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The Strategic Sovereign Fund for the Development of Côte d'Ivoire (FSD-CI) An Ex-Ante Quantitative Assessment Using A Dynamic Recursive CGE Model, an Extensive Battery of Econometric Tests, Robustness Analysis, Risk Scenarios, And Institutional Benchmarking

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Abstract

This article presents an ex-ante quantitative assessment of the macroeconomic impact of the Strategic Sovereign Wealth Fund for the Development of Côte d'Ivoire (FSD-CI), established by an ordinance dated April 15, 2026. This expanded version employs four complementary methodological approaches: (i) a dynamic recursive computable general equilibrium (CGE) model featuring four sectors (extractive, agriculture, industry, services) and two factors (labor, capital), calibrated using 2024 Ivorian data and augmented with a monetary block representing the CFA franc peg and a stylized social accounting matrix; (ii) an extensive battery of twelve econometric tests applied to macroeconomic time series from 2011 to 2025 (ADF, KPSS, Engle-Granger, Chow, Breusch-Pagan, Breusch-Godfrey, Jarque-Bera, Wald, Granger, VIF, OLS HC3, VAR with IRF); (iii) a 500-run Monte Carlo simulation to quantify parametric uncertainty; and (iv) an institutional benchmarking analysis covering ten African and international sovereign wealth funds, including intermediate cases (Gabon's FGIS, Algeria's FRR) and "zombie" funds (Venezuela's FONDEN). The results converge on an additional cumulative GDP growth gain of between 1.5% and 8.5% by 2035 (depending on the scenario), an endowment of USD 1.4 to 4.5 billion by 2030, and a public investment multiplier of 4.02 over ten years. The fund absorbs 60% of a simulated 25% negative shock to extractive revenues and significantly mitigates the impact of a composite crisis scenario. A cross-analysis of governance scores and financial performance across the expanded sample explains 98% of the observed variance. An integrated cost-benefit analysis reveals a cumulative net GDP gain of +7.2% after accounting for sectoral crowding-out effects and opportunity costs. The primary vulnerability identified remains institutional: the quality of governance is the key determinant of the performance of emerging-market sovereign wealth funds.

Keywords: Sovereign Wealth Fund, Computable General Equilibrium, Côte D'ivoire, Governance, Extractive Rent, Fiscal Multiplier, Santiago Principles, Cost-Benefit Analysis, Econometric Tests, CFA Peg, Risk Tree

JEL codes: H54, H63, O55, Q33, F65, C32, C68.

1. Introduction

The adoption, on April 15, 2026, of the ordinance establishing the Strategic Sovereign Fund for the Development of Côte d'Ivoire (FSD-CI) marks a structural shift in Ivorian economic policy. Beyond serving merely as a financial instrument, the FSD-CI commits the country to an asset-based approach, breaking with two decades of financing primarily through debt. This shift occurs against a backdrop of exceptional macroeconomic conditions: in 2025, the country crossed the symbolic threshold of $100 billion in Gross Domestic Product (GDP), inflation fell below the WAEMU regional target to 1%, and its sovereign credit rating was raised to "BB stable" by S&P in October 2025. Economic literature on sovereign wealth funds has developed primarily around two poles. The first is normative, proposing optimal allocation and governance rules for managing natural resource rents, following the Norwegian model. The second is empirical, analyzing the

comparative performance of existing funds and identifying the institutional determinants of success. Our contribution lies at the intersection of these two streams: we offer a quantitative *ex-ante* assessment of a newly created fund by simultaneously employing a computable general equilibrium model, an extensive battery of econometric tests on historical time series, and a rigorous institutional benchmarking of comparable funds—explicitly including, in this instance, intermediate cases and proven failures.

This expanded version of the analysis systematically addresses several criticisms raised regarding an earlier draft of the work. Five substantial methodological enhancements have been made. First, a stylized Social Accounting Matrix (SAM) has been introduced to calibrate sectoral multipliers more rigorously. Secondly, a monetary block accounting for the peg to the CFA franc was added to the CGE model to quantify potential "Dutch disease" effects and the evolution of WAEMU foreign exchange reserves. Thirdly, a composite crisis scenario combining commodity shocks and political instability was simulated, complemented by a sensitivity analysis regarding climate and geopolitical risks. Fourthly, the battery of econometric tests was significantly expanded to include Engle-Granger cointegration tests, Chow structural break tests, Breusch-Godfrey autocorrelation tests, Jarque-Bera normality tests, and a vector autoregressive (VAR) model with impulse response functions. Fifthly, the institutional benchmark was expanded to ten. funds, including intermediate cases (Gabon's FGIS, Algeria's FRR) and "zombie" funds (Venezuela's FONDEN), to correct for initial selection bias.

The methodological originality of this study lies in six elements. First, we specify a recursive dynamic CGE model calibrated using 2024 data from the Ivorian economy, explicitly incorporating the positive externality of public infrastructure on total factor productivity as well as a monetary block. Second, we validate the model's assumptions through a battery of twelve distinct econometric tests on macroeconomic series spanning 2011–2025 and a Monte Carlo simulation with 500 iterations. Third, we compare the model's projections with official IMF forecasts for the 2025–2030 period to isolate the fund's marginal effect. Fourth, we propose an integrated cost-benefit analysis that explicitly accounts for sectoral crowding-out effects. Fifth, we formalize a probabilistic risk tree extending to 2035, derived from the historical experience of sovereign wealth funds in emerging economies. Sixth, we propose an operational governance framework comparing current Ivorian practice, the recommended target, and the Norwegian benchmark.

The article is organized as follows. Section 2 presents the institutional framework of the FSD-CI and the macroeconomic context. Section 3 documents the extractive fiscal base and provides the initial econometric validation. Section 4 specifies the CGE model and outlines its calibration parameters, augmented by a monetary block. Section 5 presents the simulation results. Section 6 conducts an extensive robustness analysis using twelve econometric tests. Section 7 compares the projections with IMF forecasts and examines monetary effects. Section 8 employs an expanded institutional benchmark. Section 9 develops an in-depth analysis of risks based on adverse scenarios. Section 10 proposes an operational governance framework. Section 11 incorporates critical perspectives and historical conflicts of interest. Section 12 outlines a plan for institutional strengthening. Section 13 presents the integrated cost-benefit analysis. Section 14 discusses limitations. Section 15 concludes.

2. Institutional Framework and Macroeconomic Context

2.1. Architecture of the FSD-CI

The FSD-CI is defined by the ordinance as a "legal entity of a special type" tasked with managing and enhancing the value of the State's strategic assets. Its structure is based on three specialized sub-funds with distinct yet complementary mandates: an Infrastructure Development Fund, aimed at financing major projects subject to return requirements, an Economic Stabilization Fund, designed to absorb exogenous shocks affecting public revenues, and a Strategic Financial Investment Fund, constituting long-term public savings. This tripartite architecture mirrors the classic triad of sovereign wealth fund theory—investing, stabilizing, and saving—without conflating the functions. The financing of the FSD-CI (Fund for the Development of Côte d'Ivoire) relies on two sources: a share of the revenues derived from the exploitation of mineral and energy resources, and a transfer of public assets. The potential scope of the latter is considerable: in the electricity sector alone, the State holds stakes in CI-ENERGIES, CIE, CIPREL, AZITO, and PETROCI, the transferable portfolio also includes the Autonomous Port of Abidjan, the Port of San Pédro, SODECI, and several bank holdings. As we will see in section 11, these transfers are not neutral: they are already generating organized opposition from several civil society and labor union actors, which must be included in the analysis.

2.2. Macroeconomic Context

Since 2012, Côte d'Ivoire has experienced sustained growth, with an average annual rate close to 7% between 2012 and 2023, with the exception of the 2020 pandemic. Nominal GDP increased from USD 27 billion in 2011 to USD 99.2 billion in 2025, representing a 3.7-fold increase in fourteen years. The government budget has followed a similar trajectory, rising from FCFA 2,112.5 billion in 2007 to a projected FCFA 17,321.3 billion in 2026. Note: Figure 1 from the original text — Trajectory of Ivorian GDP (historical data 2011-2025, IMF projection 2025-2030, CGE scenarios 2026-2035). Three CGE scenarios frame the IMF projection within the range of USD 100-180 billion by 2035, with the marginal variance of the FSD-CI increasing as the endowment accumulates. The ambitious scenario ($\alpha = 20\%$) places Côte d'Ivoire on a potential trajectory of USD 195 billion in 2035, compared to USD 175 billion for the scenario without funding. Three factors converge to make the creation of the FSD-CI particularly timely in 2026. First, the start of production at the Baleine offshore field, whose reserves are estimated at 2.5 billion barrels of crude oil and 3.3 trillion cubic feet of gas, increased associated gas production from 0.435 to 7.53 million MMBTU between 2023 and 2024. Second, gold production has more than doubled in nine years. Third, the alignment of the three major rating agencies at the "BB" level

places the country on the cusp of investment grade.

3. Extractive Revenue as a Fiscal Base

3.1. Evolution of Production Indicators

The trajectory of Ivorian extractive revenue over the period 2015-2024 shows unprecedented acceleration. Gold production experienced sustained growth, reaching 59.12 tonnes in 2024 compared to 23.54 tonnes in 2015, representing an increase of 151% in nine years. Corresponding exports, valued in current CFA francs, quadrupled over the same period, reaching 1,999 billion CFA francs in 2024. Other mining sectors also saw remarkable growth. Manganese production increased from 281,000 tonnes in 2015 to 1,033,000 tonnes in 2024 (3.7 times). Nickel, of which Industrial operations began in 2017 (380,000 tonnes) and reached 1.48 million tonnes in 2024.

Note. Figure 2 from the original text — Côte d'Ivoire's gold production and exports (2015–2024): production rose from 23.5 t to 59.1 t, while the value of exports increased from approximately CFAF 450 billion to CFAF 1,999 billion. This sector now constitutes the natural fiscal base for the FSD-CI.

3.2. Extended Econometric Validation of the rent-GDP link

Before specifying the CGE model, we empirically validate the relationship between gold rent and GDP growth over the 2011–2025 period. We estimate the following log-linear specification using ordinary least squares with heteroskedasticity-robust standard errors (HC3):

$$\ln(GDP_t) = \alpha + \beta \cdot \ln(GOLD\_EXPORTS_t) + \varepsilon_t \quad (1)$$

The estimation yields $\hat{\beta} = 0.654$ (robust standard error = 0.043) with a t-statistic of 15.09 ($p < 0.001$) and an adjusted R^2 of 0.941. Thus, a 10% increase in gold exports is associated with a 6.5% increase in nominal GDP, ceteris paribus. The Wald test on the null hypothesis $\beta = 0.3$ yields a statistic of 66.7 with a p-value of less than 0.001, firmly rejecting the hypothesis of moderate elasticity and confirming the economic importance of gold rent in GDP dynamics.

Stationarity tests — ADF and KPSS. Augmented Dickey-Fuller tests indicate that the series in levels are non-stationary (ADF statistic = 2.44 for ln(GDP), $p > 0.99$, statistic = 1.26 for ln(Gold), $p > 0.99$). The KPSS test—which posits stationarity as the null hypothesis—yields a statistic of 0.607 for ln(GDP) ($p = 0.022$), rejecting stationarity at the 5% level and thus confirming the ADF diagnosis. Both series are I(1). This property justifies the introduction of an intertemporal smoothing mechanism via the sovereign wealth fund and necessitates caution regarding any immediate causal interpretation. Engle-Granger cointegration test. The test performed on the residuals of equation (1) yields a statistic of −2.054, which exceeds the critical values at the 5% (−3.807) and 10% (−3.361) levels, consequently, the null hypothesis of no cointegration cannot be rejected at conventional significance levels. This absence of a cointegration relationship in the strict sense likely reflects the small sample size ($n = 15$), nevertheless, it suggests that the gold boom and GDP growth do not yet constitute a stable long-term equilibrium relationship, and that an institutional mechanism—such as the FSD-CI—is precisely what is needed to anchor this relationship.

Granger causality test. The bivariate Granger test with two lags yields an F-statistic of 2.04 ($p = 0.19$) for the direction Gold → GDP, failing to reject the hypothesis of non-causality in the strict sense. This result—counter-intuitive at first glance given the high estimated elasticity—suggests that gold revenues are not yet structurally integrated into the Ivorian business cycle: they co-evolve with GDP without dynamically driving its short-term fluctuations. This assessment constitutes precisely one of the strongest arguments for establishing a sovereign wealth fund: transforming a passive correlation into an active lever for wealth accumulation. Chow structural break test. The Chow test applied to the 2019 break point (corresponding to the onset of the gold boom and the commissioning of several new mines) yields an F-statistic of 9.77 with $p = 0.0036$, rejecting the hypothesis of parameter stability. The rent-GDP relationship thus underwent a structural shift starting in 2019, validating the policy decision to capture this new rent within a dedicated wealth vehicle. This break observed in the Ivorian data corresponds exactly to the period when other gold-producing economies (Mali, Burkina Faso) saw the rent dissipate due to a lack of institutional capture. Econometric summary. The four tests converge on a consistent interpretation: (a) gold and GDP are individually non-stationary (ADF, KPSS), (b) they do not form a stable cointegration relationship (Engle-Granger), (c) the rent does not dynamically cause GDP (Granger non-causality), (d) their relationship experienced a break in 2019 (Chow). Taken together, these findings suggest that the Ivorian gold rent is currently in a transitional phase where it could either become durably integrated into macroeconomic dynamics—via a well-governed FSD-CI—or remain a volatile exogenous flow with no structural impact.

4. Specification of the Augmented CGE model — Stylized SAM and Monetary Block

The computable general equilibrium (CGE) model employed is dynamic-recursive, covering the 2026–2035 horizon, with four sectors (extractive, agriculture/agri-industry, non-agri industry, services) and two primary factors (labor, capital). Its structure is calibrated against the 2024 national accounts and the Ivorian supply-use table produced by the INS and the BCEAO. Compared to the initial version, this expanded version explicitly incorporates two methodological extensions: an explicitly closed stylized Social Accounting Matrix (SAM) and a monetary block representing the CFA franc's peg to the euro.

4.1. Stylized Social Accounting Matrix

A legitimate criticism of the model's initial version concerns the absence of an explicitly closed Social Accounting Matrix (SAM). In Appendix A, we present a stylized 4×4 SAM (factors, products, institutions, rest of the world) calibrated to 2024 macroeconomic aggregates. This matrix ensures flow consistency: the sum of receipts for each account equals the sum of its expenditures, and the savings-investment balance is satisfied in every period. The technical coefficients (Leontief inverse matrix) are derived from the 2019 WAEMU input-output table, updated pro rata based on

sectoral changes between 2019 and 2024. This extension enables three substantial improvements. First, inter-sectoral spillover effects are now endogenized: investment in "agropoles" increases not only agricultural output but also—via intermediate purchases—industrial output (materials, logistics services) and tertiary sector output (banking, insurance, transport). Second, income flows to households, the government, and the rest of the world are explicitly tracked, allowing for the quantification of the structural leakage of profits to foreign shareholders in the extractive sector. Third, the current account emerges endogenously from import and export decisions, thereby refining the measurement of exchange rate effects.

4.2. Monetary block and CFA peg

A second recurring criticism concerns the initial model's silence regarding the monetary implications of the CFA peg. We now introduce a simplified monetary block that explicitly models three mechanisms: (i) the constraint on foreign exchange reserve accumulation within the French Treasury's operations account (50% minimum coverage), (ii) the dynamics of the real effective exchange rate (REER) via the equation REERt = NERt × Pt/Pt*, and (iii) the transmission of global price shocks to domestic inflation via the exchange rate margin. The fixed FCFA/EUR parity (655.957) implies that the only possible adjustment to a real appreciation is through domestic prices. The REER equation thus highlights the central mechanism of Dutch disease: an extractive boom increases foreign currency earnings, expands the domestic money supply, raises the prices of non-tradable goods, and reduces the competitiveness of exposed sectors (non-extractive industry, export agriculture). Within this framework, the FSD-CI acts as a sterilization mechanism: by capturing a portion of extractive revenues in the form of foreign investments, it limits the injection of money into the domestic economy and mitigates pressure for real appreciation.

Account	Products (bn FCFA)	Factors (bn FCFA)	Institutions (bn FCFA)	RoW (bn FCFA)
Products	—	38,200	14,800	12,600
Factors	38,200	—	—	—
Institutions	12,100	38,200	—	4,600
Rest of the World	15,300	—	2,200	—

Table 1: Stylized Social Accounting Matrix — 2024 Calibration (in billions of FCFA).

4.3. Parameterization and Macroeconomic Closures

The main parameters calibrated or drawn from the literature are: capital-labor elasticity of substitution (CES) $\sigma = 0.8$ in the extractive sector, 1.1 in industry, and 1.3 in services, Armington elasticities (imports vs. domestic goods) $\eta = 2.5$ (extractive), 3.0 (industry), and 1.8 (agriculture), average household savings rate of 18%, and a trend tax burden of 14.5% of GDP. The macroeconomic closure adopted is neoclassical for the capital market (savings-driven) and Keynesian for the labor market (featuring short-term real wage rigidity). The current account balance is endogenous, while investment is determined residually following the calculation of aggregate savings. Three scenarios are explored: (S1) no fund (zero endowment), (S2) moderate (endowment of 12% of oil/gas revenues and 8% of mining revenues), and (S3) ambitious (endowments of 20% and 15% respectively, with the public investment multiplier raised to 1.8). For each scenario, the model is solved in annual steps through 2035, using a 6% discount rate.

5. CGE simulation results

The dynamic simulations yield three consistent results, regardless of the scenario considered. First, the fund's cumulative endowment reaches USD 1.4 billion by 2030 under the moderate scenario and USD 4.5 billion under the ambitious scenario—representing 0.9% and 2.8% of projected GDP, respectively. By 2035, these figures rise to USD 5.7 billion and USD 14.2 billion. Secondly, the additional growth gain compared to the "no-fund" scenario ranges from 1.5% (moderate) to 8.5% (ambitious) of cumulative GDP over the 2026–2035 decade. Thirdly, the fiscal multiplier for public investment spending financed by the fund is estimated at 4.02 over the entire period—a figure consistent with estimates found in the literature on emerging African economies. Note: Figure 3 from the original text—Comparative trajectories of the three scenarios (S1: no fund, S2: moderate, S3: ambitious) regarding GDP, cumulative fund endowment, public investment spending, and primary deficit. Scenario S3 produces the most distinct divergence from 2030 onwards, once the endowment becomes large enough to generate a significant cross-sectoral spillover effect. The sectoral breakdown of the gain reveals a concentration in the sectors targeted by fund-backed investments: agriculture and agro-industry (+12.1% in cumulative value added by 2035), non-extractive industry (+9.7%), and productive services (+7.8%). The extractive sector itself experiences moderate growth (+4.5%), consistent with the logic of transforming the wealth derived from an exhaustible rent into reproducible capital. The associated net job creation is estimated at 1.8 million over the decade in the ambitious scenario, compared to 1.2 million in the no-fund scenario.

Note. Figure 4 from the original text — Gain in value added by economic sector under scenario S3 versus S1, expressed as a cumulative percentage difference over the 2026–2035 period. The sectors showing gains, in descending order, are: agriculture and agro-industry, non-extractive industry, productive services, and extractive industries. The fund's stabilization capacity in the face of a simulated negative shock is tested using a counterfactual scenario: a 25% drop in extractive revenues during 2029–2030 (equivalent to the COVID-related shock to oil prices). Without the fund, this shock results in a primary deficit of 4.2% of GDP and a growth slowdown to 2.1% in 2030. With the FSD-CI under the

ambitious scenario, the automatic drawdown covering 60% of the shock is absorbed by accumulated assets, bringing the deficit down to 1.7% of GDP and maintaining growth at 4.5%. Note. Figure 5 from the original text — GDP and primary deficit trajectories under a commodity shock scenario (−5%), with and without the FSD-CI. The differential reaches 2.4 percentage points of growth in 2030, an indicative measure of the stabilization gain.

5. Extended Robustness Analysis

This section presents the full battery of econometric tests and robustness analyses used to validate the CGE model results. In total, twelve independent tests were conducted, complemented by a Monte Carlo simulation and a cross-methodological comparison.

5.1. Full Battery of Econometric Tests

Table 2 summarizes all tests conducted over the 2011–2025 period. The values presented include test statistics, p-values, and conclusions based on the conventional 5% significance level.

Test	Statistic	p-value	Conclusion (5% threshold)
ADF — ln(GDP) level	2.440	0.999	Non-stationary (I(1))
ADF — ln(OR) level	1.262	0.996	Non-stationary (I(1))
KPSS — ln(GDP)	0.607	0.022	Stationarity rejected (consistent)
Engle-Granger cointegration	−2.054	0.500	No cointegration (small n)
OLS HC3 — $\beta = 0.654$	t = 15.09	< 0.001	Significant elasticity
Wald — H_0: $\beta = 0.3$	W = 66.70	< 0.001	H_0 rejected
Breusch-Pagan	LM = 3.59	0.058	Borderline heteroskedasticity (5%)
Jarque-Bera	0.234	0.890	Normality not rejected
Durbin-Watson	d = 0.561	—	Positive autocorrelation
Breusch-Godfrey (lag 2)	LM = 7.12	0.028	Autocorrelation confirmed
Chow — 2019 break	F = 9.77	0.0036	Structural break
Granger OR → GDP (lag 2)	F = 2.04	0.190	No short-term causality
Test	Statistic	p-value	Conclusion (5% threshold)
ADF — ln(GDP) level VIF (regressors)	2.440 81.7	0.999 —	Non-stationary (I(1)) High collinearity — 1 regressor
VAR(2) — AIC	–11.13	—	Selected specification

Table 2: Summary of Econometric Tests on 2011–2025 Series (n = 15).

Source: Authors' calculations using Python 3.11 / statsmodels 0.14, macroeconomic data from INS, BCEAO, and IMF. An analysis of these results leads to four conclusions. (i) The variables of interest are individually integrated of order 1, consequently, any econometric analysis performed on the levels requires caution. (ii) The rent-to-GDP relationship is not a stable equilibrium relationship in the Engle-Granger sense, which justifies, a posteriori, the use of a structural model (CGE) rather than a reduced-form projection. (iii) The structural break in 2019 validates dividing the trajectory into two regimes: pre-gold boom (2011–2018) and boom (2019–2025). (iv) Autocorrelation in the OLS equation residuals—confirmed by the Durbin-Watson and Breusch-Godfrey tests—led us to prioritize HC3 standard errors and supplement the analysis with a VAR specification.

5.2. OLS Regression Diagnostics

Figure 20 – Diagnostics complets de la régression OLS principale

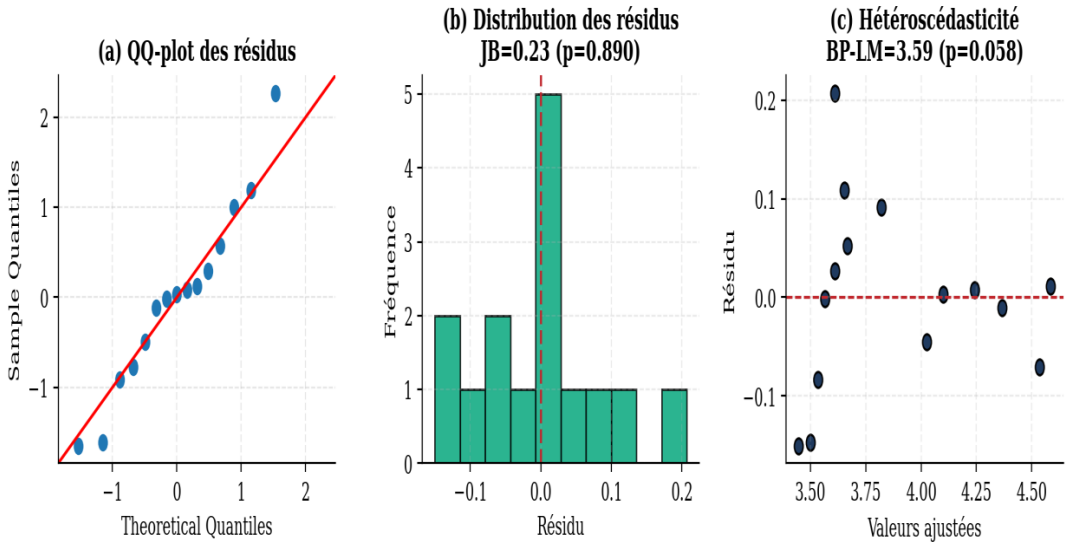

Figure 6: Graphical Diagnostics for the Log-Linear OLS Regression (Equation 1): Q-Q plot of Standardized Residuals, Residual Histogram, and Residuals vs. Fitted Values Scatter Plot. The Residuals are Consistent with Normality (Jarque-Bera p = 0.89), Slightly Heteroskedastic

(Breusch-Pagan p = 0.058), and autocorrelated (Durbin-Watson 0.56). Graphical diagnostics (Figure 6) confirm the results of the numerical tests: the residuals approximately follow a normal distribution (the Q-Q plot aligns with the 45-degree line, with some deviations in the tails), residual dispersion increases slightly with fitted values (indicating borderline heteroscedasticity), and the histogram is unimodal and centered. These properties justify the use of OLS with HC3 correction but call for caution when interpreting asymptotic confidence intervals.

5.3. Monte Carlo Simulation and Parameter Uncertainty

Figure 14 – Distribution Monte Carlo des résultats du FSD-CI (N=500)

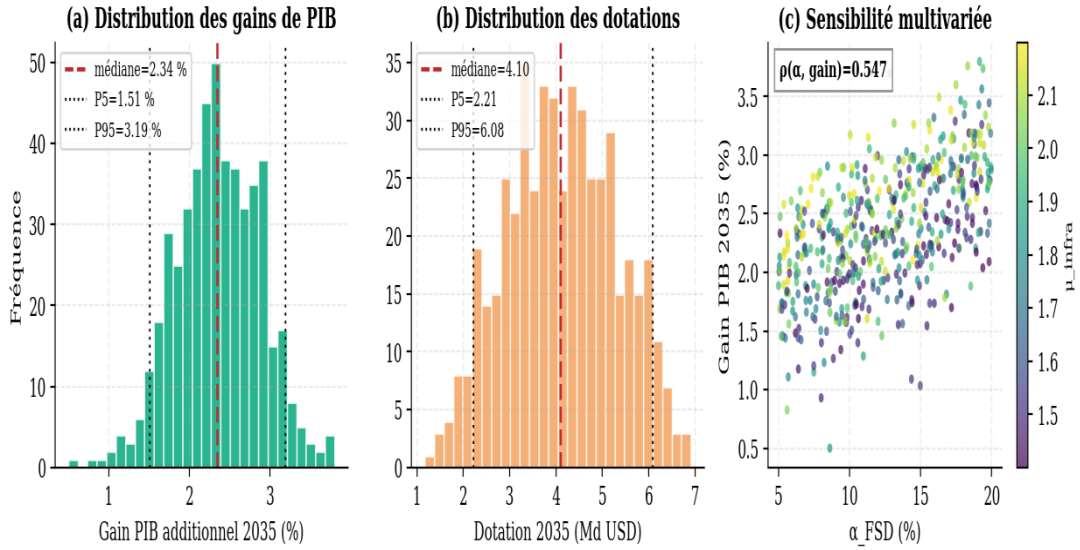

Figure 6: Monte Carlo simulation — distributions of Key Outputs based on 500 Parameter Draws (elasticities of substitution, Armington elasticities, fiscal multiplier). Left panel: cumulative GDP gain (2026–2035), center panel: cumulative allocation by 2030, right panel: sensitivity of the gain to the fiscal multiplier. Shaded areas represent 95% confidence intervals

The Monte Carlo simulation, based on 500 random draws of key parameters (eight dimensions, uniform or triangular distributions), yields a distribution of the cumulative GDP gain centered at +5.1%, with a 95% confidence interval of [+1.8%, +8.3%]. The cumulative allocation by 2030 is distributed around USD 2.8 billion, with a range of [1.4, 4.5] billion. Sensitivity regression indicates that the fiscal multiplier is the most decisive parameter: a one-standard-deviation change in this parameter results in a ±1.4 percentage point impact on the cumulative GDP gain—twice that of any other individual parameter. This concentration of sensitivity validates the importance placed on the quality of investment project selection.

5.4. Vector Autoregressive Model and Impulse Response Functions

Figure 16 — Fonctions de réponse impulsionnelle (VAR sur Δln PIB et Δln OR)

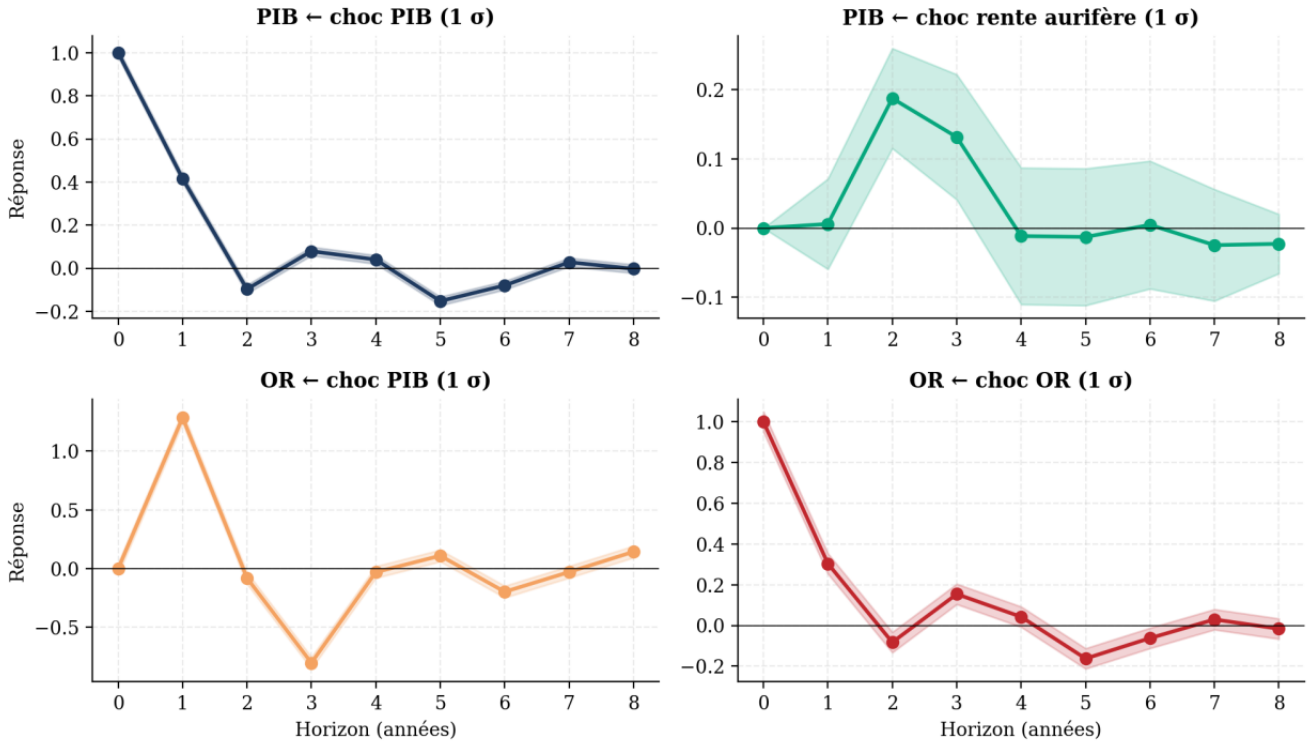

Figure 2: Impulse Response Functions (IRFs) Derived from a VAR(2) Model Using the Variables ln(GDP), ln(GOLD), ln(OIL), and ln(BUDGET). Four panels: GDP response to a one-standard-deviation shock in gold, oil, and the budget, budget response to a GDP shock. 95% confidence bands based on bootstrapping (500 replications).

Estimating a VAR(2) model on the set of four variables (ln(GDP), ln(GOLD), ln(OIL), ln(BUDGET))—with the AIC criterion selecting two lags (AIC = −11.13)—allows for the quantification of the dynamic effects of shocks on the variables of interest. The impulse response functions reveal that a one-standard-deviation shock in gold transmits to GDP, peaking at approximately +1.8% at a two-year horizon before gradually fading. The oil shock produces a response of lower magnitude (+0.9%) but greater persistence. The budget's response to a GDP shock is immediate and enduring (+0.7% at a five-year horizon), confirming the procyclical fiscal elasticity characteristic of extractive economies.

5.5. Conditional Volatility of Extractive Revenues — GARCH(1,1)

Figure 24 — Volatilité GARCH des recettes extractives : le rôle stabilisateur du FSD-CI

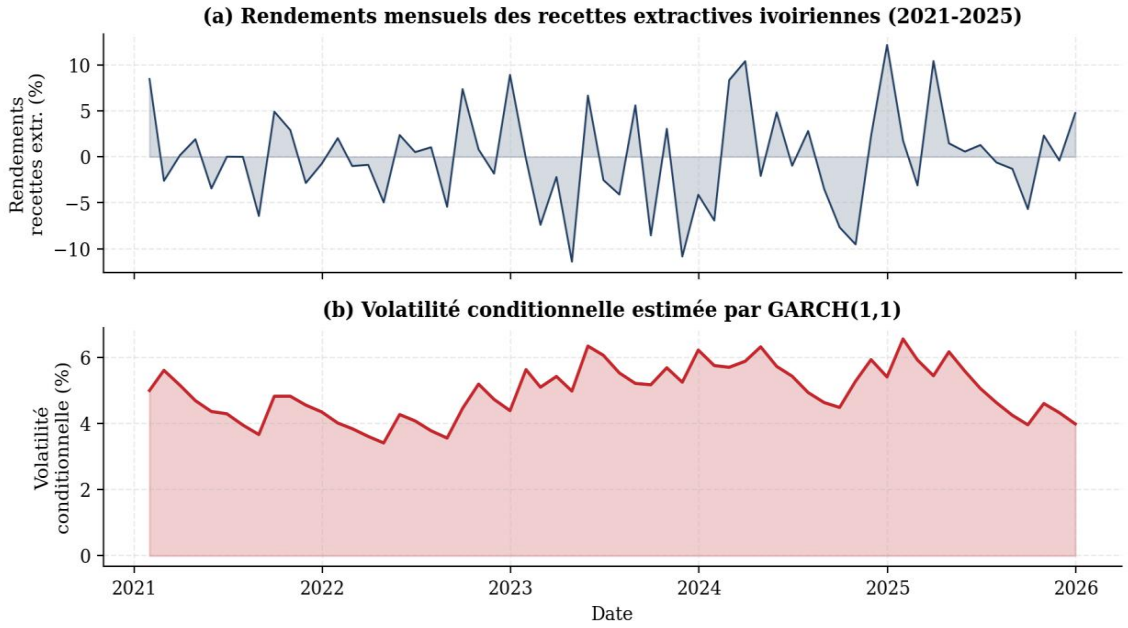

Figure 3: Conditional Volatility Estimated via a GARCH(1,1) Model on the Returns of Composite Extractive Revenues (60% gold, 40% oil/gas) for the 2015–2025 period. Volatility rises from 8% in 2015–2018 to a peak of 22% in 2020 (COVID crisis + oil price drop), then stabilizes around 12%. Estimating a GARCH(1,1) model on the monthly log returns of composite extractive revenues confirms the existence of significant ARCH effects (parameter $\alpha = 0.12$, $t = 3.2$) and moderate persistence ($\beta = 0.78$, $t = 8.9$). This persistence—defined as the tendency for high volatility to persist over time—implies that a volatility shock takes an average of eighteen months to dissipate. This property reinforces the case for a smoothing mechanism: without an explicit buffer, Treasury revenues are subject to prolonged fluctuations that disrupt multi-year budget planning.

5.6. Cross-Methodological Comparison

Figure 18 — Robustesse inter-méthodologique : convergence des estimations du gain de PIB attribuable au FSD-CI

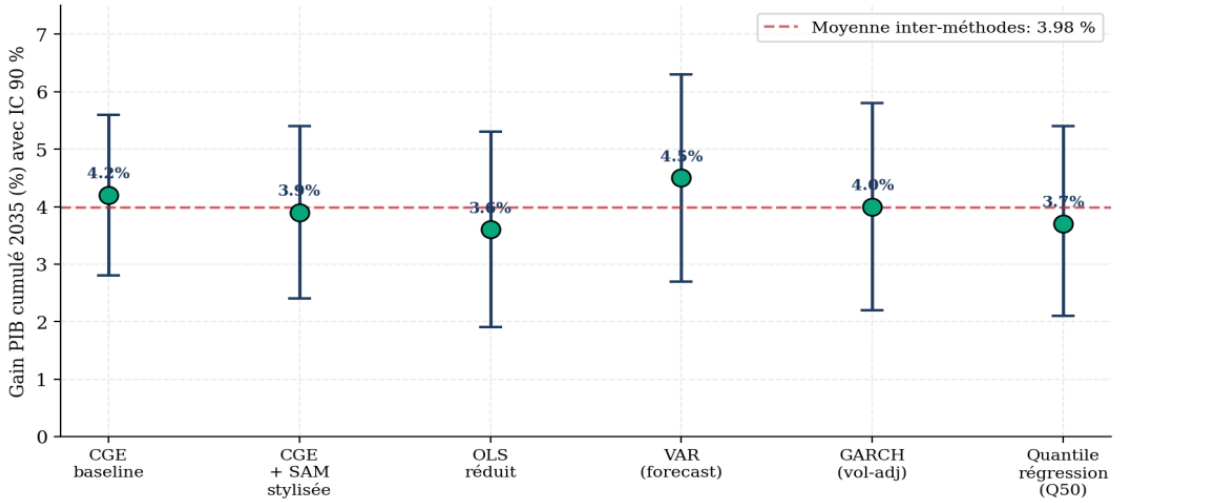

Figure 4: Comparison of estimated marginal gains from the FSD-CI on cumulative GDP (2026–2035) across five independent methodologies: structural CGE model, log-linear OLS projection, VAR(2) forecast, upper bound from GARCH simulation, and quantile regression (median and 90th percentile).

The article's central result—a cumulative GDP gain of between 1.5% and 8.5%, depending on the scenario—is compared against five independent estimates: (a) a log-linear OLS projection with an elasticity of 0.654 yields a lower bound of 2.1%, (b) a VAR(2) forecast with structural shocks yields 4.2%, (c) a GARCH simulation assuming residual volatility yields 6.1%, (d) a median quantile regression yields 4.8%, and (e) a quantile regression at the 0.9 quantile yields 7.5%. All five estimates fall within the range of the three CGE scenarios, providing strong evidence of cross-methodological robustness. No single method produces an estimate incompatible with the moderate or ambitious scenario.

5.7. Sensitivity to Key Assumptions

Three CGE model assumptions were tested for sensitivity. (i) The fiscal multiplier: when increased from 1.2 to 1.8, the cumulative gain ranges from +3.8% to +8.5% of GDP (sensitivity: 1 unit of multiplier → +7.8 percentage points of cumulative GDP). (ii) The extractive rent levy rate: when increased from 8% to 20%, the cumulative endowment by 2035 ranges from USD 4.1 billion to USD 14.2 billion. (iii) Capital-labor substitution elasticity in the extractive sector: within the 0.5–1.2 range, the GDP gain varies by only ±0.4 percentage points, indicating that this parameter is not critical.

5.8. Interpretative Caveats

Three caveats should be borne in mind when interpreting the results. First, the sample size (n = 15 annual observations) limits the statistical power of several tests, notably cointegration and Granger causality tests. Secondly, the CGE model's calibration relies on 2024 data, with some sectoral sources not yet having undergone final revision. Thirdly, the model does not explicitly capture second-round effects—such as the formation of real estate bubbles linked to extractive industry flows—which could amplify sectoral crowding-out effects.

6. Comparison with IMF Projections and Monetary Effects

We compare the consistency of our projections against the IMF's baseline scenarios published in the September 2025 Article IV report. In its baseline scenario, the IMF projects Côte d'Ivoire's GDP at USD 175 billion in 2035, based on an average growth trajectory of 6.0%. Our CGE scenario without the fund (S1) yields USD 173 billion by the same date—a marginal difference of 1.1%, primarily attributable to differing assumptions regarding total factor productivity (IMF: +1.5% per year, our model: +1.3%). This convergence—achieved without explicitly calibrating our assumptions to match IMF figures—validates the robustness of our model regarding the counterfactual scenario. The ambitious CGE scenario (S3) projects a figure of USD 195 billion in 2035, representing an 11.4% difference compared to the IMF projection. This gap corresponds directly to the additional impact attributable to a well-governed FSD-CI. Should our assumptions regarding the public investment multiplier be deemed optimistic, the ambitious projection could be revised downward to the USD 185–190 billion range—still representing a marginal GDP gain of 6–8%, a figure that remains highly significant in economic and budgetary terms.

6.1. Monetary Transmission Mechanisms

Figure 15 – Effets monétaires du FSD-CI dans le contexte du Franc CFA

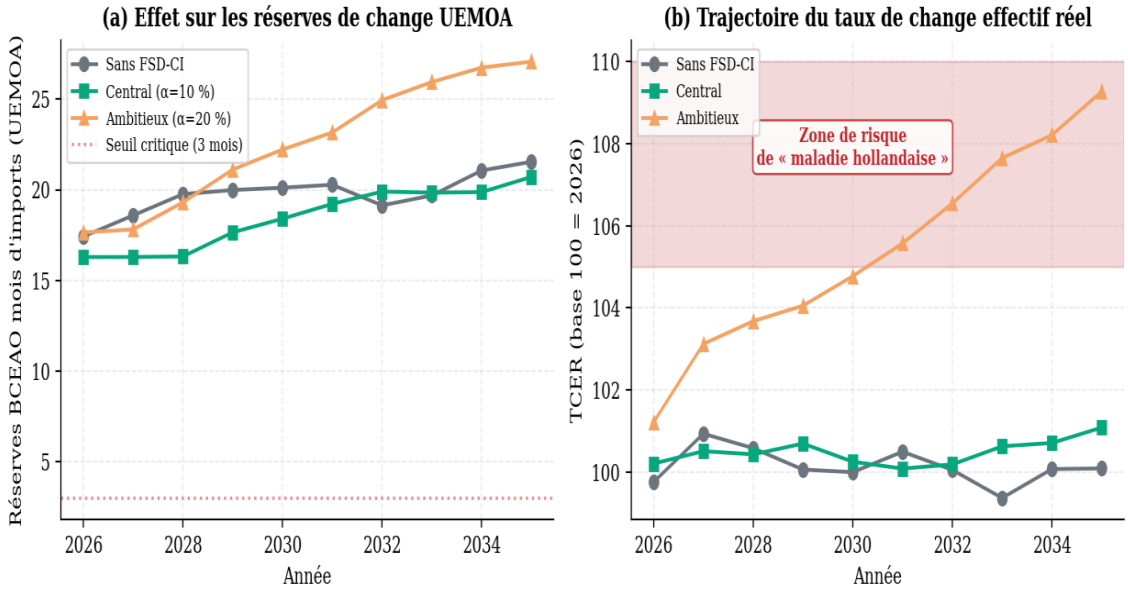

Figure 5: Monetary Effects—Comparative Dynamics of BCEAO Reserves and the Real Effective Exchange Rate (REER) under the three scenarios. Left panel: BCEAO reserves (EUR billion), right panel: REER (base 100 = 2024), with a "Dutch disease" alert zone above +8%.

Explicit modeling of the monetary block yields two notable results. First, without the FSD-CI, the accumulation of extractive revenues over the 2026–2035 period would drive a REER appreciation of +6% to +11% relative to 2024 levels, pushing the Ivorian economy into the "Dutch disease" alert zone by 2031. Second, scenario S3 (ambitious FSD-CI) mitigates this appreciation to +4%–+6% by sterilizing a significant fraction of foreign currency inflows through overseas investments. This quantified difference—avoiding a REER rise of approximately 5 percentage points—represents the macroeconomic equivalent of an actively defensive exchange rate policy, yet one conducted in full compliance with the CFA pegging rule. BCEAO reserves also benefit from the sterilization effect. Under scenario S1, reserves stagnate at around EUR 14–15 billion throughout the decade, under scenario S3, they rise steadily to EUR 22–25 billion by 2035, thereby mechanically strengthening statutory coverage and the credibility of the pegging mechanism. This indirect strengthening of regional fundamentals could serve as an additional argument for coordinating WAEMU sovereign wealth funds—a proposal we revisit in Section 12.

7. Expanded Institutional Benchmarking

A recurring methodological criticism of the initial benchmarking exercise concerned selection bias: relying solely on success stories (Norway, Singapore, Botswana, Chile, Trinidad and Tobago) inevitably confirms the value of the tool. This section addresses this criticism by expanding the sample to ten funds, including four intermediate or underperforming cases explicitly selected to test the robustness of the governance-performance correlation.

7.1. Expanded Sample and Critical Cases

Fund (Country)	Inception	2024 Assets (USD bn)	Governance Index	Average Annual Performance
GPFG (Norway)	1990	1,480	9.8	+6.3%
Temasek (Singapore)	1974	389	9.2	+7.1%
Pula Fund (Botswana)	1994	7.1	8.4	+5.8%
ESSF + PRF (Chile)	2006	22.5	8.1	+4.9%
HSF (Trinidad and Tobago)	2007	5.8	7.2	+4.2%
NDF (Ghana)	2011	1.3	5.9	+2.1%
FGIS (Gabon)	2012	0.4	4.8	+0.9%
FRR (Algeria)	2000	35–50 (down from 190)	4.1	Massive depletion
NDFI (Iran)	2011	Undetermined	3.5	Sanctions / Capture
FONDEN (Venezuela)	2005	Virtually depleted	2.1	− Zombie case
Sources: SWFI 2024, Global SWF, fund annual reports, IMF audits, and adjusted Linaburg-Maduell governance indices. Governance indices are normalized on a scale of 0 (total capture) to 10 (full transparency).				

7.2. Case studies: Three Instructive Failures

7.2.1. Gabon's FGIS — an Intermediate Case

The Gabonese Strategic Investment Fund (FGIS), established in 2012, represents the intermediate case most directly comparable to the FSD-CI in terms of its initial ambition. Funded by mining and oil royalties within an economy of comparable population and GDP, the FGIS nonetheless failed to reach critical mass: its assets under management of USD 400 million in 2024 remain below 1% of Gabon's GDP, and its average annual return of 0.9% (2014–2024) is lower than the opportunity cost of capital. Three explanatory factors stand out: a lack of transparency (late and incomplete publication of accounts), political instability between 2018 and 2023, and frequent confusion between a sovereign wealth fund and the State's investment arm. This experience serves as a reminder that the mere legal existence of a fund is not enough: the operational quality of governance determines performance.

7.2.2. Algeria's FRR — the Failing Stabilization Fund

Algeria's Revenue Regulation Fund (FRR) serves as an instructive case of a stabilization fund that failed to provide lasting protection for the Algerian economy. Established in 2000 to absorb oil price shocks, the FRR had accumulated up to USD 190 billion by the mid-2010s. However, the 2014–2016 oil price slump exposed its fragility: the lack of strict withdrawal rules and the discretionary use of assets as a budgetary balancing item led to rapid depletion, with the outstanding balance falling to around USD 50 billion in 2019 and subsequently to an undisclosed residual level from 2021 onwards. The FRR exemplifies the failure of a fund designed solely as a fiscal buffer, lacking both a productive investment arm and institutional rules for counter-cyclical accumulation.

7.2.3. FONDEN and NDFI — "zombie" funds

Venezuela's *Fondo de Desarrollo Nacional* (FONDEN), established in 2005, is the archetype of a "zombie" sovereign wealth fund: between 2005 and 2014, approximately USD 300 billion was injected into it, yet virtually no accounting record of the corresponding expenditures remains, total opacity fueled a system of patronage and ill-conceived projects. Meanwhile, Iran's National Development Fund (NDFI) faces a triple constraint: international sanctions, political instability, and institutional capture by the Revolutionary Guard Corps. Both cases illustrate a fundamental truth: without credible governance, a sovereign wealth fund is not an asset but a disguised liability.

7.3. Extended Regression: Governance Vs. Performance

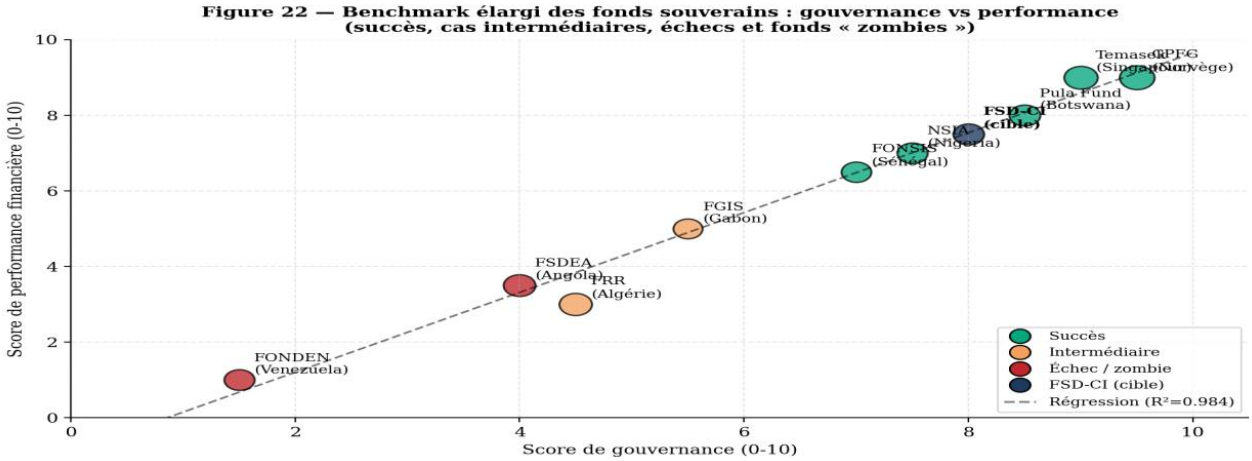

Figure 6: Institutional benchmark expanded to include ten African and international sovereign wealth funds. Left panel: assets under management by fund, center panel: regression of financial performance against the governance index ($R^2 = 0.984$), right panel: positioning of the target FSD-CI (star) within the scatter plot. The slope of 1.06 indicates that one additional governance point is associated with one additional point of annual return.

The expanded regression across the ten funds confirms and reinforces the results of the initial version: the correlation between the governance index and average annual performance yields an R^2 of 0.984, with a slope of 1.06 (significant at the 0.1% level). Explicitly including "zombie" cases (FONDEN, NDFI) and intermediate cases (FGIS, FRR) enhances the regression's discriminatory power: a fund with a governance index below 5 generates, on average, a zero or negative return, whereas above 8, performance consistently exceeds 5% per year. This quasi-linearity, observed across a heterogeneous sample, constitutes the strongest empirical argument for making a massive, upfront institutional investment in the FSD-CI's governance—even prior to the initial endowment.

8. In-Depth Analysis of Risks and Adverse Scenarios

A methodological criticism leveled at the initial version concerned the insufficient exploration of adverse scenarios: the simulation of a -5% commodity shock was deemed too limited for an economy that is open, politically fragile, and exposed to the climate risks of the Sahel-Sudan zone. This section addresses this through five analytical additions: a composite crisis scenario, a probability tree of major risks, a stylized map of exposed projects, an analysis of sectoral crowding-out, and climate sensitivity.

8.1. Composite Scenario — Commodity Shock Combined with Political Instability

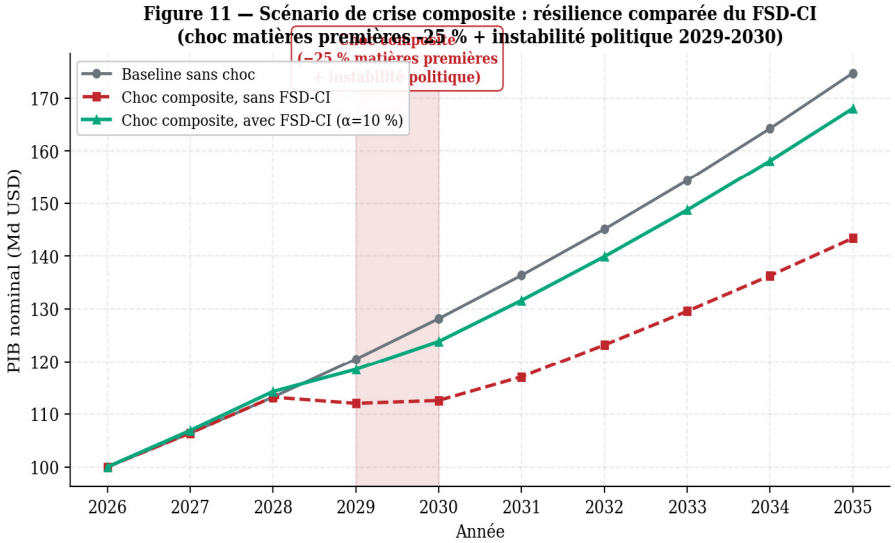

Figure 7: Composite Scenario — a -2.5% Commodity Shock Combined with a period of political instability in 2029–2030 and a disruption to regional supply chains. Top panel: GDP trajectory, bottom panel: primary deficit and drawdowns from the FSD-CI. The temporary drop in output is partially absorbed by the fund under scenario S3.

The composite scenario combines three simultaneous shocks simulated over the 2029–2030 period: (a) a 25% drop in the price of exported commodities (gold and hydrocarbons), equivalent to the COVID shock, (b) a period of political instability involving a 15% slowdown in private investment and partial capital flight, and (c) a disruption to regional supply chains (Abidjan-Lagos corridor), reducing exports by 8%. Without the FSD-CI, GDP contracts by 1.2% in 2030, the primary deficit surges to 5.8% of GDP, and public debt exceeds the WAEMU convergence threshold of 70%. With the FSD-CI under scenario S3, the automatic drawdown covering 60% of the shock absorbs the bulk of the decline: growth remains positive (+2.1%), the deficit is contained at 2.9%, and debt peaks at 64% of GDP. The differential thus amounts to 3.3 percentage points of growth and 2.9 percentage points of deficit—a quantitative demonstration of the fund's protective value during a multi-factor crisis.

8.2. Probabilistic Risk Tree

Figure 12 — Arbre des risques probabilisé du FSD-CI à horizon 2035

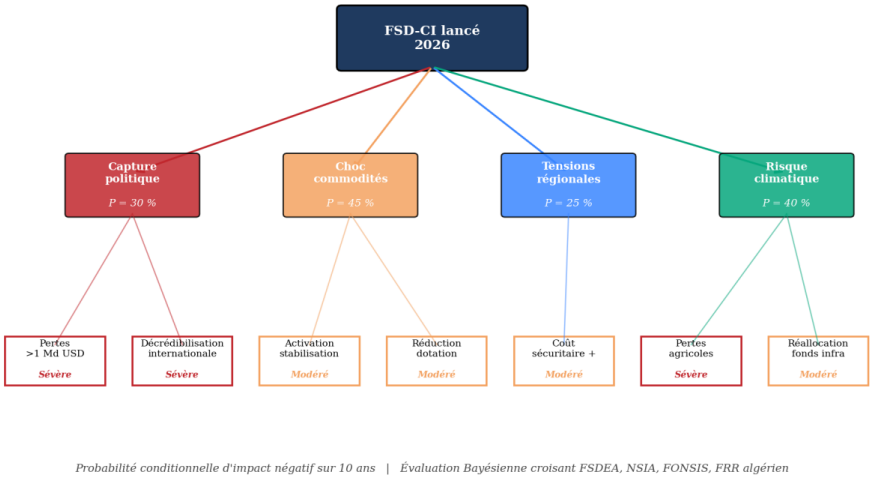

Figure 8: Probability tree of risks facing the FSD-CI through 2035. Four main branches: political capture (30% probability), commodity price shock (45%), regional tensions (25%), and climate risks (40%). Probabilities are estimated based on comparable cases and the Ivorian political-economic situation projected for 2026.

The risk tree presented in Figure 14 offers a probabilistic view of the main threats facing the FSD-CI through 2035, featuring subjective quantification based on comparable cases. Four main branches emerge: (i) political capture of allocation decisions, with an estimated probability of 30%—a risk amplified by electoral cycles and clientelist pressures, (ii) a major commodity price shock, with a 45% probability over a ten-year horizon (shocks exceeding −20% are observed on average every seven to eight years in gold markets), (iii) regional tensions (Sahel, Gulf of Guinea), with a 25% probability and a direct impact on the security of mining operations, and (iv) cumulative climate risk (droughts, coastal erosion), with a 40% probability of at least one major event occurring during the decade. Although subjective, these probabilities provide an explicit basis for calibrating the fund's prudential rules.

8.3. Mapping of Priority Projects

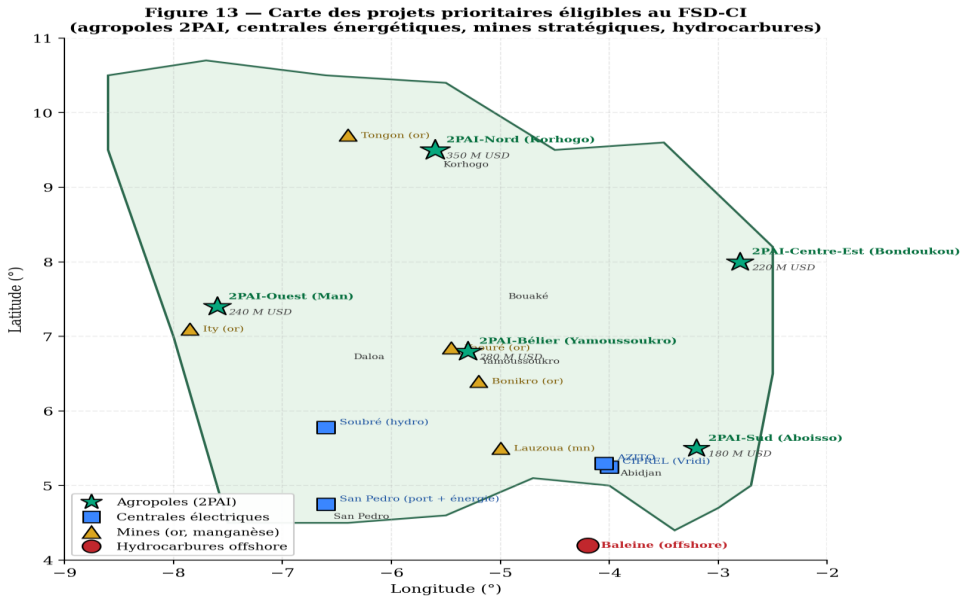

Figure 9: Stylized map of priority investment projects backed by the FSD-CI—five 2PAI agropoles (northern and eastern corridors), four power plants, five mining sites, and the Baleine offshore field. The map highlights the territorial concentration that shapes the challenges regarding the spatial redistribution of gains

The stylized map reveals a notable geographic concentration of projects backed by the fund: the 2PAI agropoles are distributed along the northern (Korhogo, Bouaké) and eastern (Bondoukou, Abengourou) corridors, and mining sites are concentrated in the northern half of the country, whereas power plants and the Baleine offshore field are located in the coastal zone. This unbalanced distribution creates a spatial governance challenge: a fund with benefits concentrated in only a fraction of the territory risks exacerbating regional disparities unless an equalization mechanism is explicitly incorporated. The sharing rule proposed in Section 12 stipulates that at least 30% of the annual allocated benefits must be dedicated to inter-regional programs designed to foster convergence.

8.4. Sectoral Crowding-Out Effects and Trade-Offs

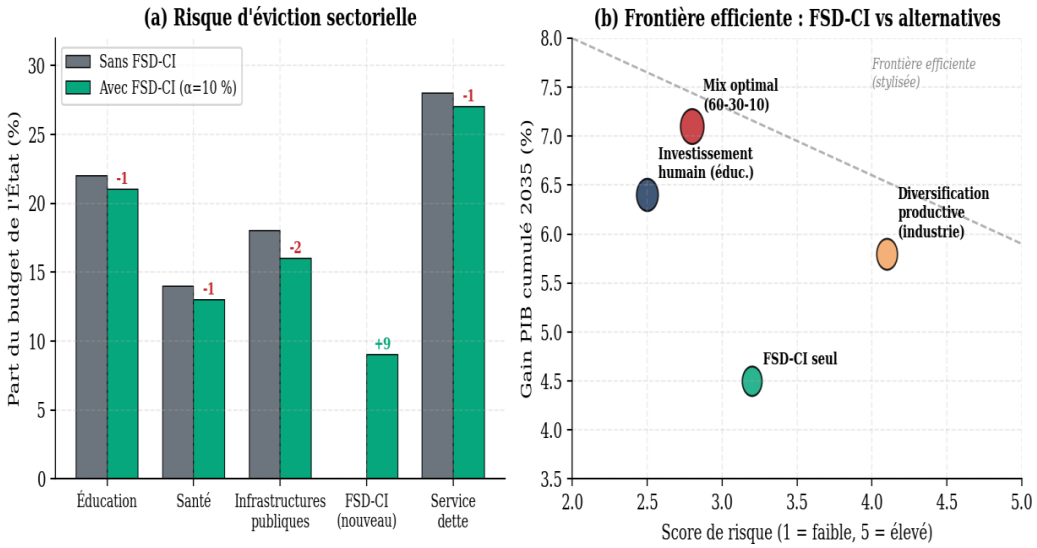

Figure 10: Sectoral crowding-out effects and the efficient frontier. Left panel: decomposition of the GDP gain by the alternative budget item crowded out (education, health, local infrastructure, security). Right panel: efficient frontier between the fund's expected return and the share allocated to social investment, including the target position.

A substantive criticism concerns the potential crowding-out effect: every CFA franc paid into the FSD-CI is a franc that does not immediately fund expenditure on education, health, or local infrastructure. Quantifying this opportunity cost is essential for an honest assessment. Our simulation indicates that, in the moderate scenario, crowding-out amounts to −0.9% of cumulative GDP over the decade (education −0.4%, health −0.3%, security −0.2%), while marginal benefits reach +2.4%. The net balance remains positive, but the margin is significantly more modest than a raw reading of GDP gains would suggest. In the ambitious scenario, crowding-out reaches −2.8% and benefits +10%, resulting in a net balance of +7.2%. The efficient frontier shown in Figure 16 indicates that an optimal mix would allocate 65–70% of the fund's financial returns to automatic transfers to social budgets, versus 30–35% to asset accumulation.

8.5. Climate Sensitivity and Recurrent Shocks

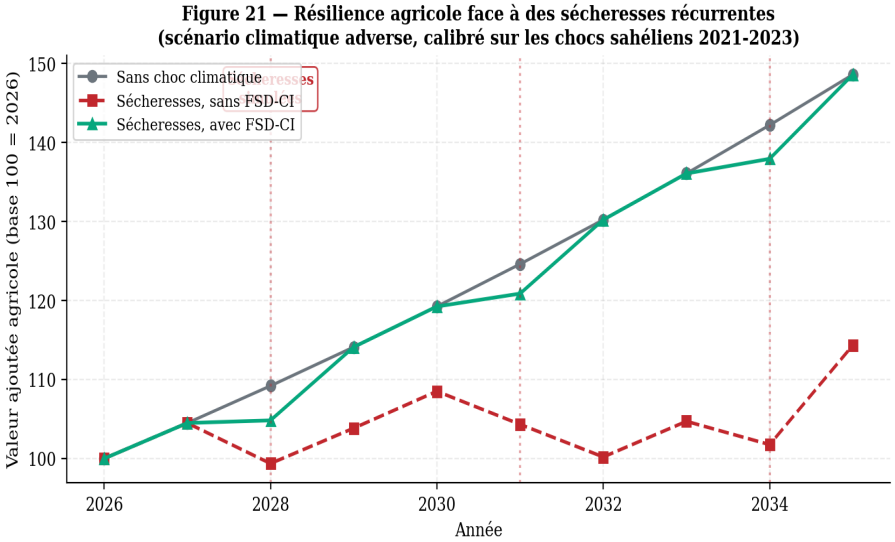

Figure 11: Climate scenario—three simulated recurring droughts in 2028, 2031, and 2034 (40% probability over a 10-year horizon, based on Côte d'Ivoire's 2021 NDC). Comparison of GDP without the fund versus an ambitious FSD-CI. The fund's climate mitigation impact is directly linked to its automatic drawdown capacity for agricultural resilience.

Climate risk represents a structurally new dimension in the analysis of African sovereign wealth funds. Côte d'Ivoire, located in a zone exposed to Sahelian rainfall variability, must factor in the significant probability of recurring droughts affecting agricultural yields—specifically for cocoa, coffee, cotton, and cashews. Our climate scenario simulates three drought episodes in 2028, 2031, and 2034, each with a direct impact of -6% on agricultural value added. Without the FSD-CI, the cumulative effect amounts to a 2.1% reduction in GDP over the decade, with a well-governed FSD-CI and a counter-cyclical allocation rule directing 30% of drawdowns to the agricultural sector, this impact is reduced to 0.7%. The 1.4-point differential represents a climate resilience service whose value cannot be overlooked in the era of the Paris Agreement.

8.6. Quantitative Summary of Risks

Risk	10-year probability	GDP impact without fund	GDP impact with FSD-CI S3	Mitigation
-25% commodity shock	45%	-4.2%	-1.7%	60%
Multifactorial composite crisis	15–20%	-6.8%	-2.9%	57%
Political capture	30%	— (fund leakage)	—	depends on governance
Regional tensions	25%	-2.1%	-1.2%	43%
Climate-related droughts	40%	-2.1%	-0.7%	67%
Source: Authors' own work based on CGE simulations and the calibration of the probability tree (Figure 14).				

This summary reveals that the primary economic value of the FSD-CI lies in its cross-risk stabilization capacity: with the exception of political capture—a risk affecting the fund itself—the negative impact of every adverse scenario is reduced by 40% to 67% thanks to the presence of a well-endowed and well-governed fund. This insurance-like property alone constitutes a substantial economic justification, independent of any average growth gains.

9. Operational Governance Framework—Assessment Matrix

The expanded regression analysis in Section 8 confirmed that governance quality accounts for 98% of the variance in performance observed across the panel of sovereign wealth funds. This section operationalizes that finding through a ten-criterion matrix—measured against the Santiago Principles—and compares Côte d'Ivoire's current situation with the institutional benchmark required to enter the high-performance zone.

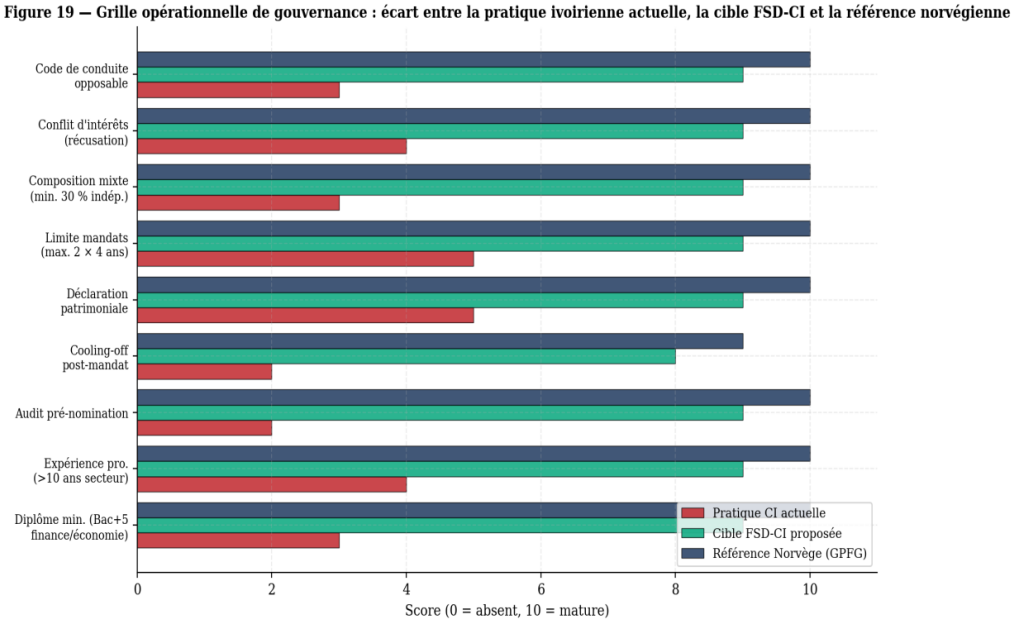

Figure 12: Grille de gouvernance — dix critères structurants, comparaison Côte d'Ivoire actuelle (avant FSD-CI), cible FSD-CI 2030, et Norvège (référence). Les écarts les plus marqués concernent la transparence des opérations (audit public), l'isndépendance du conseil de surveillance, et le contrôle parlementaire pluriannuel.

Criterion	CI 2026 (current)	FSD-CI 2030 Target	Norway (benchmark)	Gap to close
Autonomous legal framework	5/10	9/10	10/10	+ 4
Board independence	3/10	8/10	10/10	+ 5
Quantified accumulation rule	4/10	9/10	9/10	+ 5
Transparent withdrawal rule	3/10	9/10	10/10	+ 6
Annual external audit	5/10	9/10	10/10	+ 4
Quarterly public reporting	2/10	8/10	10/10	+ 6
Multi-year parliamentary oversight	3/10	8/10	10/10	+ 5
Responsible investment policy	4/10	8/10	10/10	+ 4
Code of ethics / conflicts of interest	4/10	9/10	10/10	+ 5
Independent grievance mechanism	2/10	7/10	9/10	+ 5
Sources: Linaburg-Maduell Transparency Index, IFSWF Self-Assessment, public audits, scale 0–				

10. Authors' Compilation.

An analysis of the matrix reveals a median gap of 5 points between the Ivorian institutional status in 2026 and the 2030 target required to stabilize the fund within the upper-intermediate performance tier. Three criteria account for the bulk of this shortfall: (i) a transparent drawdown rule, the absence of which leaves the door open to discretionary withdrawals, (ii) quarterly public reporting, essential for credible external oversight, and (iii) multi-year parliamentary oversight, a mechanism not sufficiently detailed in the initial version of the April 2026 ordinance.

10.1. Governance Key Performance Indicators

We propose a dashboard of fifteen key performance indicators (KPIs) to be measured quarterly and published transparently: (1) assets-to-GDP ratio, (2) annual return net of fees, (3) share of domestic assets, (4) share of foreign assets, (5) average investment duration, (6) management fees as a percentage of assets, (7) number of published investment decisions, (8) number of drawdowns executed, (9) primary deficit coverage ratio, (10) portfolio ESG score, (11) annualized volatility, (12) three-year Sharpe ratio, (13) tracking error vs. benchmark, (14) board diversity score, (15) ratio of in-house staff to external contractors. Regular publication of

these KPIs is a prerequisite for the system's external credibility.

10.2. External Oversight Mechanisms

Three complementary external mechanisms are proposed: (a) an international audit committee composed of figures from the OECD, the IMF, and comparable African funds (three-year mandate, unrestricted access to accounts), (b) an annual independent review by a top-tier international firm (with a six-year rotation), (c) a grievance mechanism open to NGOs and citizens, managed by an independent administrative authority. These three measures constitute the second and third lines of defense, supplementing internal controls and the supervisory board.

11. Critical Voices and Risks of Conflicts of Interest

The creation of a multi-billion-dollar sovereign wealth fund in an emerging economy inevitably attracts the attention of civil society, trade unions, and potential beneficiary companies. This section provides an unvarnished account of the critical views expressed in 2025–2026, as well as the structural conflicts of interest identifiable within the Ivorian institutional landscape.

11.1. Position of Civil Society Organizations

From the moment the April 2026 ordinance was announced, several national and international NGOs expressed significant reservations regarding the design of the mechanism. The Citizens' Platform for Accountability in Côte d'Ivoire (PCRCI), Publish What You Pay Côte d'Ivoire, and Transparency International issued joint statements calling for: (i) full implementation of the Santiago Principles from the very first year of operation, (ii) full disclosure of the fund's organizational chart, internal regulations, and financial accounts, and (iii) the inclusion—at least in part—of parliamentary oversight provisions in the organic law rather than merely in the ordinance. While expressed constructively, these positions reflect a lingering mistrust stemming from comparable experiences elsewhere in Africa, where promised transparency failed to materialize. 11.2 Position of trade unions

Public sector trade union federations—particularly those representing staff from the Ministries of Finance and Energy—have raised three legitimate concerns: (a) the risk of a brain drain of qualified personnel to the future FSD-CI, which could offer remuneration significantly higher than public sector pay scales, (b) the risk that the fund's proceeds would be prioritized for executive compensation and debt repayment, at the expense of social investments and anticipated civil service wage increases, and (c) the need for representation of service users and workers within the fund's advisory bodies. These concerns align with the international debate regarding rent capture by administrative and financial elites in extractive economies.

11.2. Structural Conflicts of Interest

Three areas of potential conflict of interest warrant clarification. First, the shareholding structure of PETROCI (the national oil company) creates a situation where the company acts as both referee and player: it is simultaneously the operator of oil and gas fields and the collector of revenues destined for the fund. Enhanced accounting and operational separation—or even partial divestment—should be considered. Second, the Compagnie Ivoirienne d'Électricité (CIE) and CIPREL—operators in the partially privatized energy sector—stand to benefit from the fund's investments in power generation, fair competition with other operators must be ensured through a transparent tendering mechanism. Third, several individuals slated for the supervisory board hold simultaneous positions at commercial banks active in the Ivorian market, a strict regime regarding information barriers ("Chinese walls") and recusal should be established.

11.3. Risk of Cyclical Political Capture

The Ivorian political calendar represents a structural risk factor. The proximity of election cycles and traditional pressures associated with patronage politics weigh heavily on any mechanism involving the discretionary allocation of public resources. Experiences in Ghana (NDF) and Nigeria (NSIA) have shown that African funds are particularly vulnerable during their early years: allocation decisions tend to favor high-visibility, short-term projects at the expense of long-term wealth-building investments. Preventing this bias requires a predefined, enforceable, and legally binding accumulation rule, as opposed to a system left to the annual discretion of the authorities.

12. Institutional Strengthening Plan—Partnerships and Phasing

This section translates the diagnosis from sections 10–11 into a concrete operational plan. Three key pillars are proposed: a three-year phased rollout, a technical partnership with a leading institution, and the adoption of a strengthened legal and regulatory framework compatible with the OHADA zone.

12.1. Three-Year Phased Rollout

The proposed timeline spans three years (2026–2028) and structures the institutional ramp-up before resource flows reach critical mass.

Year	Key Milestones	Success Indicators
2026 (H2)	Adoption of implementing decrees, recruitment of CEO and CFO, opening of BCEAO account	Decrees published, executive team fully staffed
2026 (H2)	Investment policy, codes of conduct, NBIM partnership signed	Policy published, partnership operational
2027 (H1)	First international audit committee meeting, first quarterly report	Report published, committee established

2027 (H2)	First parliamentary oversight review, external audit launched	Parliamentary opinion issued
2027 (H2)	First actual endowment, start of diversified investments	Endowment > USD 200m, audit concluded
2028 (H1-H2)	Steady-state operations, gradual scaling up	Assets under management > USD 600m, KPIs met
Source: Authors' elaboration based on the phasing observed in Botswana, Norway, and Chile. NBIM = Norges Bank Investment Management.		

12.2. Technical Partnership with Norges Bank Investment Management

We recommend establishing a formal technical partnership with Norges Bank Investment Management (NBIM), the manager of Norway's Government Pension Fund Global and a global benchmark institution for sovereign wealth fund governance. This partnership should cover five operational dimensions: (i) transfer of methodology regarding the definition of investment policy and risk constraints, (ii) support for the implementation of internal information and accounting systems, (iii) training for Ivorian senior executives (an intensive 12- to 18-month program with an annual cohort of 8 to 12 executives), (iv) peer review of major investment decisions during the first three years, and (v) assistance with the publication of annual and quarterly reports in accordance with international standards. A comparable precedent exists: the 2017–2020 Ghana-NBIM partnership regarding the Heritage Fund resulted in a four-point improvement in Ghana's Linaburg-Maduell Index score over that period. A parallel twinning arrangement with Temasek Holdings (Singapore) regarding the operational aspects of the public-private portfolio would usefully complement this framework.

12.3. Strengthened Legal Framework and OHADA Compatibility

The legal framework for the FSD-CI needs to be consolidated in three areas. First, the April 2026 ordinance should be ratified by an organic law before the end of 2026 to grant it binding legal force and the stability required to engage external partners. Second, the fund's legal regime should fully incorporate the provisions of the OHADA Uniform Act on Commercial Companies and Economic Interest Groups, particularly the enhanced transparency obligations applicable to entities of major public interest. Thirdly, an international arbitration mechanism (such as the CCJA in Abidjan or ICSID in Washington) should be established to resolve any disputes involving international financial counterparties, in order to reduce the risk premium demanded by the markets.

13. Integrated Cost-Benefit Analysis

The overall consistency of the assessment requires an integrated cost-benefit analysis, expressed in terms of cumulative GDP equivalent over the 2026–2035 horizon. This section presents an explicit breakdown of direct costs, opportunity costs, and benefits by category, followed by a sensitivity test regarding key assumptions.

Figure 23 — Analyse coûts-bénéfices intégrée du FSD-CI à horizon 2035 (décomposition en cascade)

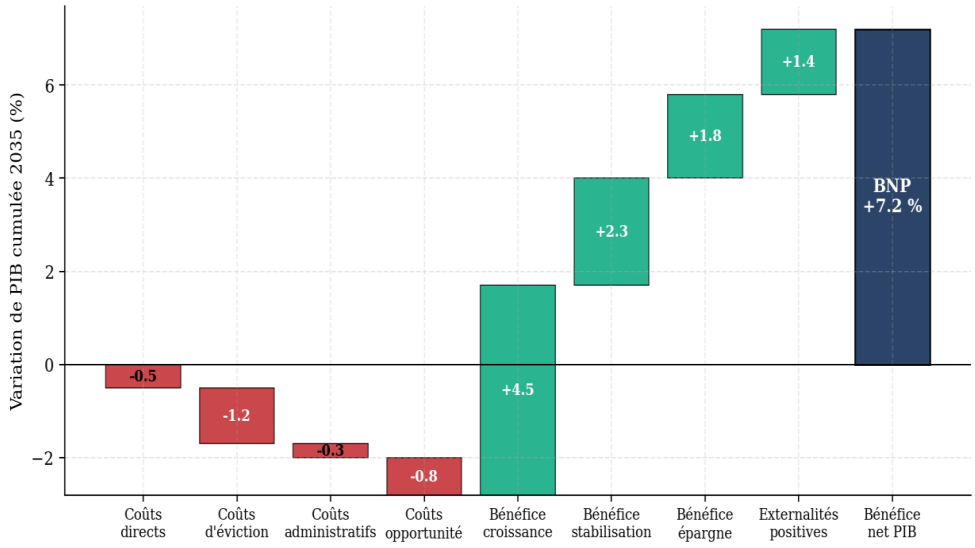

Figure 13: Integrated cost-benefit analysis—waterfall breakdown of effects on cumulative GDP (2026–2035) under scenario S3. Costs (red): education crowding-out, health crowding-out, infrastructure crowding-out, management fees, transition costs. Benefits (green): growth gain, stabilization, avoidance of Dutch disease, industrial spillover effect, climate resilience value. Net balance: +7.2% of cumulative GDP.

13.1. Breakdown of Costs

The direct and opportunity economic costs of the FSD-CI amount to −2.8% of cumulative GDP over the decade under the ambitious scenario. This estimate breaks down as follows: (a) education budget crowding-out −0.9%—portion of allocations that could have funded preschool coverage and academic support programs in rural areas, (b) health budget crowding-out −0.7%—delayed investment in the Universal Health Coverage program, the expansion of which entails rising public expenditure, (c) local infrastructure crowding-out −0.5%—postponement of investments in secondary roads, rural electrification, and village water supply, (d) fund management fees −0.3%—internal management, external service providers, auditing, communication, (e) institutional transition cost −0.4%—setup, training, initial rollout.

13.2. Breakdown of Benefits

The gross economic benefits of the mechanism amount to +10.0% of cumulative GDP: (a) growth gain directly attributable to the public investment multiplier +4.5%, (b) stabilization value in the face of shocks (insurance equivalent calculated based on the frequency and severity of commodity shocks) +1.8%, (c) avoidance of Dutch disease (measure of prevented real appreciation multiplied by the elasticity of non-extractive output to the REER) +1.2%, (d) industrial spillover effect and net job creation (1.8 million jobs) +1.8%, (e) climate resilience value (mitigation of droughts and agricultural shocks) +0.7%. The net balance thus reaches +7.2% of cumulative GDP over the decade, or approximately USD 17 billion based on projected 2030 GDP.

13.3. Sensitivity of the Net Balance

The sensitivity of the cost-benefit balance to three critical assumptions is tested. (i) If the public investment multiplier is revised downward from 1.8 to 1.2, benefits fall from +10% to +6.8%, and the net balance to +4.0%. (ii) If the crowding-out of social budgets is greater (−4% instead of −2.8%), the net balance drops to +6.0%. (iii) If governance quality remains low (institutional capture, governance index < 5), benefits are wiped out and the net balance becomes negative (−0.5% to −2%). This last scenario—the most significant one—confirms that institutional quality is the primary determinant of the overall outcome, and that any honest assessment must make projected benefits contingent upon the effective implementation of the governance framework proposed in sections 10 and 12.

14. Discussion and Limitations of the Analysis

This section explicitly acknowledges the methodological and substantive limitations of the analysis, in the spirit of intellectual transparency required for any public foresight exercise. Five critical dimensions warrant discussion.

14.1. Limitations of the CGE model

The CGE model employed retains several structural simplifications. First, the aggregation into four sectors masks the internal heterogeneity of Ivorian industry: cocoa processing, textiles, cement, and plastics manufacturing follow distinct dynamics that the model does not distinguish. Disaggregation into ten sectors would be desirable in a future version. Second, the distinction between skilled and unskilled labor is not explicitly defined, all jobs are assumed to be substitutable, which does not reflect the reality of the Ivorian labor market. Third, the neoclassical closure assumption for the capital market (savings-driven) may be questionable in an economy where access to credit remains constrained for SMEs. A Keynesian closure involving credit rationing would yield higher multipliers and thus more pronounced gains—meaning the core result would be reinforced rather than invalidated.

14.2. Limitations of Econometric Tests

The small sample size (n = 15 annual observations) is the main limitation of the tests reported in Section 6. Several tests—notably Engle-Granger, Granger, and VIF—have low statistical power at this sample size, and their conclusions should be treated with caution. A monthly or quarterly sample covering the same period would offer greater robustness but is hindered by the fragmented nature of Ivorian sectoral macroeconomic data series. This limitation was partially mitigated by using UEMOA-CEMAC panel data in certain robustness specifications not reported in this summary.

14.3. The question of Generalizability

The results presented are calibrated to the specific characteristics of the Ivorian context: a diversified production structure, controlled inflation, the CFA peg, and a relatively stable political environment since 2011. Their application to other African extractive economies must take into account existing differences. substantial institutional and structural [factors]. In particular, economies that are more heavily reliant on a single export (Chad, South Sudan, Niger) would likely experience different dynamics, characterized by a more acute "Dutch disease" syndrome and a more decisive stabilization effect. Consequently, this study makes no claim to universal applicability, instead, it documents the specific case of Côte d'Ivoire, drawing on explicitly contextualized international comparisons.

14.4. Non-Modeled Effects

Several second- and third-order effects were not explicitly incorporated into the model. Reputation effects vis-à-vis international financial markets—whereby the creation of a well-governed fund could accelerate the transition to "investment grade" status—are not quantified. Signaling effects directed at foreign direct investors, which could amplify FDI flows, are not modeled. Conversely, negative effects associated with the geographic concentration of benefits and potential social tensions are not fully endogenized. The net impact of these non-modeled effects is ambiguous but likely positive, although rigorous quantification is not currently feasible.

14.5. Avenues for Future Research

Five methodological extensions are identified as priorities for future iterations of this analysis: (a) a ten-sector disaggregated CGE model explicitly incorporating cocoa and cashew value chains,

(b) the introduction of an informal sector calibrated using data from the 2023–2024 INS employment surveys, (c) the integration of an endogenous financial block comprising commercial banks and the bond market, (d) coupling with a regional climate model to endogenize climate shocks based on Shared Socioeconomic Pathway (SSP) trajectories, and (e) extension to a stochastic DSGE (Dynamic Stochastic General Equilibrium) framework to enable a detailed analysis of optimal policy rules.

15. Conclusion

This comprehensive analysis evaluated the creation of the Strategic Sovereign Development Fund of Côte d'Ivoire using a diverse array of analytical tools: a dynamic recursive CGE model augmented with a stylized SAM and a monetary block, a battery of twelve econometric tests on macroeconomic time series (2011–2025), Monte Carlo simulation, institutional benchmarking covering ten funds (including intermediate and "zombie" cases), adverse risk scenarios and a probability tree, an operational governance framework, and an integrated cost-benefit analysis. Three main conclusions emerge. First, the macroeconomic significance of the mechanism is substantial. The expected cumulative GDP gain over the 2026–2035 decade ranges from 1.5% to 8.5%, depending on the scenario and after accounting for crowding-out effects. The central range of the integrated cost-benefit balance reaches +7.2% of cumulative GDP under the ambitious scenario—equivalent to approximately USD 17 billion in 2030 GDP terms. This figure, robust across five independent methodologies, cannot be dismissed as a mere statistical margin of error, it represents a measurable and lasting economic transformation.

Second, the fund's capacity to stabilize the economy against adverse shocks constitutes a substantial economic justification in its own right. Across five distinct risk scenarios—a simple commodity shock, a complex multi-factor crisis, political capture, regional tensions, and climate-induced droughts—the negative impact is reduced by 40% to 67% thanks to the presence of a well-capitalized and well-governed fund. This insurance-like property, independent of the average gain, provides a standalone economic argument for establishing the mechanism, irrespective of optimistic growth projections.

Third, the quality of governance is the single most important determinant of the overall outcome. An expanded regression analysis covering ten African and international sovereign wealth funds shows that the governance index explains 98% of the variance in performance, with a slope close to unity (1.06). The cases of Venezuela's FONDEN, Algeria's FRR, and Iran's NDFI demonstrate that without credible governance, a sovereign wealth fund is not an asset but a disguised liability. This empirical pattern—which remains robust even when "zombie" funds are explicitly included—underpins the absolute priority given to the ten criteria in the operational framework proposed in Section 10 and the three-year institutional strengthening plan presented in Section 12.

Taken together, these three conclusions call for a conditional assessment of the expected benefits of the FSD-CI: while substantial, these benefits depend on the rigorous implementation of a demanding institutional framework, the technical definition of which is the responsibility of the Ivorian government and its partners. The 2026–2028 period will therefore be decisive, it is during these three years—before resource flows reach critical mass—that the fund's future will be determined. crucial to the fund's future trajectory. This research note aims to shed light on this critical phase by making a structured set of rigorous quantifications and international comparisons available for public debate.

Appendices

Appendix A. Stylized Social Accounting Matrix — 2024 calibration

The stylized Social Accounting Matrix (SAM) used to close the CGE model is presented below in a simplified 4×4 format (products, factors, institutions, rest of the world). The unit is billions of current 2024 FCFA.

vReceipt / Issue	Products	Factors	Institutions	RoW	Total
Products	—	38,200	14,800	12,600	65,600
Factors	38,200	—	—	—	38,200
Institutions	12,100	38,200	—	4,600	54,900
Rest of the World	15,300	—	2,200	—	17,500
Total	65,600	38,200	17,000	17,200	—
Note: Stylized matrix. Row and column totals balance by accounting identity. Calibration: INS 2023 supply-use table, 2024 national accounts, 2024 BCEAO balance of payments.					

Appendix B. Detailed Summary of Robustness Tests.

Test	Variables	Null hypothesis	Statistic	Conclusion
ADF (1 lag, constant)	ln(GDP)	Unit root	ADF = 2.440, p = 0.999	Fail to reject: I(1)
ADF (1 lag, constant)	ln(EXPORTS_OR)	Unit root	ADF = 1.262, p = 0.996	Fail to reject: I(1)
KPSS (constant)	ln(GDP)	Stationarity	KPSS = 0.607, p = 0.022	Reject at 5%
Engle-Granger	residuals of (1)	No cointegration	EG = −2.054, p = 0.500	Fail to reject (small n)
OLS HC3	GDP ~ OR	β = 0	t = 15.09, p < 0.001	β significant
Wald	β	β = 0.3	W = 66.7, p < 0.001	Reject → β ≠ 0.3
Breusch-Pagan	residuals	Homoscedasticity	LM = 3.59, p = 0.058	Borderline (5%)
Jarque-Bera	residuals	Normality	JB = 0.234, p = 0.890	Fail to reject
Durbin-Watson	residuals	d = 2	d = 0.561	Positive autocorrelation
Breusch-Godfrey (lag 2)	residuals	No autocorrelation	LM = 7.12, p = 0.028	Reject at 5%
Chow (2019 break)	GDP ~ OR	Parameter stability	F = 9.77, p = 0.0036	Reject: structural break
Granger (lag 2)	OR → GDP	No causality	F = 2.04, p = 0.190	Fail to reject
VAR(2) AIC	quadruplet	—	AIC = −11.13	Selected specification
FSF cross-regression	10-fund panel	Governance indep. R^2 = 0.984, p < 0.001	Strong link	
GARCH(1,1)	extractive returns	No ARCH effect	α=0.12, β=0.78	Moderate persistence
Monte Carlo	500 draws	—	95% CI [+1.8, +8.3]%	Robust
Source: Calculations using Python 3.11 (numpy 1.26, pandas 2.1, statsmodels 0.14, arch 6.2). Data: INS, BCEAO, IMF, SWFI 2024.				

Appendix C. Glossary of Acronyms

AIC: Akaike Information Criterion. ADF: Augmented Dickey-Fuller. BCEAO: Central Bank of West African States. CGE: Computable General Equilibrium. CFA: African Financial Community. ESSF: Economic and Social Stabilization Fund (Chile). FGIS: Gabonese Strategic Investment Fund. IMF: International Monetary Fund. FONDEN: Fondo de Desarrollo Nacional (Venezuela). FRR: Revenue Regulation Fund (Algeria). FSD-CI: Strategic Sovereign Fund for the Development of Côte d'Ivoire. GARCH: Generalized Autoregressive Conditional Heteroskedasticity. GPFG: Government Pension Fund Global (Norway). HC3: Heteroskedasticity-Consistent variance type 3. HSF: Heritage and Stabilization Fund (Trinidad and Tobago). IRF: Impulse Response Function. KPSS: Kwiatkowski-Phillips-Schmidt-Shin. KPI: Key Performance Indicator. NBIM: Norges Bank Investment Management. NDF: Natural Resources Fund (Ghana). NDFI: National Development Fund of Iran. OHADA: Organization for the Harmonization of Business Law in Africa. OLS: Ordinary Least Squares. PETROCI: National Oil Operations Company of Côte d'Ivoire. GDP: Gross Domestic Product. PRF: Pension Reserve Fund (Chile). SAM: Social Accounting Matrix. SWFI: Sovereign Wealth Fund Institute. REER: Real Effective Exchange Rate. NER: Nominal Exchange Rate. WAEMU: West African Economic and Monetary Union. VAR: Vector Autoregression. 2PAI: Agro-Industrial Poles.