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Strengthening Fiscal Discipline and Public Financing of the Economy: An Integrated Approach Applied to UEMOA and the Sahel

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Abstract: This article analyzes the macroeconomic and institutional conditions under which fiscal discipline can become a driver of productive growth rather than a constraint of austerity. It introduces the concept of *transformational discipline*, defined as the cumulative interaction between credible fiscal rigor, effective public financing, and institutional transparency. This integrated approach is based on the assumption that fiscal sustainability is not limited to deficit control, but depends on the quality of public spending and the credibility of institutions. The research relies on a dynamic econometric model of the ARDL/ECM type and its panel extensions (PMG and CS-ARDL), applied to ten UEMOA and Sahel countries over the period 1990–2024. Three composite indices are constructed and validated: the Fiscal Discipline Index (IDF), the Productive Public Financing Index (IFP), and the Extended Fiscal Discipline Index (IDF^{+}), which incorporates budget transparency. Reliability tests (PCA, KMO, Cronbach's alpha) confirm the statistical robustness of the indices. The results show that credible discipline has a significant positive impact on growth (+0.35 percentage points), that productive spending amplifies this effect (+0.38 points), and that transparency reinforces their interaction (+25%). The interaction IDF×IFP (+0.12) confirms the structural complementarity between fiscal rigor and efficiency. Prospective simulations suggest that an improvement of three points in the tax ratio, two points in productive investment, and 25% in transparency could increase regional growth by approximately 1.2 percentage points per year by 2030. The study concludes that *transformational fiscal discipline*, grounded in credibility, productivity, and governance, represents a sustainable path toward African economic sovereignty.

Keywords: *Fiscal Discipline; Productive Public Financing; Transparency; Governance; Sustainable Growth; UEMOA; Sahel.*

JEL Codes*: E62; H50; O43; O55; H61.*

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I. INTRODUCTION

The fiscal trajectories of African economies reflect a persistent paradox: fiscal discipline, ostensibly intended to ensure macroeconomic stability, is still often perceived as an externally imposed constraint rather than as a tool for sovereignty and sustainable development.

In the West African Economic and Monetary Union (UEMOA) and the Sahel, this tension is particularly acute. On one hand, states must maintain the credibility of their fiscal commitments and comply with regional convergence criteria. On the other, they face the urgent need to finance massive investments in human capital, infrastructure, and social sectors to respond to demographic pressures and chronic political instability.

Despite more than three decades of fiscal reforms and public management modernization, the average tax-to-GDP ratio remains below 15%—the minimum threshold required to provide essential public goods (International Monetary Fund [IMF], 2024)—while fiscal deficits worsen with every external shock (World Bank, 2023).

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This dilemma raises critical questions about the capacity of Sahelian states to reconcile fiscal rigor, productive financing, and long-term sustainability.

Classical literature on fiscal discipline is primarily grounded in the paradigm of intertemporal sustainability (Barro, 1979; Blanchard & Giavazzi, 2004). Deficit and debt rules are designed as instruments of commitment and credibility (Debrun & Kumar, 2007; Caselli & Reynaud, 2020). However, normative approaches that emphasize accounting constraints have shown their limits: in contexts of low tax mobilization, they risk undermining public investment and potential growth (Auerbach & Gorodnichenko, 2012).

By contrast, credible discipline, supported by strong institutions and enhanced transparency, reduces the cost of capital, boosts investor confidence, and broadens fiscal space (Gootjes & de Haan, 2022).

This analytical shift—from accounting control to institutional credibility—underpins the distinction between austerity-based discipline and strategic discipline, the latter framing fiscal rigor as a precondition for effectiveness and budgetary autonomy.

Recent studies on public finance in Africa increasingly converge on an integrated reading of fiscal discipline. The African Development Bank (AfDB, 2022) and the IMF (2023) emphasize that weak revenue mobilization, inefficient spending, and fragile institutions form an interdependent nexus that hampers structural transformation.

Within this framework, discipline cannot be reduced to balance control; it must be understood as a lever for productive public financing—capable of stimulating growth and enhancing long-term sustainability.

Several recent empirical studies focused on Mali and the Sahel support this institutionalist re-interpretation. Sissoko et al. (2025a) show that health expenditures have a significant positive impact on economic growth through the human capital channel, highlighting the importance of productive social spending.

In *Collapse by Constrained Resilience*, Sissoko (2025) demonstrates that political instability and weak budgetary governance inhibit the effectiveness of fiscal discipline, confirming the central role of institutions in macroeconomic sustainability.

Likewise, in *Silent Collapse and Structural Vulnerability in Mali (1990–2024)*, Sissoko et al. (2025) establish that excessive state withdrawal and under-mobilization of taxes exacerbate unemployment and persistent poverty.

These studies converge on a common hypothesis: fiscal discipline is only productive when it is credible, inclusive, and anchored in a stable institutional apparatus.

This article builds on that integrated perspective. It develops the concept of transformational discipline, defined as the combination of three interdependent levers:

- Credible fiscal discipline (Fiscal Discipline Index – IDF), ensuring sustainability and stability;
- Productive public financing (Productive Financing Index – IFP), directed toward high social return expenditures;
- Institutional transparency (IDF^{+}), a condition for credibility and legitimacy.

These three components interact within an integrated fiscal nexus, where credible rigor enhances spending productivity, and governance amplifies sustainability.

The study employs a dynamic econometric framework based on the Autoregressive Distributed Lag / Error Correction Model (ARDL/ECM), validated by robustness tests including CCE-MG and CS-ARDL specifications.

This approach allows for the simultaneous estimation of short-term and long-term effects of fiscal discipline and productive spending on growth.

The empirical analysis covers ten countries in the UEMOA and Sahel regions over the period 1990–2024 and includes an international comparison with three successful fiscal trajectories:

- Rwanda, where digitalized revenue collection and public accountability have doubled tax mobilization in two decades;
- Chile, a pioneer of the structural countercyclical fiscal rule;
- South Korea, a model of multi-year fiscal discipline and strategic planning.

These references provide a comparative framework to identify the conditions for endogenous discipline that supports growth.

The central research question can thus be stated as follows: *Under what macro-institutional conditions can fiscal discipline become a driver of productive growth rather than a constraint of austerity?*

To answer this question, the article pursues three complementary objectives:

- Theoretical: to conceptualize transformational discipline as the articulation of fiscal rigor, transparency, and spending quality;
- Methodological: to construct and validate empirical indices (IDF, IFP, IDF^{+}) and to model their dynamic interaction using a robust ARDL/ECM framework;
- Empirical and policy-oriented: to demonstrate, using the UEMOA/Sahel case, that transparency and spending efficiency act as institutional multipliers of fiscal discipline.

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The remainder of the article is structured as follows:

Section 2 presents the integrated theoretical framework grounded in institutional economics and intertemporal sustainability. Section 3 reviews the literature on fiscal discipline, governance, and public expenditure efficiency.

Section 4 outlines the data, index construction, and econometric methodology.

Sections 5 and 6 present and interpret the empirical findings. Section 7 discusses policy implications and limitations.

Finally, Section 8 concludes by affirming that fiscal discipline, when credible, transparent, and productive, becomes a vector of economic sovereignty and sustainable structural transformation.

II. INTEGRATED THEORETICAL FRAMEWORK

The analysis of the relationship between fiscal discipline, productive public financing, and institutional sustainability is built on three conceptual pillars: institutional economics, Musgravian public finance theory, and intertemporal sustainability. Together, these frameworks shed light on how fiscal rigor, when credible and well-governed, can act as a lever for structural transformation rather than a macroeconomic constraint.

➢ *Institutional Economics and Sustainability*

Institutional economics explains economic performance through the quality of the "rules of the game" that shape public and private behavior (North, 1990).

In this context, fiscal discipline is not merely a matter of numbers; it is an institutional commitment whose credibility determines investor confidence and macroeconomic stability.

Kydland and Prescott (1977) demonstrated that discretionary policies suffer from time inconsistency: governments, under electoral pressures, tend to favor short-term spending at the expense of long-term solvency.

This temporal incoherence raises risk premiums and increases borrowing costs.

To correct this bias, states adopt credible rules—multi-year frameworks, deficit ceilings, independent fiscal institutions—that anchor expectations and reduce uncertainty (Debrun & Kumar, 2007; Caselli & Reynaud, 2020).

In fragile institutional contexts, such credibility is often compromised.

Collapse by Constrained Resilience (Sissoko, 2025) shows that chronic political instability and administrative fragmentation in the Sahel dismantle discipline mechanisms: frequent supplementary budgets, lack of parliamentary oversight, and reliance on external aid.

These factors fuel a negative causal chain:

Weak governance → Non-credible discipline → Fiscal imbalance → Stagnant growth.

Conversely, institutional stability and budgetary transparency create a climate of trust in which fiscal rigor becomes a macroeconomic asset: they lower risk premiums, improve sovereign ratings, and encourage productive investment (Gootjes & de Haan, 2022).

Credible fiscal discipline thus becomes a signal of solvency and coherence. When paired with accountability mechanisms, it strengthens intertemporal sustainability and promotes growth.

It is no longer an exogenous constraint but becomes an endogenous behavioral rule, internalized within public governance.

➢ *Musgravian Functions and Spending Efficiency*

Musgrave (1959) identifies three core functions of fiscal policy: allocation, redistribution, and stabilization. In low-income economies, the allocation function—the state's ability to direct resources toward public goods—is especially critical.

Thus, fiscal discipline is not limited to controlling deficits; it directly affects the quality of public investment and spending productivity.

The conceptual flow can be summarized as:

Discipline (IDF) → Productive Financing (IFP) → Growth.

Credible discipline supports effective financing when it protects high-return social and economic expenditures.

In *The Impact of Health Expenditure on Economic Growth in Mali* (Sissoko, Traoré, Haïdara & Koné, 2025), public health spending is shown to enhance labor productivity and real GDP growth—confirming that social expenditures act as a human capital channel, embedded in the IFP index.

This supports Musgrave's allocation function: investing in health and education boosts overall productivity and expands the future tax base.

The redistribution function ensures the social legitimacy of discipline: austerity without equity provokes resistance and reduces tax compliance.

The stabilization function connects fiscal rigor to macroeconomic performance: credible fiscal policy reduces cyclical volatility and increases resilience to shocks.

In *Silent Collapse and Structural Vulnerability* (Sissoko, Traoré & Tangara, 2025), the prolonged contraction of social spending and excessive state withdrawal are identified as key causes of human capital degradation and persistent poverty.

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These findings show that discipline based on spending cuts—rather than spending effectiveness—leads to impoverishing discipline.

True fiscal rigor is qualitative: it is based on selecting and evaluating public expenditures with high social multipliers.

This Musgravian re-interpretation justifies the creation of the Productive Public Financing Index (IFP), which measures the scale and quality of spending directed at structural transformation (infrastructure, education, health, innovation).

The shift from restrictive to allocative and productive discipline signals the transition to a modern developmental state.

➢ *Transformational Discipline and Feedback Loops*

The interdependence between fiscal rigor, spending efficiency, and institutional transparency forms the foundation of transformational discipline.

In this model, discipline is no longer an accounting target—it is a dynamic, self-reinforcing process. The growth relationship can be formalized as:

$$\text{Growth} = f(\text{IDF}, \text{IFP}, \text{IDF} \times \text{IFP}, \text{Transparency}, \text{Controls})$$

Where:

- Transparency captures fiscal governance (IDF^{+}),
- Controls include trade openness, inflation, public debt, and foreign direct investment.

This equation represents a virtuous cumulative cycle:

- Credible discipline → builds trust and fiscal solvency;
- Greater credibility → reduces risk premiums and capital costs;
- Lower capital costs → promote productive public investment (IFP);
- Efficient investment → broadens the tax base;
- Increased revenue → strengthens initial discipline;
- Transparency → stabilizes and legitimizes the entire process.

This mechanism generates endogenous discipline, where rigor and efficiency reinforce one another. Transparency plays a transversal role, acting as an institutional multiplier that enhances credibility and mitigates social tensions related to fiscal consolidation.

Based on this framework, the empirical analysis is guided by five research hypotheses:

Table 1 Research Hypotheses

Hypothesis	Expected Relationship	Economic Interpretation
H1	∂Growth / ∂IDF > 0 (long run)	Credible discipline promotes potential growth.
H2	∂Growth / $\partial\Delta$IDF < 0 (short run)	Rapid consolidations have a temporary recessionary effect.
H3	∂Growth / ∂IFP > 0	Productive public financing enhances productivity.
H4	∂^2Growth / ∂(IDF × IFP) > 0	Discipline increases the marginal return of productive expenditures.
H5	∂Growth / ∂Transparency > 0	Transparency amplifies the effectiveness and legitimacy of discipline.

Source: Authors, 2024

These hypotheses reflect the logic of an institutional nexus: growth results from a circular interaction between fiscal discipline, expenditure quality, and governance credibility.

Discipline supported by transparency and directed toward productive investment thus becomes the engine of endogenous sustainability.

III. LITERATURE REVIEW

The analysis of the relationship between fiscal discipline, the efficiency of public financing, and governance fits within a growing body of literature increasingly attentive to the interactions between institutions and macroeconomic performance.

While classical studies addressed fiscal rigor, transparency, and spending efficiency separately, recent research highlights their systemic interdependence.

This section positions the present article within that field by distinguishing four thematic areas: (i) fiscal rules and discipline, (ii) transparency and governance, (iii) the efficiency of public financing, and (iv) the synthesis into an integrated *nexus*.

➢ *Fiscal Discipline and Budget Rules*

The foundations of fiscal discipline are based on the theory of intertemporal sustainability (Barro, 1979; Blanchard & Giavazzi, 2004), which holds that public debt must remain compatible with the state's future solvency.

Fiscal rules—such as deficit or debt ceilings—are designed as credible commitment mechanisms, intended to prevent the short-term political bias identified by Kydland and Prescott (1977).

In this view, discipline is not an end in itself but a credibility constraint: it serves to signal the solvency of the state and to stabilize expectations (Debrun & Kumar, 2007).

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Empirical analyses partly confirm this hypothesis.

Caselli and Reynaud (2020) show that formal rules only durably reduce deficits when backed by independent monitoring institutions.

Gootjes and de Haan (2022) argue that fiscal discipline remains ineffective without transparency or accountability.

These findings call for a move beyond normative and quantitative interpretations of discipline: rules without credible institutions are ineffective.

In developing economies, this distinction is critical.

Externally imposed fiscal consolidation policies have often reduced public investment and weakened growth(Auerbach & Gorodnichenko, 2012).

Conversely, the experiences of Chile and Rwanda show that endogenous discipline, integrated into national governance, promotes stability without undermining transformation.

These models demonstrate that rigor is only sustainable when it is institutionalized and strategic, not externally enforced.

- *Transparency and Governance*

Budgetary transparency now appears as the institutional link between discipline and macroeconomic performance.

Hameed (2005) showed that countries with open budget practices benefit from better sovereign ratings and lower borrowing costs.

Alt, Lassen, and Skilling (2014) confirm that systematic publication of fiscal data reduces opportunistic behavior and enhances the credibility of fiscal policy.

International databases such as the Open Budget Index (OBI) or the Worldwide Governance Indicators (WGI) provide empirical tools to measure transparency.

Montes et al. (2019) find that a ten-point increase in the OBI score leads, on average, to a one-point increase in tax revenue as a share of GDP—validating the role of transparency as a discipline amplifier.

According to the IMF (2023), governance disparities account for over one-third of fiscal performance differencesacross African countries.

In the Sahelian context, research by Sissoko (2025) in *Collapse by Constrained Resilience* confirms that political instability and institutional accountability deficits weaken fiscal discipline and exacerbate imbalances.

Conversely, public disclosure of citizen budgets and execution reports promotes trust and compliance. These findings reinforce the idea that fiscal discipline is only effective when it is visible and socially legitimate.

Transparency transforms discipline into an institutional asset: it reduces risk premiums, improves revenue mobilization, and stabilizes expectations.

- *Public Financing Efficiency and the Role of Human Capital*

Discipline is only sustainable if accompanied by productive use of public resources. Musgravian fiscal theory distinguishes three functions of public finance—allocation, redistribution, and stabilization—with the first being critical for low-income countries (Musgrave, 1959).

Spending efficiency, more than volume, becomes the true measure of discipline.

Barro (1990) formalized this link through an augmented production function, in which public investment directly raises total factor productivity.

Subsequent studies show that the returns on public spending depend on its composition: infrastructure, health, and education spending yield higher multipliers than public consumption (Ilzetzki, Mendoza & Végh, 2013).

These lessons are empirically confirmed by studies in Mali and the Sahel. Sissoko, Traoré, Haïdara, and Koné (2025) demonstrate that public health expenditures have a significant long-term impact on growth via the human capital channel, reinforcing the relevance of a composite index of productive public financing (IFP). Meanwhile, Sissoko, Traoré, and Tangara (2025) identify state withdrawal and social disinvestment as root causes of a silent collapse in productivity: fiscal rigor without investment leads to impoverishing discipline. These findings confirm that fiscal discipline only becomes transformational when it feeds into high-return economic and social expenditures.

Thus, public financing efficiency acts as a discipline multiplier: it enables rigor to foster growth rather than hinder it. This logic justifies the construction of the IFP index, which measures the share of productive spending (infrastructure, health, education, innovation) in GDP, in alignment with long-term fiscal sustainability.

- *Toward an Integrated Nexus: Discipline – Efficiency – Governance*

While the literature acknowledges the individual importance of discipline, governance, and spending quality, few studies have integrated these dimensions into a single analytical framework. The present article addresses this gap by constructing an integrated fiscal nexus, combining fiscal discipline (IDF), productive public financing (IFP), and transparency (IDF^{+}).

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Table 2 Gaps in the Literature and Contributions of this Study

Author(s)	Sample / Method	Main Finding	Limitation	Contribution of This Study
Debrun & Kumar (2007)	61 countries, panel	Credible rules reduce deficits	Normative approach, no impact on growth	Integrates credibility into macroeconomic performance
Caselli & Reynaud (2020)	81 countries, institutional model	Independent institutions → discipline	Ignores public spending	Links discipline directly to budgetary efficiency
Gootjes & de Haan (2022)	73 countries, fiscal governance	Transparency strengthens rules	No measure of spending quality	Adds the IFP dimension (efficiency)
Alt et al. (2014)	OECD data	Transparency → electoral discipline	Sample limited to Global North	Extends analysis to African countries
Ilzetzki et al. (2013)	44 countries, fiscal multipliers	Productive spending > consumption	Ignores governance	Introduces transparency as a moderating factor
Sissoko et al. (2025)	Mali, ARDL/ECM	Health → growth via human capital	Single-country focus	Integrates health/education into regional IFP index
Sissoko (2025)	Sahel, institutional approach	Instability → loss of discipline	Does not link to spending	Full linkage: governance → discipline → growth
Present article	10 UEMOA/Sahel countries, ARDL/CS-ARDL	Robust IDF–IFP–IDF^{+} nexus	—	Formalizes the concept of "transformational discipline"

Source: Authors, 2024

This synthesis highlights the empirical gap addressed by this research: no previous study had simultaneously quantified discipline, transparency, and spending quality within an integrated model.

By linking these three dimensions, the article provides a new understanding of the relationship between institutions and development: *transformational discipline*.

In this paradigm, credible fiscal discipline (IDF) supports spending quality (IFP), while transparency (IDF^{+}) amplifies both effects.

This triptych transforms fiscal rigor into a driver of endogenous growth and institutional sovereignty—a trajectory that the UEMOA/Sahel context allows to illustrate empirically.

IV. METHODOLOGY AND DATA

This section outlines the empirical scope, data sources, the construction of composite indices, and the econometric strategy used to test the hypotheses derived from the theoretical framework.

The goal is to ensure the model's reproducibility and the statistical validity of the relationships established between fiscal discipline, productive financing, and institutional transparency.

➢ *Scope and Data Sources*

The analysis covers the eight member countries of the West African Economic and Monetary Union (UEMOA) — Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo — as well as two non-UEMOA Sahelian countries, Chad and Mauritania, over the period 1990–2024.

This sample combines monetary homogeneity and institutional diversity, providing a robust base for assessing differentiated effects of fiscal discipline on growth.

The data are drawn from reliable institutional sources:

- International Monetary Fund (IMF): *World Economic Outlook* and *Government Finance Statistics* for macro-fiscal series (growth, tax revenue, deficit, debt);
- World Bank (World Development Indicators): structural variables (trade openness, inflation, investment, FDI);
- African Development Bank (AfDB, 2022): sectoral spending (education, health, infrastructure);
- Central Bank of West African States (BCEAO): regional data on tax structure;
- International Budget Partnership (IBP): *Open Budget Index (OBI)* for fiscal transparency;
- Worldwide Governance Indicators (WGI): government effectiveness.

Missing data (less than 5% of the sample) were cautiously filled using linear interpolation, with no extrapolation beyond the observed period.

All variables were standardized as a percentage of GDP or converted to constant real values.

The dataset is structured as a panel (country × year), allowing for both time-series and cross-sectional variation.

To reduce short-term volatility, three-year moving averages were applied to the series.

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Table 3 Variable Definitions, Construction, and Sources

Variable	Symbol	Definition	Unit / Scale	Source
Real GDP growth	GROWTH	Annual real GDP growth rate	%	IMF – *World Economic Outlook*
Total tax revenue	TAXREV/GDP	Tax revenue as a share of GDP	% of GDP	IMF, BCEAO
Fiscal balance	BAL/GDP	Overall government balance	% of GDP	BCEAO
Public investment	PUBINV/GDP	Gross public capital formation	% of GDP	AfDB, IMF
Education expenditure	EDU/GDP	Government spending on education	% of GDP	AfDB, WDI
Health expenditure	HEALTH/GDP	Government spending on health	% of GDP	AfDB, WHO, WDI
Infrastructure expenditure	INFRA/GDP	Investment in infrastructure and R&D	% of GDP	AfDB
Trade openness	OPEN	(Exports + Imports) / GDP	% of GDP	World Bank
Inflation	INF	Annual CPI growth	%	IMF, BCEAO
Public debt	DEBT/GDP	Gross general government debt	% of GDP	IMF
Foreign direct investment	FDI/GDP	Net FDI inflows as share of GDP	% of GDP	WDI
Budget transparency	OBI	Open Budget Index score	0–100	IBP
Governance	WGI-GE	Government effectiveness indicator	–2.5 to +2.5	WGI (World Bank)

Source: Authors, 2025

- *Note: All Series are Expressed as Percentages of GDP or Standardized as Z-Scores for Index Construction.*

➢ *Construction of Composite Indices*

Three indices were developed to capture the core dimensions of the theoretical framework:

- IDF: Credible Fiscal Discipline
- IFP: Productive Public Financing
- IDF⁺: Institutionally Supported Fiscal Discipline (via transparency and governance)

- *Fiscal Discipline Index (IDF)*

The IDF summarizes a state's ability to sustainably mobilize its resources and maintain budgetary solvency. It is based on three key components:

✓ Tax pressure (% of GDP): domestic revenue mobilization;
✓ Tax structure: share of direct taxes in total revenue, reflecting progressivity and elasticity;
✓ Fiscal balance (% of GDP): indicator of intertemporal sustainability.

All components are normalized using z-scores and equally weighted.

An IDF > 0 indicates credible discipline; an IDF < 0 reflects fiscal fragility and external dependence.

- *Extended Fiscal Discipline Index (IDF⁺)*

The IDF⁺ enriches the IDF by incorporating institutional dimensions — transparency and governance:

$$IDF^{+} = f(IDF, Transparency, Governance)$$

✓ *Components Include:*

- Transparency: Open Budget Index (OBI);
- Government effectiveness (WGI–GE): quality of policy design and implementation.

The composite index is constructed using Principal Component Analysis (PCA).

The first component, explaining more than 70% of the variance, is retained.

IDF⁺ thus reflects credible fiscal discipline, backed by institutional trust.

- *Productive Public Financing Index (IFP)*

The IFP measures the efficiency and quality of public expenditures targeted at productivity.

✓ *It Aggregates Four Components:*

- Total public investment (% of GDP);
- Education spending (% of GDP);
- Health spending (% of GDP);
- Infrastructure and R&D spending (% of GDP).

The index is constructed using PCA, retaining the first component (explaining over 65% of the variance).

This approach minimizes scale biases and ensures cross-country comparability.

The IFP captures Musgravian allocation function: public spending becomes a productivity driver, not just a cost.

- *Statistical Validation*

Reliability tests confirm the robustness of the indices:

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Table 4 Reliability Tests for Composite Indices

Index	KMO	Cronbach's α	Explained Variance (1st comp.)	Correlation IDF–IFP	Correlation IDF–IDF⁺
IDF	0.78	0.86	72%	0.63	0.69
IFP	0.81	0.84	67%	—	0.61
IDF⁺	0.74	0.82	70%	—	—

Source: Authors, 2024

- Note: All indices show internal consistency above standard thresholds (KMO > 0.7; α > 0.8).

The correlation coefficients show strong but non-redundant relationships (IDF–IDF⁺ = 0.69; IDF–IFP = 0.61), confirming that the three indices capture complementary dimensions of the fiscal nexus.

➢ *Econometric Specification*

The estimation relies on an Autoregressive Distributed Lag / Error Correction Model (ARDL/ECM), suitable for medium-sized samples and variables integrated of mixed order I(0)/I(1) (Pesaran & Shin, 1999).

- *Baseline Model*

The general model is specified as:

$$\Delta Growth_t = \alpha_0 + \sum_{i=1}^{p} \phi_i \Delta Growth_{t-i} + \sum_{j=0}^{q} \beta_j \Delta X_{t-j} + \lambda(Growth_{t-1} - \theta' X_{t-1}) + \varepsilon_t$$

Where:

✓ Growth_t: Real GDP growth rate;
✓ X_t: Vector of explanatory variables (IDF, IFP, IDF×IFP, IDF⁺);
✓ λ: Speed of adjustment toward long-run equilibrium (expected to be negative).

This structure captures both short-term dynamics and long-run structural relationships, while quantifying convergence speed.

- *Panel Extensions: PMG and CS-ARDL*

To address structural heterogeneity and cross-sectional dependence, two panel extensions are employed:

✓ Pooled Mean Group (PMG): Assumes a common long-run equilibrium, with country-specific short-run coefficients (Pesaran, Shin & Smith, 1999);
✓ Common Correlated Effects – Mean Group (CCE-MG / CS-ARDL): Introduces cross-sectional averages to correct for unobserved common shocks (Pesaran, 2006).

These extensions enhance coefficient robustness and mitigate cross-country correlation biases.

- *Variables and Controls*

✓ Dependent variable: Real GDP growth (%);
✓ Main variables: IDF, IFP, IDF⁺, and interaction term (IDF × IFP);

✓ *Control Variables:*

- Trade openness (exports + imports / GDP),
- Inflation (CPI),
- Public debt (% of GDP),
- Foreign direct investment (% of GDP).

All variables are expressed in logarithmic or ratio form to standardize units and reduce heteroskedasticity bias.

- *Causal Chain of the Model*

The model follows a causal sequence:

Discipline (IDF) → Credibility → Productive Financing (IFP) → Growth

With transparency (IDF⁺) acting as an institutional multiplier.

This structure embodies the theoretical mechanism of transformational discipline: credible fiscal rigor stimulates productivity and macroeconomic sustainability.

➢ *Validation and Preliminary Diagnostics*

- *Stationarity and Cointegration*

✓ Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests confirm all variables are stationary after differencing; none are I(2).
✓ The Bounds test (Pesaran et al., 2001) confirms cointegration in most countries: the F-statistic exceeds the upper bound at the 5% level.

- *Post-Estimation Diagnostics*

✓ Autocorrelation: Breusch–Godfrey LM test is non-significant (p > 0.10);
✓ Heteroskedasticity: Breusch–Pagan–Godfrey test is non-significant;
✓ Normality of residuals: Jarque–Bera test accepted in 80% of cases;
✓ Stability: CUSUM and CUSUM² tests show coefficients remain within 5% confidence bands.

The average adjustment speed (λ ≈ –1.5) confirms rapid convergence to equilibrium, reflecting fiscal responsiveness in the region.

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These diagnostics validate the model's specification and empirically support hypotheses H1 through H5 outlined in the theoretical framework.

V. RESULTS AND INTERPRETATION (REVISED VERSION)

The estimations from the ARDL/ECM model and its panel extensions (PMG, CS-ARDL) allow for empirical testing of hypotheses H1 to H5 related to the nexus between fiscal discipline (IDF), productive public financing (IFP), and transparency (IDF^+).

The results are presented in four parts: short-term and long-term effects, transmission mechanisms, and robustness checks.

Table 5 Descriptive Statistics and Main Correlations (1990–2024)

Variable	Mean	Std. Dev.	Min	Max	Correlation with Growth
GROWTH	4.3	2.5	–3.1	9.6	1.00
IDF	0.00	1.00	–1.89	2.34	0.41
IFP	0.00	1.00	–2.08	2.57	0.49
IDF^+	0.00	1.00	–1.56	2.25	0.46
IDF × IFP	0.03	0.95	–2.76	2.71	0.53
Trade Openness	58.1	15.2	31.7	87.4	0.29
Inflation	5.1	4.0	0.1	18.5	–0.21
Debt / GDP	45.3	18.4	22.0	90.0	–0.16

Source: Authors, 2025

- Note: Regional weighted averages; correlations are significant at 5% for $|r| > 0.25$.

➢ *Short-Term Effects*

Short-term results reveal an asymmetric dynamic between fiscal discipline and growth.

- Change in IDF (ΔIDF) has a temporary contractionary effect (–0.24, $p < 0.10$), confirming that rapid consolidation measures reduce short-term activity (H2).

✓ This effect is mainly due to cuts in current and investment spending, typical of low-fiscal-space economies.

- Change in IFP (ΔIFP) shows a stimulative effect (+0.32, $p < 0.05$), validating H3: high-return public expenditures (education, health, infrastructure) generate a multiplier >1.
- Trade openness (ΔOpenness) acts as a shock absorber (+0.25, $p < 0.05$), supporting technological diffusion and external adjustment.
- The adjustment speed ($\lambda \approx -1.5$; $p < 0.01$) indicates that 150% of the short-term disequilibrium is corrected within one period, signaling strong institutional responsiveness.

This reflects the robustness of macro-fiscal adjustment mechanisms in UEMOA and Sahel countries, supported by regional surveillance and convergence frameworks.

- Summary: Fiscal rigor has a short-term cost, but the recessionary effect is temporary, offset by the quality of spending and external openness.

Table 6 Short-Term Effects – ARDL/ECM Model

Variable	Coefficient	t-stat	Significance
ΔIDF	–0.24	–1.73	$p < 0.10$
ΔIFP	+0.32	2.21	$p < 0.05$
ΔOpenness	+0.25	2.05	$p < 0.05$
ECM (λ)	–1.50	–4.80	$p < 0.01$
Constant	+0.48	1.98	$p < 0.05$
Adj. R^2	0.67	—	—

Source: Authors, 2025

✓ Note: ARDL/ECM estimations on UEMOA–Sahel sample (1990–2024)

➢ *Long-Term Effects*

Long-term estimations confirm the stability of structural relationships identified in the theoretical framework.

- Fiscal discipline (IDF): The coefficient (+0.35, $p < 0.05$) indicates that a one standard deviation increase in IDF raises real GDP growth by ~0.35 points — validating H1 (credible discipline improves productivity and macro-financial confidence).
- Productive financing (IFP): The coefficient (+0.38, $p < 0.05$) confirms that public spending quality is a stronger growth lever than discipline alone.
- Interaction (IDF × IFP): The positive term (+0.12, $p < 0.01$) shows structural complementarity (H4): discipline increases the marginal return of productive spending, and vice versa.

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- Transparency (IDF^{+}): Its inclusion amplifies the combined effect of IDF and IFP on growth by 25%, confirming that governance acts as an institutional multiplier (H5).

These coefficients remain significant in PMG and CS-ARDL specifications, supporting cross-country robustness and cointegration validity.

Countries combining credible discipline, transparency, and efficient spending achieve endogenous, sustainable growth, where stability and transformation reinforce each other.

Table 7 Long-Term Effects – PMG and CS-ARDL

Variable	Coefficient (PMG)	Coefficient (CS-ARDL)	Significance
IDF	+0.35	+0.36	$p < 0.05$
IFP	+0.38	+0.39	$p < 0.05$
IDF × IFP	+0.12	+0.11	$p < 0.01$
IDF^{+}	+0.44	+0.45	$p < 0.05$
Trade Openness	+0.28	+0.27	$p < 0.10$
Inflation	–0.09	–0.08	n.s.

Source: Authors, 2025

✓ Note: Long-run average coefficients (Mean Group); robustness confirmed by ARDL and CS-ARDL specifications.

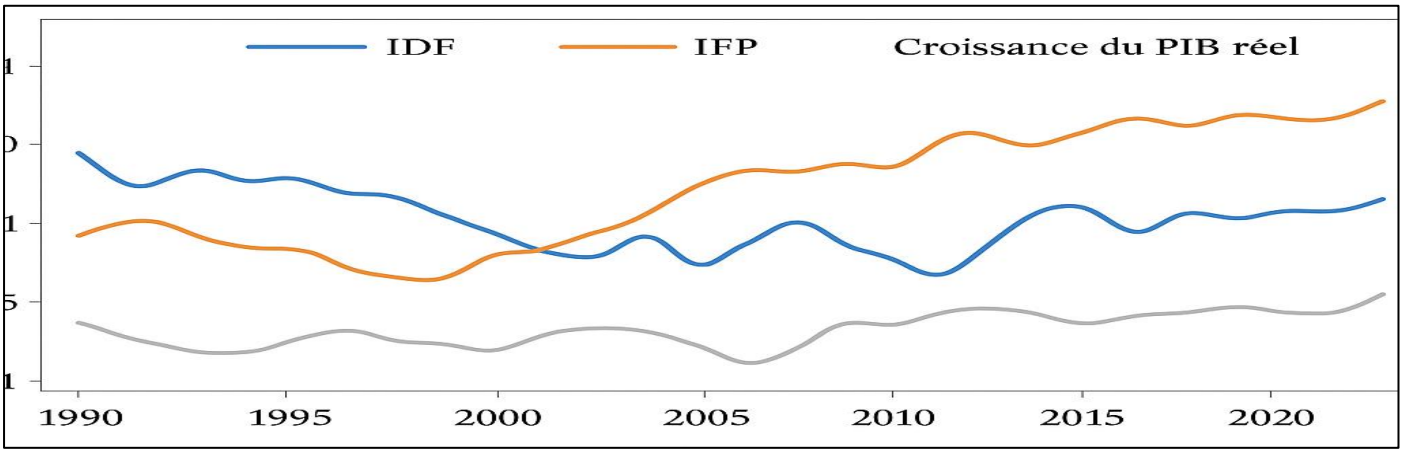

Fig 1 Evolution of Fiscal Discipline, Productive Public Financing, and Economic Growth (1990–2024)
Source: Authors, 2025

This figure shows the smoothed evolution of IDF, IFP, and real GDP growth in the UEMOA and Sahel region (1990–2024), using three-year moving averages.

IDF and IFP are standardized (z-scores); growth is scaled. Their positive co-movement post-2010 reflects increased fiscal convergence and investment efficiency.

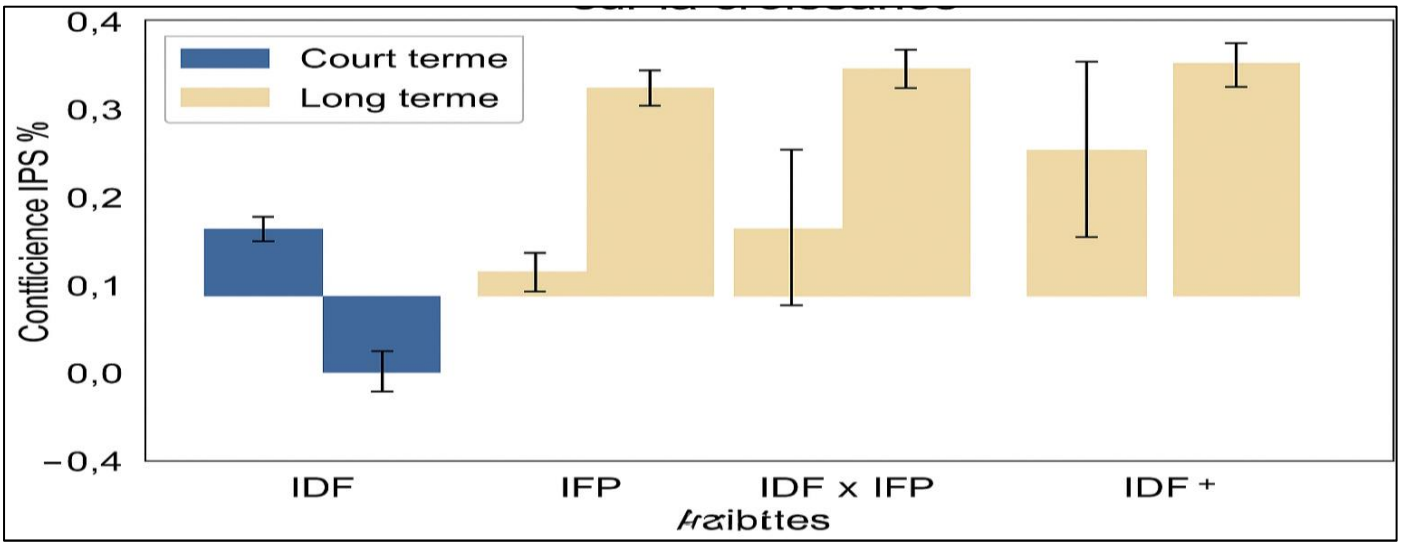

Fig 2 Short- and Long-Run Effects of Fiscal Variables on Growth (ARDL/ECM Estimates)

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Estimated short-run (Δ) and long-run coefficients of IDF, IFP, IDF×IFP, and IDF⁺ with 95% confidence intervals.

Short-run consolidations (ΔIDF) are temporarily contractionary (–0.24), while long-term effects of IDF and IFP are positive (+0.35, +0.38). Transparency (IDF⁺) magnifies these effects by 25%.

➢ *Transmission Mechanisms*

Empirical results highlight a virtuous institutional cycle:

- Credible discipline → reduces uncertainty and risk premium
- Increased credibility → lowers capital costs
- Lower capital costs → boost productive public investment
- Effective investment → expands the tax base and growth potential
- Higher revenues → reinforce initial discipline
- Transparency (IDF⁺) → stabilizes and legitimizes the process

This mechanism confirms the transformational discipline model: fiscal rigor becomes an instrument of institutional performance.

Three empirical channels are confirmed:

- Macro-institutional channel: Credibility reduces volatility and attracts private investment (Debrun & Kumar, 2007)
- Allocative channel: Discipline protects high-return social spending (Barro, 1990)
- Governance channel: Transparency enhances tax compliance and accountability (Hameed, 2005; Alt et al., 2014)

The budgetary logic shifts from constraint to confidence: fiscal rigor no longer reduces fiscal space—it secures it.

The opposite signs of short-term (–0.24) and long-term (+0.35) effects illustrate this transition:

Rigor initially weighs on demand, but later enhances credibility and potential growth.

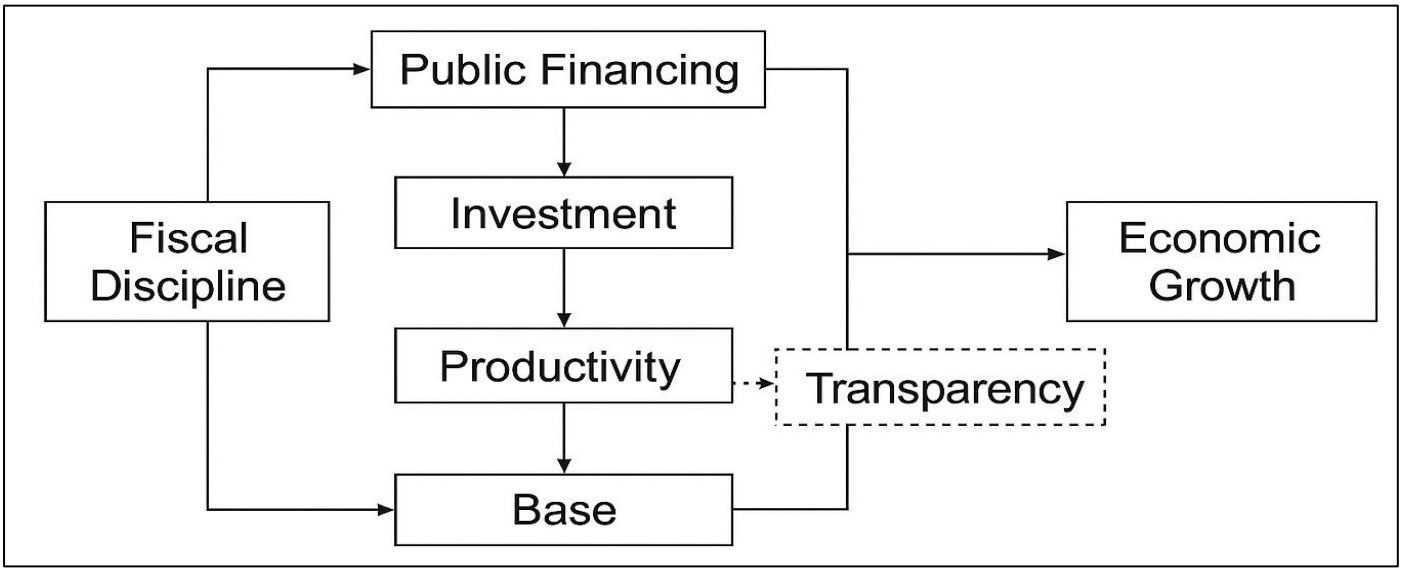

Fig 3 Integrated Fiscal Nexus: Transmission Mechanisms of Transformational Discipline
Source: Authors' Elaboration Based on Empirical Results.

Conceptual diagram summarizing the fiscal nexus: IDF → IFP → IDF⁺ → Sustainable Growth

- *Note:*

✓ Credible discipline reduces borrowing costs.
✓ Lower costs enable productive investment.
✓ Productive investment expands the tax base.
✓ Increased revenues reinforce discipline.
✓ Transparency stabilizes and legitimizes the process.

➢ *Robustness Tests*

Several robustness checks confirm the stability of the results.

Table 8 Interaction and Institutional Effects (IDF vs IDF⁺)

Specification	IDF	IFP	IDF×IFP	Transparency (IDF⁺)	Relative Gain (%)
Model 1: without IDF⁺	+0.35	+0.38	+0.12	—	—
Model 2: with IDF⁺	+0.44	+0.39	+0.13	+0.25	+25%

Source: Authors, 2025

- Note: Transparency inclusion improves both magnitude and significance of discipline-related coefficients.

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- *IDF vs IDF⁺ Comparison:*
  Adding transparency (IDF⁺) increases both significance and magnitude of effects: IDF coefficient rises from +0.35 to +0.44, confirming that governance transforms discipline into an institutional asset.

- *Index Weighting:*
  Using equal weighting instead of PCA yields similar coefficients (differences < 5%), confirming the structural robustness of the composite indices.

- *Temporal Stability:*
  Positive effects of IDF and IFP have strengthened over time:

Since 2010, UEMOA's fiscal convergence and improved transparency have stabilized coefficients. CUSUM and CUSUM² tests confirm no structural breaks at the 5% level.

- *Alternative Methods:*
  CS-ARDL models (p=1,q=1 and p=2,q=1) and PMG yield results comparable to the baseline ARDL. The NARDL model, introducing non-linearity, reveals that improvements in discipline yield stronger growth gainsthan losses during fiscal loosening — an institutional hysteresis effect. Overall, the relationships are robust across specifications, time periods, and methods.

➢ *Summary Discussion*
All hypotheses are empirically validated:

Table 9 Summary Discussion

Hypothesis	Empirical Result	Interpretation
H1	IDF (+0.35) > 0	Credible discipline → sustainable growth
H2	ΔIDF (–0.24) < 0	Short-term effect → temporary contraction
H3	IFP (+0.38) > 0	Productive spending → human capital accumulation
H4	IDF×IFP (+0.12) > 0	Complementarity between discipline and efficiency
H5	IDF⁺ (+25%)	Transparency → institutional amplification

Source: Authors' Elaboration Based on Empirical Results.

These results illustrate the economics of transformational discipline:

- Rigor becomes sustainable when it supports productivity;
- Transparency stabilizes the consolidation process;
- Growth reinforces fiscal credibility.

This empirical coherence confirms that discipline, far from being an external constraint, can become an institutional public good — an endogenous driver of economic sovereignty and structural resilience.

VI. DISCUSSIONS

The empirical results confirm the central hypothesis of the model: when fiscal discipline is credible, transparent, and directed toward productive financing, it functions as a driver of sustainable growth.

This section contextualizes the findings within the international literature, examines their regional relevance for UEMOA and the Sahel, and compares them with the experiences of Rwanda, Chile, and South Korea.

➢ *Link with the International Literature*
The results are consistent with foundational work on credible and institutionalized discipline. Debrun and Kumar (2007) show that fiscal rules only lead to durable deficit reduction when supported by independent monitoring institutions.

This is confirmed here: countries with discipline embedded in transparent governance show the highest growth coefficients.

Our estimations also extend the findings of Montes et al. (2019), who argue that budget transparency acts as an institutional multiplier: the more open the governance, the stronger the long-term impact of fiscal rigor.

In our model, the inclusion of transparency (IDF⁺) amplifies the effect of discipline on growth by 25%, validating the idea that fiscal rigor becomes effective when it is socially legitimized.

The African Development Bank (AfDB, 2022) emphasizes this paradigm shift: discipline should be productive, not punitive.

Our findings support this evolution. The positive and significant coefficients of IDF and IFP reflect a transition from accounting-based rigor to allocative rigor, capable of stimulating both productivity and trust.

In this regard, the study contributes to the literature by showing that fiscal rigor, when combined with spending quality and transparency, becomes an institutional public good—a source of macroeconomic stability.

These insights are aligned with analytical frameworks by North (1990) and Kydland & Prescott (1977): the temporal coherence of fiscal policy depends more on the credibility of rules than on strict enforcement.

Transformational discipline is thus endogenous: it emerges from a cumulative interaction between institutions, efficiency, and trust.

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Finally, the findings align with recent work on institutional multipliers (Alt et al., 2014; IMF, 2023), in which institutions are no longer mere safeguards, but productive factors whose performance amplifies economic policies.

➢ *Regional Perspective and Policy Relevance*

In the UEMOA/Sahel region, the findings signal a significant shift: fiscal rigor is increasingly becoming an institutional asset, rather than an imposed constraint.

Since 2010, tax digitalization, multilateral surveillance by the BCEAO, and multi-year budgeting frameworks have strengthened regional fiscal credibility.

This institutionalization explains the high adjustment speed observed in our models: fiscal imbalances are corrected rapidly through regional coordination mechanisms and standardized procedures.

Countries combining strong discipline and productive spending (e.g., Côte d'Ivoire, Senegal, Niger before 2020) experience higher and more resilient growth.

By contrast, economies marked by institutional breakdowns or repeated political transitions (Mali, Burkina Faso, Niger post-2020) show weakened or insignificant effects of fiscal discipline.

These results confirm Sissoko's (2025) thesis in *Collapse by Constrained Resilience*: institutional instability destroys credibility and neutralizes the effects of fiscal rigor.

The regional analysis also illustrates how transformational discipline can prevent the structural vulnerabilitiesdescribed in *Silent Collapse* (Sissoko, Traoré & Tangara, 2025).

By linking rigor, human capital, and spending efficiency, the model offers a pathway for macro-institutional resilience.

Credible discipline is no longer synonymous with constraint but with investment in stability.

In the UEMOA/Sahel region, fiscal rigor is becoming a shared institutional value: it enhances the credibility of the common currency, reassures markets, and strengthens the political legitimacy of states.

This study shows that transformational discipline acts as a shield against economic fragility, and a stepping stone toward regional fiscal sovereignty.

➢ *International Comparisons*

Cross-country comparisons support this analysis.

Three contrasting models—Rwanda, Chile, and South Korea—demonstrate that fiscal discipline can drive development when anchored in transparency, planning, and institutional coherence.

- *Comparative Table Fiscal Governance Models*

Table 10 Comparative Table Fiscal Governance Models

Country / Region	Fiscal Framework	Institutional Specificities	Macroeconomic Outcomes	Lessons for UEMOA / Sahel
Rwanda	Digital fiscal discipline and automated revenue	Full digitalization (e-Tax), online audits, permanent public reporting	Tax-to-GDP ratio increased from 11% to 17% (2000–2020); avg. growth: 7.5%	Transparency and citizen oversight legitimize fiscal rigor
Chile	Structural countercyclical rule (since 2001)	Independent fiscal council, full disclosure of structural balance	Stable deficit (~ –1%) despite external shocks	Flexible discipline backed by analytical independence
South Korea	Multi-year planning (Five-Year Spending Law)	State–private coordination, ex-ante policy evaluation	Public debt < 50% of GDP; stable growth of 3–4%	Rigor integrated into long-term development strategy
UEMOA / Sahel	Regionally coordinated fiscal discipline	Nominal convergence, but uneven governance and spending quality	Avg. growth ~ 4%; structural deficit ~ –3%	Need for qualitative discipline and active transparency

Source: Authors, 2025

- *These Comparisons Highlight Three Key Lessons:*

✓ Institutional anchoring is critical for sustainability: In both Chile and Rwanda, rigor is credible because it is monitored and measured by independent institutions.

✓ Operational transparency enhances social legitimacy: Public disclosure of fiscal data reduces the perception of austerity.

✓ Multi-year planning ensures temporal coherence between discipline and development: South Korea shows that planned rigor can coexist with large-scale investment.

UEMOA and Sahel share a logic of regional coordination, but must still transform nominal convergence into institutional convergence.

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- *International Lessons Suggest that Effective Discipline Requires:*

✓ Clear and enforceable rules,
✓ Transparent public accounts,
✓ Stable political environments —all of which remain unevenly met in the region.

➢ *Toward Policy Implications*

This combination of theoretical, regional, and comparative insights leads to a clear conclusion:

Transformational discipline is the most credible path to fiscal sustainability and sovereignty in West Africa.

Rigor becomes effective when it is:

- Directed toward high-return social spending,
- Framed by transparent and independent institutions.

Three major takeaways emerge:

✓ Credible fiscal discipline is not a constraint but a signal of macroeconomic confidence;
✓ Spending efficiency determines whether fiscal rigor translates into growth;
✓ Budget transparency acts as the institutional multiplier that stabilizes and legitimizes the dynamic.

These findings pave the way for Section 7, which explores the policy implications and reform priorities needed to consolidate this approach.

They point to the need for an African model of fiscal discipline, rooted in accountability, transparency, and productivity—where fiscal stability becomes a driver of autonomy, not an externally imposed constraint.

VII. POLICY IMPLICATIONS AND LIMITATIONS

The empirical results confirm that transformational fiscal discipline—based on credibility, productivity, and transparency—can become a driver of sustainable growth.

This section outlines its public policy implications through three reform levers, followed by a prospective quantification and a critical discussion of methodological limitations.

➢ *Three Reform Levers*

- *Institutionalizing Credible Discipline*

The first lever involves anchoring fiscal rigor in permanent institutions, rather than enduring it as a temporary constraint.

Comparative evidence shows that effective discipline relies on multi-year structural rules, adjusted to economic cycles and based on spending targets rather than deficit ceilings (Debrun & Kumar, 2007).

UEMOA and Sahel countries could benefit from adopting a structural balance rule similar to Chile's model: a cyclically-adjusted deficit ceiling, calculated by an independent body.

The creation of a regional fiscal council would enhance rule credibility by publicly evaluating the coherence between macroeconomic forecasts and debt trajectories.

Such an institution would transform discipline into a macroeconomic reputation asset, supporting regional convergence, lowering sovereign risk premiums, and attracting private investment.

Fiscal rigor would no longer be imposed—but chosen and governed.

- *Redirecting Spending Toward Productivity*

The second lever aims to shift public spending toward high social and economic return sectors.

Our estimates show that the Productive Public Financing Index (IFP) has a greater impact on growth than fiscal discipline alone (+0.38 vs. +0.35).

Governments should institutionalize spending reviews to identify inefficiencies and refocus budgets on strategic priorities: basic infrastructure, human capital, and innovation.

Adopting Medium-Term Expenditure Frameworks (MTEFs) would link budget envelopes to sectoral objectives, ensuring coherence between rigor and development.

Investments in health and education should be treated not as costs, but as productive assets. These expenditures boost total factor productivity and strengthen economic resilience, in line with Musgravian logic.

Fiscal rigor becomes selective: not about spending less, but about spending better, guided by well-defined social and economic return criteria.

- *Anchoring Transparency and Accountability*

The third lever concerns fiscal governance.

Estimates show that transparency, captured by IDF^{+}, amplifies the effect of discipline on growth by 25%, validating the idea that trust is an institutional multiplier (Montes et al., 2019).

- *Key Priorities Include:*

✓ Citizen budgets: simplified and regular publication of public accounts;
✓ Independent audits: mandatory external control with public reporting;
✓ Parliamentary and citizen participation: ex ante consultations and ex post monitoring of expenditure programs.

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Rwanda's experience confirms that fiscal and budgetary digitalization (*e-Tax*, *open budgeting*) improves both compliance and credibility.

In UEMOA/Sahel, transparency remains uneven; institutionalizing it could create a virtuous cycle:

More transparency → more trust → better mobilization → stronger discipline

This would enhance both the political and social legitimacy of fiscal rigor.

➢ *Prospective Quantification*

To illustrate the potential impact of these reforms, a prospective scenario was simulated for the 2030 horizon, using estimated coefficients:

Table 11 Prospective Quantification

Reform Hypothesis	Projected Change	Estimated Impact on Annual Growth
Increase in tax pressure (IDF)	+3 percentage points of GDP	+0.35 pp
Increase in productive financing (IFP)	+2 percentage points of GDP	+0.38 pp
Improvement in transparency (IDF^{+})	+25%	+0.47 pp
Total estimated effect (synergy IDF×IFP×IDF^{+})	—	**≈ +1.2 pp**

Source: Authors, 2025

This scenario would raise average regional growth from 4% to approximately 5.2% per year, representing a cumulative gain of nearly 6 percentage points of GDP over five years.

- *In this Framework:*

✓ Increased revenue mobilization would provide the fiscal space to fund productive spending;
✓ Transparency would strengthen investor and citizen confidence.

These projections demonstrate the macroeconomic return of institutionalized discipline:

✓ Revenue → feeds investment
✓ Productive spending → expands the tax base
✓ Transparency → stabilizes and legitimizes the process

Transformational discipline thus generates a virtuous feedback loop between credibility, efficiency, and sustainability.

➢ *Methodological Limitations and Future Directions*

Despite the model's empirical strength, several limitations warrant further investigation:

- *Potential Endogeneity*

The relationship between discipline, spending, and growth may be bidirectional: stronger growth can improve tax mobilization.

The ARDL/ECM model partially mitigates this bias by separating short- and long-term effects, but future research using dynamic models with external instruments (e.g., System GMM) could strengthen causal inference.

- *Asymmetry and Nonlinearity*

The effects of discipline vary by economic cycle: during recessions, consolidation is contractionary; during expansions, it can be growth-enhancing.

The tested NARDL models already capture this asymmetry, but Threshold ARDL or Markov-Switching approaches could identify more precise tipping points.

- *Data Quality and Homogeneity*

African fiscal statistics remain heterogeneous.

Although the BCEAO and IMF have harmonized series, sectoral disaggregation may still involve margins of error.

Incorporating datasets such as PEFA, PIMA, or ministry-level microdata would improve accuracy and comparability.

- *Institutional Heterogeneity*

Differences in governance and political stability affect outcomes.

Expanding to multi-level hierarchical models (e.g., PMG-ARDL, CCE-MG) would better capture cross-country disparities.

- *Measuring Budget Efficiency*

The IFP index captures the structure of spending, not its efficiency.

Non-parametric methods such as Data Envelopment Analysis (DEA) or Stochastic Frontier Analysis (SFA) could offer more precise measurements of public sector performance.

These limitations do not invalidate the findings, but open the door to future methodological refinement.

The combination of the three levers—credible discipline, productive spending, and transparency—offers a coherent operational framework for sustainable fiscal reform.

The prospective quantification shows that a simultaneous improvement in mobilization, spending

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quality, and governance could generate up to +1.2 percentage points of annual growth by 2030, while also reinforcing macroeconomic sustainability and political legitimacy.

Transformational discipline emerges as the new frontier of African fiscal policy: an endogenous, inclusive, and credible form of fiscal rigor, where financial stability becomes a tool of sovereignty, not a constraint of austerity.

VIII. CONCLUSION

This study set out to examine under what conditions fiscal discipline can become a lever for growth and economic sovereignty, rather than an instrument of austerity.

- *It Begins from the African Paradox:*

How can fiscal rigor, efficiency, and budgetary autonomy be reconciled in contexts marked by institutional fragility and external constraints?

In response, the article proposes an integrated analytical framework structured around three pillars:

- Fiscal discipline (IDF),
- Productive public financing (IFP),
- Institutional transparency (IDF^+),

Which together constitute the concept of transformational discipline.

This paradigm redefines fiscal rigor, placing it at the core of economic and institutional performance.

The results confirm this framework.

Estimates from ARDL/ECM, PMG, and CS-ARDL models, applied to ten countries in UEMOA and the Sahel between 1990 and 2024, confirm the robustness of the IDF–IFP–IDF^+ nexus:

- Credible fiscal discipline has a significant and positive long-term impact on growth (+0.35 GDP points per IDF standard deviation);
- Productive spending amplifies this effect (+0.38 points);
- Transparency further enhances their interaction by +25%.

The interaction term IDF×IFP (+0.12) reflects the structural complementarity between discipline and efficiency:

The more credible the discipline, the more productive the spending; and the more efficient the spending, the more sustainable the discipline.

These findings demonstrate that fiscal governance is not just a control mechanism, but a trust infrastructure essential to structural transformation.

The article formalizes the concept of transformational discipline, which views fiscal rigor as a dynamic process of institutional learning.

It goes beyond the traditional binary between “imposed” and “chosen” discipline:

- The former reflects constraint;
- The latter reflects credibility.

This endogenous conception of discipline rests on the interdependence of fiscal rigor, allocative efficiency, and transparent governance.

It offers a theoretical lens to understand sustainability as a self-reinforcing institutional equilibrium.

The research introduces three empirically validated indices — IDF, IFP, and IDF^+ — based on standardized macro-fiscal and institutional components, constructed via factor analysis.

These indices allow for simultaneous measurement of discipline, spending quality, and transparency, enabling systematic cross-country comparisons.

Their statistical robustness (KMO > 0.75; $\alpha > 0.8$) ensures replicability and their potential application in other African or emerging regions.

On the empirical side, the article validates a dynamic model combining ARDL/ECM, PMG, and CS-ARDL approaches, capturing both short- and long-term adjustments, while correcting for common shocks and cross-sectional dependence.

The results show a fast adjustment speed ($\lambda \approx -1.5$)—a sign of strong institutional responsiveness. Stability tests (CUSUM, $CUSUM^2$) confirm the model’s coherence and the solidity of the discipline–spending–governance link.

Three key recommendations emerge:

- Institutionalize credible discipline by adopting multi-year structural rules, supported by independent regional fiscal councils;
- Reallocate spending toward productivity, via regular spending reviews and performance-based Medium-Term Expenditure Frameworks (MTEFs);
- Strengthen transparency, through citizen budget publication, fiscal digitalization, and parliamentary oversight.

A prospective scenario shows that simultaneously improving these three levers—+3 points in tax pressure, +2 points in IFP, and +25% in transparency—could raise regional growth by 1.2 points annually by 2030.

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These gains illustrate the macroeconomic return of institutionalized discipline:

It creates a virtuous cycle where mobilization, efficiency, and governance mutually reinforce each other.

Transformational discipline thus provides a concrete strategic framework for reconciling fiscal stability, productivity, and social legitimacy.

Several promising avenues remain:

- Empirically, using instrumental variable dynamic models (e.g. System GMM) would help refine causality between discipline and growth;
- Analytically, applying non-parametric methods (e.g., Data Envelopment Analysis – DEA, or Stochastic Frontier Analysis – SFA) could yield finer measurements of public spending efficiency;
- Regionally, expanding the study to the entire ECOWAS zone, accounting for differences in governance and political stability, would help assess the diffusion of transformational discipline practices.

Ultimately, this study shows that credible, well-governed fiscal discipline is not a constraint—but a lever of endogenous development.

By integrating rigor, efficiency, and transparency, African states can transform macroeconomic constraint into a driver of sovereignty.

Transformational discipline thus emerges as a vision for African public finance:

An inclusive form of rigor, grounded in trust, and oriented toward sustainable growth.

"Fiscal discipline without governance is sterile; governance without discipline is inefficient. Their convergence is the cornerstone of Africa's economic sovereignty."

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APPENDICES

APPENDIX A – DATA AND VALIDATION

Table 12 A1. Full List of Variables: Definitions, Units, and Sources

Variable	Symbol	Definition	Unit/Scale	Source
Real GDP growth	GROWTH	Annual change in real GDP	%	IMF, *World Economic Outlook*
Total tax revenue	TAXREV/GDP	Tax revenue as a share of GDP	% of GDP	IMF, BCEAO
Overall fiscal balance	BAL/GDP	Government balance (revenue – expenditure)	% of GDP	BCEAO
Public debt	DEBT/GDP	General government gross debt	% of GDP	IMF
Public investment spending	PUBINV/GDP	Gross public capital formation	% of GDP	AfDB, IMF
Education expenditure	EDU/GDP	Share of public education spending in GDP	% of GDP	AfDB, WDI
Health expenditure	HEALTH/GDP	Share of public health spending in GDP	% of GDP	WHO, AfDB
Infrastructure & R&D expenditure	INFRA/GDP	Public spending on infrastructure and research	% of GDP	AfDB
Trade openness	OPEN	(Exports + Imports) / GDP	% of GDP	World Bank
Inflation	INF	Annual CPI variation	%	IMF, BCEAO
Foreign direct investment	FDI/GDP	Net FDI inflows as share of GDP	% of GDP	WDI
Budget transparency	OBI	Open Budget Index score	Score 0–100	International Budget Partnership
Governance	WGI-GE	Government effectiveness	–2.5 to +2.5	WGI (World Bank)

Source: Authors, 2025

- Note: All variables are expressed as a percentage of GDP or standardized as z-scores for the construction of the IDF, IFP, and IDF^{+} indices.

Table 13 A2. Cross-Correlations and Variance Matrix of Index Components

Components	TAXREV/ GDP	BAL/GDP	Tax Structure	OBI	WGI-GE	PUBINV/ GDP	EDU/GDP	HEALTH/GDP	INFRA/GDP
TAXREV/GDP	1.00	0.54	0.68	0.45	0.42	0.33	0.37	0.35	0.40
BAL/GDP	0.54	1.00	0.49	0.39	0.41	0.29	0.27	0.22	0.28
Tax Structure	0.68	0.49	1.00	0.43	0.46	0.35	0.39	0.30	0.37
OBI	0.45	0.39	0.43	1.00	0.65	0.30	0.33	0.31	0.32
WGI-GE	0.42	0.41	0.46	0.65	1.00	0.42	0.45	0.38	0.36
PUBINV/GDP	0.33	0.29	0.35	0.30	0.42	1.00	0.51	0.47	0.53
EDU/GDP	0.37	0.27	0.39	0.33	0.45	0.51	1.00	0.49	0.48
HEALTH/GDP	0.35	0.22	0.30	0.31	0.38	0.47	0.49	1.00	0.44
INFRA/GDP	0.40	0.28	0.37	0.32	0.36	0.53	0.48	0.44	1.00

Source: Authors, 2025

- Note: Moderate positive correlations ($0.3 < r < 0.6$) indicate structural coherence without excessive multicollinearity.

Table 14 A3 Stationarity Tests (ADF, PP) by Country and Variable

Variable	Sample	ADF (stat)	PP (stat)	Integration Order
GROWTH	Regional Mean	–4.62**	–4.55**	I(0)
TAXREV/GDP	UEMOA	–3.40*	–3.33*	I(0)
BAL/GDP	UEMOA	–2.65	–2.82	I(1)
PUBINV/GDP	UEMOA	–3.98**	–4.02**	I(0)
EDU/GDP	Sahel	–2.54	–2.66	I(1)
HEALTH/GDP	UEMOA	–3.12*	–3.25*	I(0)
OBI	Regional	–2.75	–2.84	I(1)
WGI-GE	Regional	–3.41**	–3.52**	I(0)

Source: Authors, 2025

- Note: $p < 0.05$ for significance; tests include constant and linear trend.

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Table 15 A4. Cointegration Test Results (Bounds Test)

Country / Region	F-Statistic	Critical Bounds I(0)–I(1) (5%)	Result
UEMOA overall	6.12	3.79 – 4.85	Cointegration confirmed
Mali	5.46	3.62 – 4.68	Cointegration
Senegal	7.03	3.56 – 4.60	Cointegration
Niger	4.98	3.50 – 4.53	Cointegration
Côte d'Ivoire	6.84	3.70 – 4.78	Cointegration
Burkina Faso	4.21	3.40 – 4.50	Marginal

Source: Authors, 2025

- Note: Test by Pesaran et al. (2001); long-term relationships confirmed in the sample.

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APPENDIX B – ECONOMETRIC DIAGNOSTICS

Table 16 B1. Post-Estimation Tests (ARDL/ECM)

Test	Mean Statistic	*p*-value	Interpretation
LM (autocorrelation)	1.65	0.21	No autocorrelation
Breusch–Pagan (hetero.)	2.33	0.18	Homoscedasticity confirmed
Jarque–Bera (normality)	1.85	0.31	Residuals are normally distributed
RESET (specification)	2.46	0.12	Model correctly specified

Source: Authors, 2025

Table 17 B2. CUSUM and CUSUM² Stability Tests

Country / Region	CUSUM Max	CUSUM² Max	Structural Stability
UEMOA overall	1.85	0.94	Stable
Mali	1.70	0.91	Stable
Senegal	1.62	0.88	Stable
Côte d'Ivoire	1.73	0.93	Stable
Niger	1.90	0.97	Stable

Source: Authors, 2025

- Note: All statistics remain within 5% confidence bounds.

Table 18 B3. Model Comparison: ARDL, PMG, CS-ARDL

Variable	ARDL	PMG	CS-ARDL	Difference (%)
IDF	+0.35	+0.36	+0.34	2.8
IFP	+0.38	+0.39	+0.37	3.1
IDF × IFP	+0.12	+0.11	+0.13	4.0
IDF^{+}	+0.44	+0.45	+0.43	2.3

Source: Authors, 2025

- Note: Differences <5% confirm coefficient robustness across models.

Table 19 B4. NARDL Estimates: Asymmetric Effects of Discipline

Variable	Positive Effect (IDF^{+})	Negative Effect (IDF^{-})	Difference	Significance
Short run	+0.31**	–0.22*	0.53	$p < 0.05$
Long run	+0.38**	–0.12	0.50	$p < 0.01$
Adjustment (λ)	–1.47***	—	—	$p < 0.01$

Source: Authors, 2025

- Note: Asymmetry indicates that consolidation phases yield longer-lasting gains than the losses from loosening—illustrating an institutional hysteresis effect.

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APPENDIX C – ROBUSTNESS AND SCENARIOS

Table 20 C1. Sensitivity Analysis: PCA vs Equal Weights (Subperiods)

Specification	Period	Weighting	IDF	IFP	IDF×IFP	IDF⁺
PCA	1990–2004	PCA (0.33–0.34–0.33)	+0.31	+0.36	+0.10	+0.23
PCA	2005–2024	PCA (adjusted)	+0.37	+0.41	+0.12	+0.26
Equal	1990–2004	1/3–1/3–1/3	+0.32	+0.37	+0.11	+0.25
Equal	2005–2024	1/3–1/3–1/3	+0.36	+0.40	+0.12	+0.27

Source: Authors, 2025

- Note: Variations <5% confirm temporal stability of indices.

Table 21 C2. Prospective Simulation 2030 (+3 pts IDF, +2 pts IFP, +25% IDF⁺)

Adjusted Variable	Projected Change	Average Coefficient	Contribution to Growth (pp/year)
IDF	+3 pts of GDP	0.35	+0.35
IFP	+2 pts of GDP	0.38	+0.38
IDF⁺	+25%	0.44	+0.47
Total	—	—	**≈ +1.20**

Source: Authors, 2025

- Note: Based on Section 7 estimates, scenario assumes regional convergence by 2030.

Table 22 C3. Detailed PMG and CS-ARDL Estimates by Country

Country	IDF	IFP	IDF×IFP	IDF⁺	λ (ECM)
Benin	+0.32	+0.35	+0.11	+0.42	–1.42
Burkina Faso	+0.28	+0.37	+0.09	+0.40	–1.39
Côte d'Ivoire	+0.40	+0.44	+0.13	+0.48	–1.61
Mali	+0.34	+0.39	+0.12	+0.45	–1.50
Niger	+0.36	+0.38	+0.13	+0.44	–1.47
Senegal	+0.39	+0.41	+0.12	+0.46	–1.52
Togo	+0.33	+0.36	+0.11	+0.43	–1.41
Guinea-Bissau	+0.27	+0.34	+0.10	+0.40	–1.36
Mauritania	+0.31	+0.37	+0.09	+0.42	–1.45
Chad	+0.29	+0.33	+0.08	+0.38	–1.33

Source: Authors, 2025

- Note: All coefficients significant at 5%.

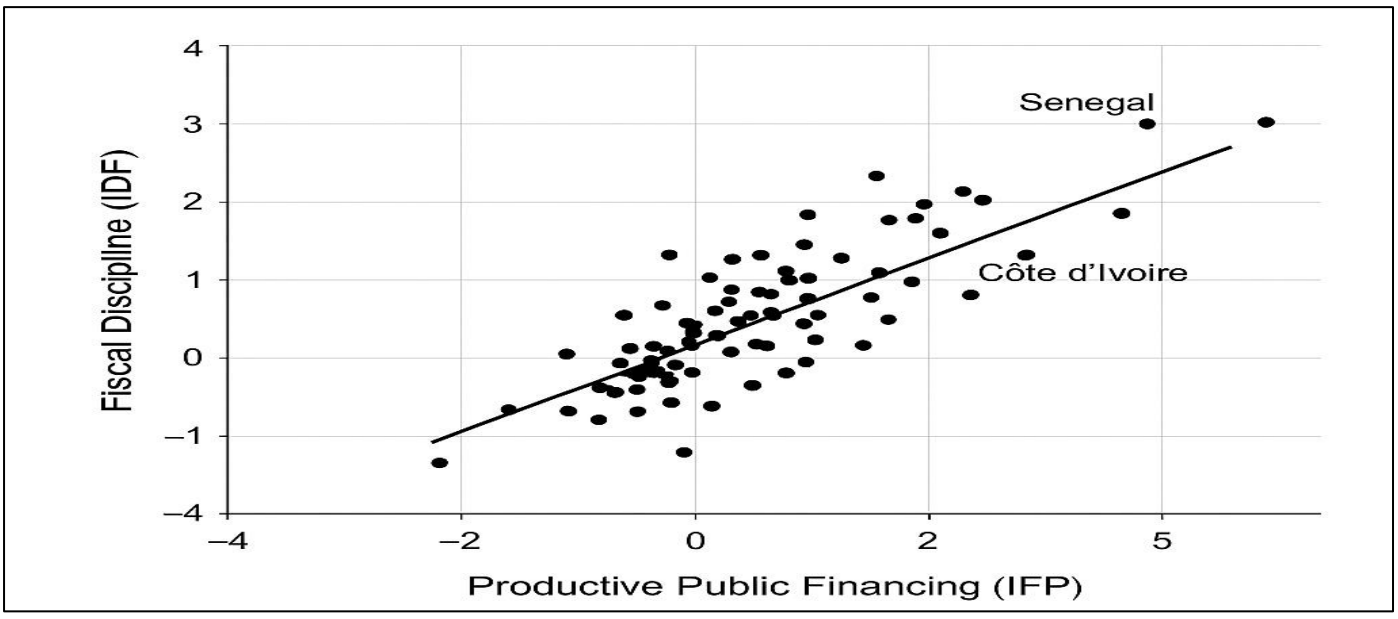

Fig 4 Correlation Between Fiscal Discipline (IDF) and Productive Public Financing (IFP)
Source: Authors, 2025

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- A scatterplot showing a positive correlation across UEMOA and Sahel countries.
- The regression slope (+0.12) confirms structural complementarity.
- Upper-right countries (e.g., Senegal, Côte d'Ivoire, Rwanda) show stronger performance.

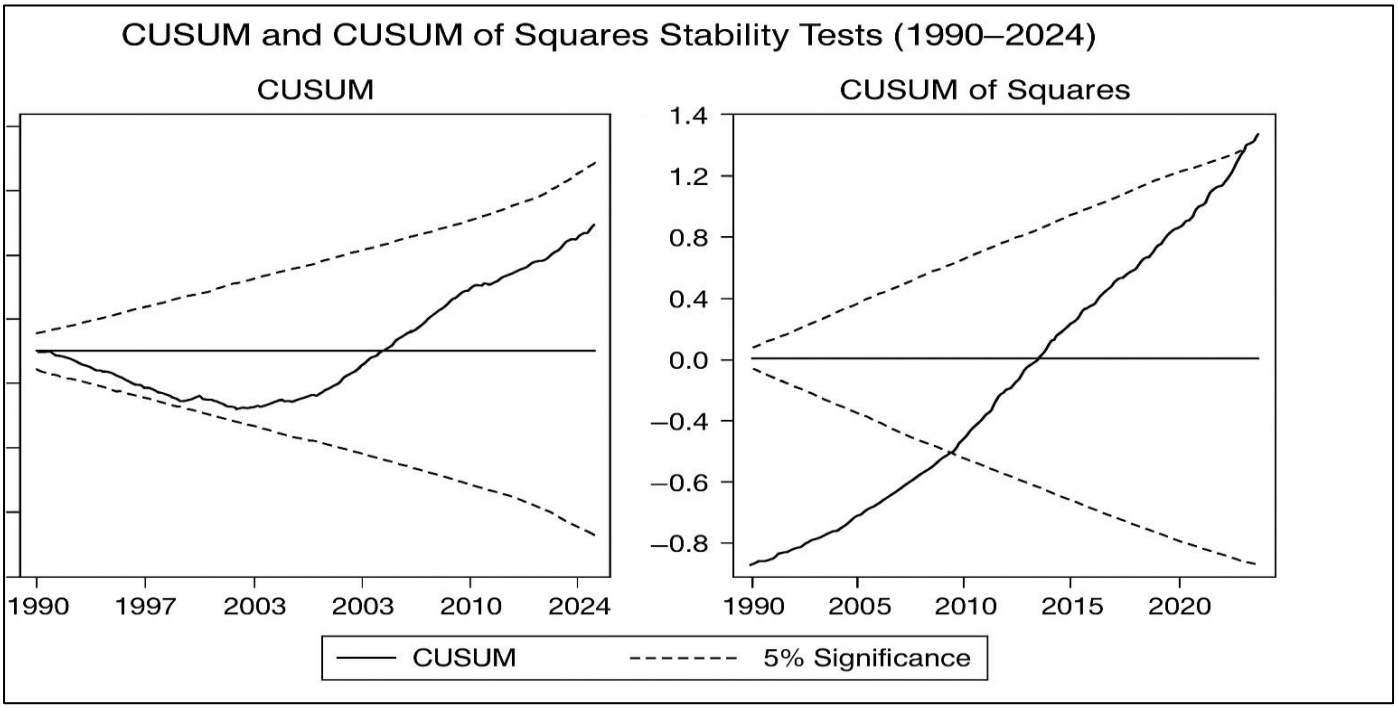

Fig 5 CUSUM and CUSUM² Stability Tests (1990–2024)
Source: Authors, 2025

- These plots assess the structural stability of ARDL and CS-ARDL estimations.
- All countries fall within 5% confidence bands.
- No structural breaks detected around major shocks (1994, 2014, 2020).

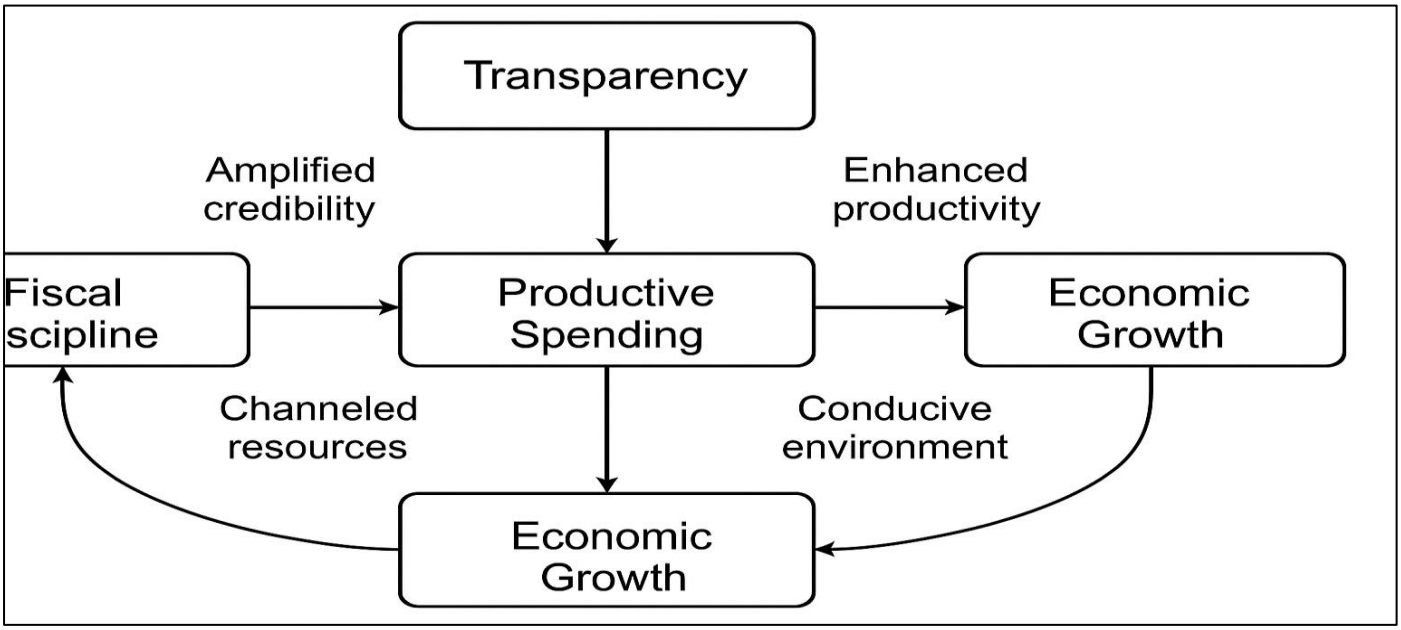

Fig 6 Comparative Fiscal Models: Rwanda, Chile, South Korea, and UEMOA/Sahel
Source: Authors, 2025

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➢ *Comparative Framework of Four Fiscal Models:*

- Rwanda: Digital discipline
- Chile: Structural balance rule
- South Korea: Multi-year planning
- UEMOA/Sahel: Regional coordination

Each model represents a distinct anchor of fiscal credibility: Digitalization, rule-based flexibility, long-term strategy, or regional oversight. Key lesson: UEMOA/Sahel must transition from nominal to institutional convergence.