debt and economic growth, but only a few studies, without taking into account the dynamics of the threshold effect, have been conducted on the link between sovereign debt and macroeconomic stability, considered as a broader component than economic growth. Moreover, although there are a few studies on the place of governance in the relationship between debt and economic growth, there is very little study on the threshold effect of institutional quality in the relationship between sovereign debt and macroeconomic stability.

In addition, to our knowledge, this is the first study to carry out an analysis on a large sample considering developed and developing countries on this theme.

It is in this sense that our study makes an original contribution.

Our main objective is to study the role of institutional quality in the relationship between sovereign debt and macroeconomic stability.

The central assumption that underpins our study is that sovereign debt positively affects macroeconomic stability only below a certain minimum threshold of institutional quality.

3. Description of Variables and Data

In this section, we describe our data and variables to make our study more understandable.

3.1. Measuring Macroeconomic Stability

The dependent variable is macroeconomic stability (STAB_MACRO). Following the broad measurement approach of Ismihan et al. (2005) and Martínez-Vázquez and MacNab (2006), the index combines five components: the budget deficit, real interest rate, unemployment rate, annual inflation rate, and nominal exchange rate. Before aggregation, the indicators are harmonized so that higher transformed values consistently represent greater macroeconomic stability. The nominal exchange-rate series is transformed before aggregation because its raw numerical magnitude depends on currency denomination and is not directly com-

parable across countries. The five harmonized indicators are combined using principal component analysis (PCA), retaining the first principal component; therefore, the components contribute according to the estimated PCA loadings rather than equal weights. The resulting composite index is normalized to a 0 - 100 scale using min-max normalization.

3.2. Measuring Sovereign Debt

Sovereign debt is one of our interest variables considered to be debt issued by the government and/or a central bank. It is expressed as a percentage of GDP. It will be noted SOV_DEBT.

3.3. Institutional Quality (IQ) Calculation

The institutional-quality index (IQ) is based on the six Worldwide Governance Indicators (WGI) dimensions developed by Kaufmann et al. (2009): Voice and Accountability; Political Stability and Absence of Violence/Terrorism; Government Effectiveness; Regulatory Quality; Rule of Law; and Control of Corruption.

The six Worldwide Governance Indicators (WGI) dimensions are expressed on a common 0 - 100 scale and combined using their arithmetic mean: IQ = (VA + PS + GE + RQ + RL + CC)/6, where VA denotes Voice and Accountability, PS Political Stability and Absence of Violence/Terrorism, GE Government Effectiveness, RQ Regulatory Quality, RL Rule of Law, and CC Control of Corruption. Each dimension therefore receives an equal weight of 1/6. The resulting index is bounded between 0 and 100, so the estimated threshold is interpreted on this constructed governance scale. The full-sample threshold of 70.532 represents the estimated governance level at which the relationship between sovereign debt and macroeconomic stability changes regime in this sample; it is not a universal benchmark for good governance.

3.4. The Control Variables of Our Model

Like several authors, we take into account certain control variables in our study that, according to the economic literature, influence the relationship between institutional quality, sovereign debt and macroeconomic stability (Ffrench-Davis, 2000; Ffrench-Davis, 2012; Lederman and Maloney, 2007; Sirimaneetham and Temple, 2009).

Tax revenues (REVENUES-TAX), showing the government's ability to mobilize domestic resources in the form of taxes. Also we have capital formation rated FOR_CAP capturing the level of accumulation of physical and financial assets in order to strengthen sustainable investments (Ffrench-Davis, 2000; Ffrench-Davis, 2012). Trade openness (Ouv_Com) to understand the influence of trade with the Rest of the World on the relationship between public debt and macroeconomic stability (Lederman and Maloney, 2007). Finally, economic growth (CR_ECO) in order to capture the level of wealth and the phases of economic expansion and recession that a country is facing (Sirimaneetham and Temple, 2009).

3.5. Data Descriptions and Sample

The sample contains 120 countries observed over 2004-2022, corresponding to 19 annual observations per country and 2280 country-year observations in the descriptive panel. It comprises 80 high-income/developed economies and 40 middle- or low-income/developing economies. The GMM estimations contain 2160 observations because the dynamic specification requires lagged observations. The descriptive panel is therefore balanced in terms of the reported country-year count, whereas the estimation sample is smaller after accounting for the dynamic specification (Table 1).

Table 1. List of variables and their sources.

Variables	Description	Data source
STAB_MACRO	Composite index based on the budget deficit, real interest rate, unemployment rate, annual inflation, and nominal exchange rate; constructed using PCA after transformation and normalization. The exact transformations, PCA weights/loadings, score orientation, and exchange-rate comparability procedure must be documented in the text.	WDI
IQ	Arithmetic mean of the six WGI dimensions: Voice and Accountability; Political Stability and Absence of Violence/Terrorism; Government Effectiveness; Regulatory Quality; Rule of Law; and Control of Corruption. The precise 0 - 100 normalization formula and data version must be stated in the text.	WDI
SOV_DEBT	Sovereign debt as a percentage of GDP	IMF
CREDIT_ECO	Credit to the economy to the private sector (% of GDP)	WDI
REVENUES-TAX	Tax revenue (% of GDP)	WDI
FOR_CAP	Logarithm of gross capital formation	WDI
OUV_COM	Trade openness (% of GDP), calculated	WDI
CR_ECO	Annual Economic Growth of GDP	WDI

4. Estimation Methods

4.1. Basic Models (Least Squares, Ordinary, Pooled, Fixed and Random Effects Panel)

To assess the effect of institutional quality on macroeconomic stability, we will rely on a basic model, which allows us to make an estimate using the Ordinary Pooled Least Squares, Fixed-Effects and Random Effects Panel Methods.

The basic equation is as follows:

$$\text{STAB_MACRO}_{i,t} = \alpha + \beta_1 \text{DEBT_SOV}_{i,t} + \beta_2 \text{QI}_{i,t} + \beta_3' X_{it} + \mu_i + \varepsilon_{i,t} \quad (1)$$

where STAB_MACRO, DEBT_SOV, IQ, X_{it}, μ_i, and $\varepsilon_{i,t}$ respectively represent macroeconomic stability as the dependent variable, Sovereign debt, institutional quality, the vector of the set of control variables, the error term with capturing the countries and the year. These above-mentioned models are considered static, i.e. unable to estimate better results for our case, while dynamic panel models are more robust and adequate to solve these problems.

The baseline dynamic-panel analysis uses the Generalized Method of Moments (GMM) framework associated with Arellano and Bond (1991) and Blundell & Bond (1998), with the purpose of accounting for persistence in macroeconomic stability and potential endogeneity. The validity of a GMM specification depends on the moment conditions, the classification of regressors as endogenous, predetermined, or exogenous, the lag ranges used to construct instruments, and diagnostic tests. Accordingly, the estimator and instrument strategy must be described explicitly rather than treating GMM as an automatic solution to all endogeneity concerns (Arellano and Bover, 1995).

In the reported specifications, the lagged dependent variable is treated as endogenous, and sovereign debt is treated as potentially endogenous because debt accumulation and macroeconomic stability may be jointly determined. Institutional quality and the debt-institutional-quality interaction are handled within the internal-instrument framework. For variables treated as endogenous, internal instruments use lags dated t−2 and earlier, and the instrument set is restricted to limit instrument proliferation. GMM1 and GMM2 use 71 and 72 instruments, respectively. The reported diagnostics are AR(1) $p = 0.001$ in both specifications, AR(2) $p = 0.149$ and 0.148, and Hansen $p = 0.178$ and 0.430. These results do not indicate second-order serial correlation, and the Hansen tests do not reject the instrument sets.

4.2. Seo and Shin (2016) Threshold Dynamic Panel Model

To test whether the association between sovereign debt and macroeconomic stability changes with institutional quality, the study employs the dynamic panel-threshold approach of Seo and Shin (2016). In this framework, the threshold variable may be endogenous, and inference must account for the non-standard distribution of threshold-related test statistics. The written equation must match the estimated specification, including any regime-specific coefficients on sovereign debt and the dynamic term.

The empirical model can be written as follows:

$$\text{STAB_MACRO}_{it} = \alpha_i + \delta x'_{it} + k\left(q_{it} - \gamma\right)1\left\{q_{it} > \gamma\right\} + \varepsilon_{i,t} \tag{2}$$

In the threshold specification, STAB_MACRO_{it} is the dependent variable; the explanatory-variable vector includes sovereign debt and the stated controls; IQ is the threshold variable; γ is the estimated threshold; and the indicator function assigns observations to the lower and upper governance regimes. Separate debt coefficients are estimated for IQ ≤ γ and IQ > γ, corresponding to the regime-

specific terms in Equation (3). The Seo and Shin (2016) framework is used, and the reported linearity-test p-value of 0.000 is expressed as $p < 0.001$. The estimated full-sample threshold is 70.532.

5. Results and Discussions

In this section we put the results of the descriptive and correlation statistics in subsection 5.1, then the estimation results with the basic model in 5.2 and finally the robustness results in 5.3.

5.1. Results of Descriptive Statistics and Correlations

Tables 2-4 report descriptive statistics for the pooled sample and the two country groups. The pooled sample contains 2280 observations, while the developed- and developing-country subsamples contain 1520 and 760 observations, respectively. The mean macroeconomic-stability index is 42.90 in the pooled sample, compared with 49.05 for developed countries and 35.38 for developing countries. Table 2 reports a pooled minimum of 19.02 for STAB-MACRO and 0.30 for SOV_DEBT, consistent with the minima shown in the subgroup tables.

The mean institutional-quality index is 51.02 in the pooled sample, compared with 63.41 for developed countries and 21.35 for developing countries. The reported pooled minimum and maximum are 1.58 and 99.80, respectively. The response to the reviewer confirms the corrected pooled minima, but does not provide a fresh export of the descriptive statistics from the final analysis dataset.

Our results in Table 5 reveal a positive and significant correlation between the institutional quality variable and the other variables in our study except for the economic growth variable. In addition, the relationship between governance and macroeconomic stability is strong and positive. This result confirms the crucial place of institutional quality in the socio-economic development of any nation, which result reinforces our interest in studying this theme in a wider set of countries.

Table 2. Global sample of countries.

Variables	N	Mean	SD	Min	Max
STAB-MACRO	2280.00	42.90	11.05	19.02	100.00
SOV_DEBT	2280.00	50.60	38.07	0.30	345.33
CREDIT_ECO	2280.00	57.30	48.10	0.00	307.88
REVENUES-TAX	2280.00	17.60	7.30	0.05	63.50
FOR_CAP	2280.00	24.01	1.80	18.10	30.14
OUV_COM	2280.00	88.15	59.25	0.80	445.80
CR_ECO	2280.00	4.25	5.50	−52.38	86.50
IQ	2280.00	51.02	28.62	1.58	99.80

Note: SD = Standard Deviation, N = Number of observations.

Table 3. Sample of developed countries.

Variables	N	Mean	SD	Min	Max
STAB-MACRO	1520.00	49.05	10.12	19.87	100.00
SOV_DEBT	1520.00	51.91	39.65	0.30	343.55
CREDIT_ECO	1520.00	73.04	48.95	0.22	304.25
REVENUES-TAX	1520.00	19.07	8.00	0.05	63.10
FOR_CAP	1520.00	24.20	1.90	19.11	29.79
OUV_COM	1520.00	99.17	64.12	20.50	442.30
CR_ECO	1520.00	3.10	5.60	−50.48	87.12
IQ	1520.00	63.41	24.24	3.19	99.74

Note: SD = Standard Deviation, N = Number of observations.

Table 4. Sample of developing countries.

Variables	N	Mean	SD	Min	Max
STAB-MACRO	760.00	35.38	5.87	19.02	47.24
SOV_DEBT	760.00	52.98	31.50	7.30	272.18
CREDIT_ECO	760.00	26.03	22.06	0.00	147.80
REVENUES-TAX	760.00	13.17	4.70	0.05	29.60
FOR_CAP	760.00	22.50	1.80	17.25	28.10
OUV_COM	760.00	66.12	31.44	0.78	211.13
CR_ECO	760.00	4.30	4.75	−28.10	26.44
IQ	760.00	21.35	13.25	1.54	61.17

Note: SD = Standard Deviation, N = Number of observations.

Table 5. Correlation between variables.

Variables	STAB-MACRO	SOV_DEBT	CREDIT_ECO	REVENUES-TAX	FOR-CAP	OUV_COM	CR_ECO	IQ
STAB-MACRO	1.00							
SOV_DEBT	0.03	1.00						
CREDIT_ECO	0.67***	0.18***	1.00					
REVENUES-TAX	0.52***	0.09***	0.42***	1.00				
FOR_CAP	0.40***	0.08***	0.54***	−0.04	1.00			
OUV_COM	0.33***	−0.80***	0.30***	0.29***	−0.07***	1.00		
CR_ECO	−0.12***	−0.18***	−0.19***	−0.15***	−0.03	0.04	1.00	
IQ	0.90***	0.07***	0.75***	0.55***	0.42***	0.38***	−0.14***	1.00

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 6. Estimation results with our basic models.

Variables	POLS	FE	RE	GMM1	GMM2
STAB-MACRO				0.770***	0.801***
				(0.005)	(0.006)
SOV_DEBT	−0.016***	−0.004	−0.006***	−0.006***	0.013***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.005)
REVENUES-TAX	0.023*	0.000	−0.002	−0.004	−0.004
	(0.013)	(0.010)	(0.011)	(0.003)	(0.006)
CREDIT_ECO	0.008***	0.007**	0.006**	0.0015***	0.022***
	(0.003)	(0.003)	(0.003)	(0.001)	(0.001)
FOR_CAP	−0.156***	−0.001	−0.051	−0.136***	−0.122***
	(0.043)	(0.059)	(0.055)	(0.021)	(0.031)
OUV_COM	−0.012***	−0.005*	−0.005***	−0.005***	−0.006***
	(0.001)	(0.003)	(0.002)	(0.001)	(0.004)
CR_ECO	0.015	0.002	0.003	0.017***	0.022***
	(0.013)	(0.007)	(0.007)	(0.003)	(0.005)
IQ	0.394***	0.445**	0.420	0.082***	0.112***
	(0.004)	(0.011)	(0.008)	(0.004)	(0.008)
SOV_DEBT × IQ					−0.005***
					(0.001)
Constant	28.391***	21.301***	25.548***	9.063***	8.710***
	(0.989)	(1.504)	(1.330)	(0.513)	(0.834)
Observations	2280	2280	2280	2160	2160
R-Squared	0.522	0.477			
Number of Country	120	120	120	120	120
Year and Country Effect		Yes	Yes		
AR(1)				0.001	0.001
AR(2)				0.149	0.148
Hansen				0.178	0.430
Number of Instruments				71	72

Note: ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$. POLS = pooled ordinary least squares; FE = fixed effects; RE = random effects; GMM = generalized method of moments. Hansen denotes the Hansen test p-value; AR(1) and AR(2) denote tests for first- and second-order serial correlation, respectively.

Table 6 reports the baseline and dynamic-panel estimates. In GMM2, the coefficient on SOV_DEBT is positive (0.013) and the coefficient on the interaction SOV_DEBT × IQ is negative (−0.005), both statistically significant as reported. In an interaction model, the marginal association between sovereign debt and macroeconomic stability is β_debt + β_interaction·IQ. Thus, given the reported signs, the estimated association of debt declines as IQ increases; the sign of the marginal association at any particular governance level depends on the index scale and the estimated coefficients. These interaction results should not be described as showing that governance necessarily makes the debt effect more positive at every level. The threshold model addresses a distinct question by estimating separate debt coefficients below and above the estimated governance threshold.

However, these above-mentioned results do not give us the threshold level at which institutional quality reinforces the impact of debt on macroeconomic stability. Therefore, using a dynamic threshold panel model from Seo and Shin (2016), we obtain an optimal threshold at the level of our overall sample and similarly at the level of the subgroups of developed and developing countries.

5.2. The Results of Regressions with the Dynamic Threshold Effect Panel Model of Seo and Shin (2016)

Table 7 reports a governance threshold of 70.532 on the index scale used in this study. The estimated sovereign-debt coefficient is negative below the threshold (−0.003) and positive above it (0.058), with statistical significance as reported in the table. The reported linearity-test p-value of 0.000 should be interpreted as $p < 0.001$, subject to confirmation of the test procedure and its implementation. This evidence is consistent with a regime-dependent association between sovereign debt and macroeconomic stability. Because the threshold is defined using the constructed governance index, its numerical value depends on the index's normalization and should not be interpreted as a universal cut-off for good governance.

Table 7. Dynamic threshold panel estimation results.

Variables	IQ < 70,532 Below the threshold	IQ > 70,532 Beyond the threshold
STAB-MACRO	0.046***	0.501***
	(0.004)	(0.007)
SOV_DEBT	−0.003***	0.058***
	(0.000)	(0.001)
REVENUE-TAX	−0.005***	0.004**
	(0.001)	(0.002)
ECO-CREDIT	0.004***	−0.015***
	(0.000)	(0.002)

Continued

FOR-CAP	0.014***	0.970***
	(0.006)	(0.050)
OUV-COM	0.003***	−0.020***
	(0.000)	(0.001)
CR-ECO	−0.007***	−0.016***
	(0.000)	(0.002)
IQ	0.402***	0.900***
	(0.004)	(0.019)
Constant		−109.508***
γ	70.532***	(1.302)
	(0.470)	
N Countries	120	
T	19	
LT *p*-Value	0.000	

Note: Standard errors are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$. LT denotes the linearity test. The reported threshold and *p*-value should be confirmed against the original estimation output.

5.3. Robustness Verification Results

We check the robustness of our results by considering the heterogeneous characteristics in our overall sample.

Therefore, we make the estimate by splitting the overall sample into two subsamples, i.e. a sample from developed countries and another from developing countries.

This choice is justified because the economic literature informs us that there are indeed divergent characteristics between a developed country and a developing country. This difference starts from the level of financial development, the cultural level, the level of governance, the level of wealth, the level of different infrastructures, etc.

Indeed, our results may be influenced by these heterogeneous characteristics, so it is appropriate to estimate on the two sub-samples on either side to draw potential conclusions about the threshold effect of institutional quality in the relationship between sovereign debt and macroeconomic stability. In more explicit terms, our results can be influenced by the level of wealth of countries, as it reflects the state's ability to cope with external shocks and to be resilient. They can be affected by the financial development of countries, as greater financial development indicates a greater ability to find domestic financing in order to keep the economy on a good footing, which is a source of attraction for foreign investors,

a guarantee of growth and macroeconomic stability. They can also be conditioned by the degree of trade openness, which is a proxy for the integration of countries into the world economy and which informs us about the extroversion of economies which also influences the decision of investors to invest or not in a country.

Table 8. Robustness test results with two subsamples.

Variables	a. Case of developed countries		b. Case of developing countries	
	IQ < 85,221 Below the threshold	**IQ > 85,221 Beyond the threshold**	**IQ < 30,754 Below the threshold**	**IQ > 30,754 Beyond the threshold**
STAB-MACRO	0.140***	0.170***	0.121***	0.147*
	(0.025)	(0.023)	(0.044)	(0.077)
SOV_DEBT	−0.008***	0.051***	−0.006***	0.013***
	(0.000)	(0.003)	(0.001)	(0.002)
REVENUE_TAX	0.008***	−0.023***	−0.014**	0.019
	(0.002)	(0.005)	(0.007)	(0.016)
CRE-ECO	−0.000	−0.020***	0.000	0.008
	(0.000)	(0.001)	(0.011)	(0.008)
FOR-CAP	0.152***	−0.701***	−0.023	−0.087
	(0.009)	(0.060)	(0.067)	(0.077)
OUV_COM	0.000	0.006***	−0.002*	−0.003
	(0.000)	(0.001)	(0.001)	(0.002)
CR-ECO	−0.006***	0.053***	−0.039***	0.050***
	(0.002)	(0.007)	(0.006)	(0.019)
IQ	0.390***	3.023***	0.387***	0.540***
	(0.006)	(0.067)	(0.039)	(0.012)
Constant		−227.807***		4.620
γ	85.221***	(5.877)	30.754***	(3.50)
	(0.267)		(7.235)	
N countries	80		40	
T	19		19	
LT *p*-Value	0.000		0.000	

Note: Standard errors are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$. LT denotes the linearity test. The threshold estimates and test results should be confirmed against the original estimation output.

The subsample estimates show different governance thresholds: 85.221 for developed countries and 30.754 for developing countries, as reported in **Table 8**. In both subsamples, the estimated sovereign-debt coefficient is negative below the threshold and positive above it: −0.008 and 0.051 for developed countries, and −0.006 and 0.013 for developing countries. The reported significance levels should be interpreted in conjunction with the relevant standard errors and the threshold-test procedure. These estimates are consistent with the possibility that the relationship between debt and macroeconomic stability varies across governance regimes and country groups.

These results reveal that the massive indebtedness of countries is still not followed by an improvement in the fundamentals of the economy without a minimum of adequate framework for good governance.

The results on both samples confirm that the regulatory role of institutional quality in the debt-macroeconomic stability relationship is relevant, but the relationship is not linear. These results require a minimum of effort in economic, societal and political governance on the part of the authorities to have a greater impact on the well-being of their citizens.

6. Conclusions and Economic Implications

This paper examined the relationship between sovereign debt, governance, and macroeconomic stability in 120 countries (80 classified as developed and 40 as developing) over 2004-2022. Using the dynamic panel-threshold approach of Seo and Shin (2016), the estimates indicate that the association between sovereign debt and macroeconomic stability varies with institutional quality. The reported threshold is 70.532 for the pooled sample, 85.221 for developed countries, and 30.754 for developing countries; the pooled threshold value must be reconciled with the original estimation output before publication because the manuscript also reports 70.523 in the conclusion. Across the reported threshold specifications, the debt coefficient is negative below the threshold and positive above it. These results suggest that governance quality may condition the macroeconomic consequences of sovereign borrowing, although the estimated thresholds are specific to the index construction, sample, and econometric specification used.

Our results confirm that a minimum of good governance within states will optimize the management of borrowed resources, a better allocation of resources to the most productive sectors capable of absorbing unemployment, creating wealth and improving the mobilization of tax revenues at the domestic level. These results have strong economic implications for decision-makers in states that have been going through a crisis of over-indebtedness and macroeconomic instability that have been repeated for decades. More practically, they should put anti-corruption programs into national development strategies and implement them annually by creating autonomous authorities for the management of public debts. It is imperative that countries make good governance a national priority so that borrowed funds can have a positive impact on macroeconomic fundamentals. Also,

these countries must promote the effective and efficient use of public spending by digitizing public services to control the traceability of transactions, following the example of other African countries, Rwanda and Kenya, which have reached a high level in the digitalization of its services, in turn a control of corruption, a source of gain for the State.

Finally, they must guarantee political stability by fighting against terrorists and coups d'état by promoting free and transparent elections in accordance with their constitution.

Author Contributions

Professor Brou Emmanuel Aka supervised the research. Konan Kévin Yao was responsible for the conceptualization, methodology, data collection, econometric estimation, data analysis, interpretation of results, and writing of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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