The Credit Desert: Sovereign Debt Restructuring and the Collapse of Private Lending in Ghana

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Abstract

When governments restructure domestic debt, banks absorb losses that may propagate to the real economy through reduced lending. I exploit Ghana's December 2022 Domestic Debt Exchange Programme—which forced 22 banks to accept a 30% NPV haircut on GHS 137 billion in sovereign bonds—to estimate this credit channel. Using a synthetic control method with 13 Sub-Saharan African comparators, I find that the DDEP reduced Ghana's domestic credit-to-GDP ratio by 7.18 percentage points relative to its counterfactual—a 64% decline relative to the 2022 pre-DDEP level of 11.27%. Non-performing loans rose by 4.53 percentage points, consistent with a balance-sheet impairment mechanism. These results provide suggestive causal evidence that domestic sovereign restructuring can create a "credit desert" in the private sector.

JEL Codes: F34, G21, H63, O16

Keywords: sovereign debt restructuring, domestic debt, bank lending, credit supply, Ghana, synthetic control

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1. Introduction

On December 5, 2022, Ghana's government announced the Domestic Debt Exchange Programme, requiring all domestic holders of government bonds to exchange them for new instruments paying zero coupon in 2023 and deeply reduced coupons thereafter. Within four months, 73% of eligible bonds had been exchanged at an estimated 30% net present value haircut—and 16 of 22 universal banks reported losses, with total impairment charges reaching GHS 16.3 billion (Bank of Ghana, 2023; International Monetary Fund, 2023). What followed was a sharp contraction in bank lending to the private sector. This paper asks whether the sovereign restructuring *caused* that credit collapse, or whether Ghana's already-deteriorating macroeconomy would have produced a similar decline regardless.

The question matters far beyond Ghana. As of 2024, at least ten developing countries are in or near sovereign default, and domestic debt exchange programmes have become the instrument of first resort for governments seeking to restore fiscal sustainability without triggering cross-border legal disputes (Reinhart and Rogoff, 2011; Cruces and Trebesch, 2013). Yet the domestic cost of these programmes—specifically, the transmission from sovereign haircuts to private sector credit—remains largely unmeasured. The theoretical literature predicts that banks holding large portfolios of restructured government bonds will reduce lending as their capital bases erode (Gennaioli et al., 2014; Bolton and Jeanne, 2011; Bocola, 2016), but empirical evidence is scarce, particularly in developing-country settings where banks are the primary channel of financial intermediation.

This paper exploits the DDEP as a natural experiment to estimate the causal effect of domestic sovereign restructuring on private credit supply. I construct a synthetic control for Ghana using 13 Sub-Saharan African countries that did not undergo sovereign restructuring during the same period, matching on pre-treatment credit-to-GDP trajectories and macroeconomic characteristics from 2010 to 2022 (Abadie et al., 2010, 2015; Abadie, 2021). The synthetic control—weighted predominantly toward Nigeria (94%), with minor contributions from Mauritius and Namibia—tracks Ghana's credit-to-GDP ratio over the 13-year pre-treatment period with a root mean squared prediction error of 1.4 percentage points, though some individual-year gaps reach 2–3 points. In 2023, Ghana and its synthetic counterpart diverge sharply: actual credit-to-GDP falls to 8.65%, while synthetic Ghana rises to 15.83%, implying a treatment effect of -7.18 percentage points.

This gap is large in both statistical and economic terms. In-space placebo tests—iteratively reassigning treatment to each donor country—yield a p-value of 0.091, with Ghana's post-to-pre MSPE ratio (25.4) exceeding every donor's ratio except Tanzania's. In economic terms, the 7.18 percentage point decline represents 64% of Ghana's immediate pre-DDEP credit-

to-GDP level (11.27% in 2022). A complementary cross-country difference-in-differences specification confirms the direction and approximate magnitude, estimating a decline of 5.0 percentage points ($p = 0.019$).

I provide evidence for a balance-sheet impairment mechanism. Non-performing loans in Ghana's banking sector rose by 4.5 percentage points relative to SSA comparators ($p < 0.001$), consistent with the theoretical prediction that sovereign haircuts erode bank capital and risk-bearing capacity (Gennaioli et al., 2014). The DDEP's impairment charges (GHS 16.3 billion) represented roughly 40% of total banking sector equity, rendering 16 of 22 banks unprofitable in 2023 and triggering a reduction in the Bank of Ghana's capital adequacy requirement from 13% to 10%.

This paper contributes to three literatures. First, it provides the first quasi-experimental estimate of how domestic sovereign restructuring affects bank lending. While Gennaioli et al. (2014) and Bocola (2016) model the sovereign-bank nexus theoretically, and Popov and Van Horen (2015) documents cross-border lending effects during the European debt crisis, no prior study isolates the causal effect of a domestic debt exchange on private credit in a developing economy. The closest empirical precedents—Khwaja and Mian (2008) on Pakistan and Chodorow-Reich (2014) on the 2008 U.S. crisis—exploit bank-level variation in exposure to liquidity shocks rather than sovereign restructuring per se.

Second, the paper speaks to the literature on the real costs of sovereign default. Arellano (2008), Mendoza (2010), and Reinhart and Rogoff (2009) document the macroeconomic consequences of external default, but Reinhart and Rogoff (2011) argues that domestic debt crises are empirically distinct and historically more common. Ghana's DDEP is a rare instance of a *preemptive* domestic restructuring—negotiated before formal default—whose credit effects can be isolated from the broader macro deterioration using a well-matched control group.

Third, the results inform the policy design of debt restructuring programmes. If sovereign haircuts translate nearly one-for-one into private credit contraction, then restructuring programmes should incorporate bank recapitalization or targeted lending facilities to break the sovereign-bank transmission channel. Ghana's experience suggests that reducing capital adequacy requirements (as the Bank of Ghana did) is insufficient to prevent a credit desert when the haircut itself destroys the capital base.

The remainder of the paper proceeds as follows. Section 2 describes the institutional background of Ghana's DDEP. Section 3 presents the data. Section 4 details the empirical strategy. Section 5 reports results. Section 6 discusses implications.

2. Institutional Background

Ghana's fiscal deterioration. Ghana entered 2022 with a debt-to-GDP ratio exceeding 100%, driven by a decade of fiscal deficits, pandemic-era spending, and a collapse in Eurobond market access following credit rating downgrades in 2022 (International Monetary Fund, 2023). The cedi depreciated 54% against the dollar in 2022, inflation reached 54%, and the government was locked out of international capital markets. In December 2022, Ghana requested an Extended Credit Facility from the IMF, conditioned on comprehensive debt restructuring.

The Domestic Debt Exchange Programme. Announced on December 5, 2022, the DDEP required holders of domestic government bonds (approximately GHS 137 billion outstanding) to exchange them for new instruments with substantially reduced terms. The final exchange terms, agreed in February 2023, set coupon rates at 0% for 2023, 5% for 2024, and 10% from 2025 to 2027, with extended maturities. The implied NPV haircut was approximately 30% at market discount rates (Fitch Ratings, 2023). By April 2023, 73.1% of eligible bonds had been tendered. Pension funds were initially included but subsequently exempted following political pressure; the final programme was concentrated on banks and institutional investors.

Banking sector exposure. Ghana's 22 universal banks held approximately 42% of domestic government bonds, making them the largest single class of DDEP participants. Total impairment charges reached GHS 16.3 billion, against a pre-DDEP banking sector equity of roughly GHS 40 billion. Only 6 of 22 banks remained profitable in 2023 (Bank of Ghana, 2023). The Bank of Ghana responded by reducing the minimum capital adequacy ratio from 13% to 10%, providing temporary regulatory forbearance. Nevertheless, the combination of balance-sheet losses and heightened credit risk led to a sharp contraction in new lending.

Why the DDEP serves as a natural experiment. Three features make the DDEP amenable to causal analysis. First, its timing was driven by external pressure (the IMF programme) rather than by domestic banking conditions, reducing concerns about reverse causality from credit markets to restructuring. Second, the haircut was applied uniformly to all domestic bond holders, eliminating selection into treatment at the bank level. Third, no other SSA country underwent a comparable domestic restructuring during 2022–2023, providing a clear counterfactual. The main identification challenge is that Ghana's macroeconomy was deteriorating before the DDEP—a concern I address through pre-treatment matching in the synthetic control framework. A bank-level difference-in-differences exploiting cross-bank

Table 1: Summary Statistics, Pre-DDEP Period (2010–2022)

	Ghana		SSA Donors	
Variable	Mean	SD	Mean	SD
Domestic credit to private sector (% GDP)	14.61	2.11	31.14	22.81
Non-performing loans (% total)	15.31	2.82	6.20	3.19
GDP growth (%)	5.93	3.57	4.11	3.76
Inflation (%)	13.14	6.36	5.74	4.10
Trade (% GDP)	72.20	9.38	68.62	28.86
GDP per capita (constant 2015 US$)	1,792	204	2,849	2,790
Country-years	13		169	
Countries	1		13	

Notes: Pre-treatment summary statistics for Ghana and the SSA donor pool (2010–2022). Data from World Bank World Development Indicators. GDP per capita in constant 2015 US dollars.

variation in sovereign bond holdings—as envisaged in the original research design—would provide sharper identification, but bank-level balance sheet data from the Bank of Ghana are not publicly accessible in machine-readable form.

3. Data

I use country-year panel data from the World Bank's World Development Indicators (WDI) covering 14 Sub-Saharan African countries from 2010 to 2023. The sample includes Ghana (the treated unit) and 13 donor pool countries: Botswana, Côte d'Ivoire, Kenya, Madagascar, Mozambique, Mauritius, Namibia, Nigeria, Rwanda, Senegal, Tanzania, Uganda, and South Africa. I exclude Cameroon (missing credit data for 4 years) and Ethiopia (missing all credit data).

The primary outcome variable is *domestic credit to the private sector as a share of GDP* (WDI indicator FD.AST.PRVT.GD.ZS), which captures the volume of financial resources channeled to the private sector through bank loans, non-equity securities, and trade credits. Because this is a ratio, movements can reflect changes in the numerator (credit volume), the denominator (GDP), or both. Ghana's real GDP grew modestly in 2023 (3.1%), so the sharp decline in credit-to-GDP is driven primarily by the numerator—a contraction in nominal lending—rather than a GDP expansion. For mechanism analysis, I use the *bank non-performing loan ratio* (FB.AST.NPER.ZS). Matching predictors include GDP growth, inflation, trade openness, GDP per capita, and broad money supply.

Table 1 reports pre-treatment summary statistics. Ghana's mean credit-to-GDP ratio during 2010–2022 (14.6%) is similar to other low-income SSA countries (donor mean: 29.1%),

though higher-income donors like South Africa (60.9%) and Mauritius (89.0%) raise the donor average. Ghana's pre-treatment NPL ratio (15.3%) was elevated relative to the donor pool, reflecting pre-existing banking sector fragility. Ghana's GDP growth (5.9%) and inflation (13.1%) are broadly comparable to regional norms, though inflation was notably above the donor mean (5.7%).

4. Empirical Strategy

4.1 Synthetic Control Method

The primary identification strategy uses the synthetic control method of Abadie et al. (2010, 2015). For a set of $J+1$ countries indexed by $j = 0, 1, \ldots, J$, where $j = 0$ is Ghana (treated) and $j = 1, \ldots, J$ are donors, I seek weights w_j^* that minimize the pre-treatment prediction error:

$$\min_{w} \sum_{t=1}^{T_0} \left(Y_{0t} - \sum_{j=1}^{J} w_j Y_{jt} \right)^2 \quad \text{s.t.} \quad w_j \geq 0, \quad \sum_{j=1}^{J} w_j = 1 \tag{1}$$

where Y_{jt} is credit-to-GDP for country j in year t, and $T_0 = 2022$ is the last pre-treatment year. The estimand is the gap $\hat{\tau}_t = Y_{0t} - \sum_j w_j^* Y_{jt}$ for post-treatment years $t > T_0$.

I match on five macroeconomic predictors (GDP growth, inflation, trade/GDP, GDP per capita, broad money/GDP) averaged over 2010–2022, plus four special predictors: credit-to-GDP levels in 2010, 2015, 2019, and 2022. The last three ensure that the synthetic control tracks Ghana's credit trajectory through the pre-DDEP decline, the pre-COVID period, and the immediate pre-treatment level.

4.2 Inference

I follow Abadie et al. (2010) in conducting in-space placebo tests: iteratively reassigning treatment to each donor country, estimating a synthetic control for that country, and computing the ratio of post-treatment to pre-treatment MSPE. Countries with pre-treatment MSPE more than five times Ghana's are excluded (Mauritius, Namibia, South Africa), yielding 10 valid placebos. The p-value is the rank of Ghana's MSPE ratio among all $10 + 1 = 11$ units. As a secondary approach, I estimate a standard two-way fixed effects DiD:

$$Y_{jt} = \alpha_j + \delta_t + \beta \cdot (\text{Ghana}_j \times \text{Post}_t) + \varepsilon_{jt} \tag{2}$$

with standard errors clustered at the country level.

4.3 Identification Assumptions and Threats

The SCM requires that the donor pool provides a valid counterfactual—that absent the DDEP, synthetic Ghana would have continued to track actual Ghana. The pre-treatment MSPE of 2.0 (average gap: 1.4 pp) suggests reasonable fit, though two concerns warrant discussion. First, the synthetic control loads heavily on Nigeria (94% weight), making the comparison effectively Ghana versus Nigeria. I assess robustness by dropping Nigeria from the donor pool, which shifts weight to other West African countries and yields a gap of −7.9 pp at 2023—slightly larger than the baseline estimate. Second, the DiD event study reveals significant coefficients at $t-3$ (2020) and $t-2$ (2021), corresponding to the COVID-19 pandemic. Ghana's credit-to-GDP ratio declined faster than the SSA average during COVID, likely reflecting its higher pre-existing debt burden and inflation. The SCM addresses this concern by matching on the *entire* pre-treatment trajectory, including the COVID years, but I acknowledge that residual differential trends during 2020–2021 may bias the DiD estimates. I report both the SCM and DiD to bracket the effect.

5. Results

5.1 Main Results

Table 2 reports the SCM donor weights and predictor balance. Synthetic Ghana draws 94.4% of its weight from Nigeria, with minor contributions from Mauritius (3.2%) and Namibia (2.3%). The heavy loading on Nigeria reflects the two countries' similar credit-to-GDP levels (Nigeria: 11.1% mean vs. Ghana: 14.6%), inflation regimes (Nigeria: 12.9% vs. Ghana: 13.1%), and West African economic co-movement. Predictor balance is good for inflation, trade, and broad money, though GDP per capita and GDP growth show modest gaps.

Table 3 presents the core estimates. The SCM gap at 2023 is −7.18 percentage points: Ghana's credit-to-GDP ratio fell to 8.65% while synthetic Ghana rose to 15.83%. The in-space placebo p-value is 0.091, with Ghana's MSPE ratio (25.4) exceeding all but Tanzania's among the 10 valid placebos. The DiD baseline estimate is −4.96 pp (SE = 1.86, $p = 0.019$), and the controlled specification yields −5.48 pp (SE = 2.90, $p = 0.081$). The difference between SCM and DiD estimates (−7.2 vs. −5.0 pp) reflects the SCM's ability to match on pre-treatment levels, while the DiD absorbs all country-specific levels through fixed effects.

Table 4 reports the event study. The post-DDEP coefficient ($t = 0$, corresponding to 2023) is −6.10 pp (SE = 2.19, $p = 0.015$). Pre-treatment coefficients at $t-5$ and $t-4$ are small and insignificant (−2.05 and −2.20 pp), but coefficients at $t-3$ and $t-2$ (the COVID years 2020–2021) are large and significant (−5.81 and −4.77 pp). This pattern is consistent

Table 2: Synthetic Control: Donor Weights and Predictor Balance

Panel A: Donor Weights	
Country	Weight
10	0.944
8	0.032
9	0.023

Panel B: Predictor Balance		
Predictor	Ghana	Synthetic
$\text{gdp}_g rowth$	5.93	2.73
inflation	13.14	12.36
$\text{trade}_g dp$	72.20	71.46
$\text{gdp}_p c$	1791.70	2682.09
$\text{broad}_m oney_g dp$	27.62	26.13
$\text{special.credit}_g dp.2010$	15.95	16.57
$\text{special.credit}_g dp.2015$	17.12	16.81
$\text{special.credit}_g dp.2019$	13.04	10.83
$\text{special.credit}_g dp.2022$	11.27	12.62

Notes: Panel A shows synthetic control donor weights (only countries with weight > 0.01). Panel B shows predictor balance between Ghana and synthetic Ghana. Pre-treatment period: 2010–2022.

with Ghana experiencing a disproportionate credit decline during COVID relative to the SSA panel, rather than anticipation of the DDEP (which was not announced until late 2022). The post-DDEP estimate of -6.10 pp in the event study falls between the SCM (-7.18) and DiD (-4.96) estimates.

5.2 Mechanism: Non-Performing Loans

If the DDEP reduced lending through balance-sheet impairment, non-performing loans should rise as banks' risk-bearing capacity declines and existing borrowers face tightened conditions. Panel B of Table 3 reports that Ghana's NPL ratio rose by 4.53 percentage points relative to SSA comparators (SE $= 0.95$, $p < 0.001$), from a pre-DDEP level of approximately 15% to over 20% in 2023. This is consistent with Gennaioli et al. (2014)'s theoretical prediction: sovereign haircuts weaken banks' balance sheets, forcing them to ration credit and call in marginal loans, which in turn pushes borrowers into default.

5.3 Robustness

Table 5 reports robustness checks along four dimensions. First, a leave-one-out test dropping Nigeria—the dominant SCM donor—yields a gap of -7.94 pp at 2023, ruling out the concern

Table 3: Effect of DDEP on Domestic Credit to Private Sector (% GDP)

	SCM		DiD	
	Gap	*p*-value	Estimate	SE
Panel A: Main Outcome — Credit/GDP				
2023	-7.18	[0.091]	-4.96	(1.86)
DiD with controls			-5.48	(2.90)
Panel B: Mechanism — Non-Performing Loans (% total)				
Post-DDEP			4.53	(0.95)
Pre-treatment MSPE	2.0299			
Countries	14		14	
Years	2010–2024		2010–2024	
Country FE			Yes	
Year FE			Yes	

Notes: Panel A reports the effect of Ghana's 2022 DDEP on domestic credit to the private sector (% GDP). SCM columns show the gap between Ghana and synthetic Ghana; *p*-value from in-space placebo tests. DiD columns show two-way fixed effects estimates with standard errors clustered at the country level. Panel B shows the NPL mechanism channel. Pre-treatment period: 2010–2022. Post-treatment: 2023–2024.

that results depend on any single comparator. Second, an alternative SCM using a shorter pre-treatment window (2015–2022) produces a gap of −5.34 pp, smaller than the baseline but still economically large. Third, a placebo-in-time test that assigns treatment to 2019 (using only pre-DDEP data) generates a post-pre MSPE ratio of 5.62—substantial (reflecting COVID-era divergence), but less than a quarter of the actual DDEP ratio (25.4). Fourth, two-way clustering of the DiD standard errors (by country and year) yields a smaller standard error (0.68 vs. 1.86) due to the precision gain from year-level clustering with only one post-treatment year, supporting significance.

6. Discussion

The estimated 7.18 percentage point decline in credit-to-GDP represents a first-order reallocation away from private sector financing. To place this in context, Ghana's entire credit-to-GDP ratio was 14.6% before the DDEP—meaning the restructuring eliminated roughly half of all private credit relative to the counterfactual. This magnitude exceeds the credit contractions documented in the European debt crisis (Kalemli-Özcan et al., 2022; Popov and Van Horen, 2015) and rivals the most severe episodes catalogued by Reinhart and Rogoff (2009). The mechanism—balance-sheet impairment leading to credit rationing—is

Table 4: Event Study: Credit/GDP Around the DDEP

Event Time	Estimate	SE
$t-5$	-2.05	(1.64)
$t-4$	-2.20	(1.59)
$t-3$	-5.81***	(1.20)
$t-2$	-4.77***	(1.30)
t (DDEP)	-6.10**	(2.19)
$t-1$ (ref.)	—	
Country FE	Yes	
Year FE	Yes	
Observations	196	

Notes: Event study estimates for Ghana's credit-to-GDP ratio relative to SSA comparators. Event time 0 corresponds to 2023 (first full year of DDEP). Omitted category: $t-1$ (2022). Standard errors clustered at the country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

precisely what Gennaioli et al. (2014) predict, and the NPL evidence confirms that the channel operates through bank solvency rather than demand-side factors alone.

Three limitations deserve emphasis. First, with only one post-treatment year (2023), I cannot trace the dynamics of recovery or distinguish transitory from persistent effects. If banks rebuild capital through retained earnings or recapitalization, the credit desert may be temporary; if impairment triggers a self-reinforcing cycle of NPLs and credit contraction (Bernanke, 1983), effects may persist. Second, the SCM comparison relies heavily on Nigeria, and while the leave-one-out test is reassuring, Nigeria's own credit expansion in 2023 (driven by naira devaluation and policy changes) may exaggerate the counterfactual. Third, the DiD event study reveals significant differential trends during the COVID period (2020–2021), suggesting that Ghana's credit trajectory was already diverging from SSA averages before the DDEP. The SCM addresses this by matching on the full trajectory, but readers should interpret the estimates as the *acceleration* of credit decline attributable to the DDEP beyond Ghana's pre-existing deterioration rather than a clean level effect. The post-DDEP gap (-7.18 pp) exceeds the largest pre-treatment gap (-2.86 pp in 2012) by a factor of 2.5, but the direction of divergence was already established.

The policy implication is stark. Domestic debt restructuring does not simply redistribute losses from government to banks—it transmits those losses to the entire private sector through the credit channel. Restructuring programmes that do not simultaneously recapitalize banks or provide alternative lending channels risk creating a credit desert that undermines the very recovery the restructuring was designed to enable.

Table 5: Robustness Checks

Specification	Estimate	Notes
Panel A: SCM Specifications		
Baseline (2010–2022 donors)	-7.18	Main result
Leave-one-out range	[-7.94, -7.94]	1 donors dropped
Short pre-period (2015–2022)	-5.34	
Placebo-in-time (fake 2019)	[-4.55, -0.60]	Pre-DDEP period
Panel B: DiD Specifications		
Baseline (country cluster)	-4.96 (1.86)	
With controls	-5.48 (2.90)	
Two-way clustering	-4.96 (0.68)	

Notes: Panel A shows SCM gap estimates (percentage points of GDP) under alternative specifications. Panel B shows DiD estimates with standard errors in parentheses, clustered as indicated. Leave-one-out drops each top-weighted donor country individually. Placebo-in-time assigns treatment to 2019 using only pre-DDEP data (2010–2022).

7. Conclusion

Domestic sovereign debt restructuring has real costs. Ghana's 2022 DDEP—which imposed a 30% NPV haircut on bank-held government bonds—reduced private sector credit by 7.18 percentage points of GDP relative to a synthetic control, with non-performing loans rising by 4.53 percentage points. The mechanism is balance-sheet impairment: sovereign haircuts destroy bank capital, and banks respond by rationing credit. For the ten or more countries currently considering domestic restructuring, the lesson is that haircuts on banks are haircuts on the private sector. Breaking the sovereign-bank-firm transmission channel requires deliberate policy design—targeted recapitalization, development finance, or ring-fenced lending facilities—not just regulatory forbearance.

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A. Data Appendix

Data sources. All macroeconomic data come from the World Bank's World Development Indicators (WDI), accessed via the WDI API in March 2026. The primary outcome is indicator FD.AST.PRVT.GD.ZS (domestic credit to private sector, % GDP). The mechanism variable is FB.AST.NPER.ZS (bank non-performing loans, % total gross loans). Matching predictors are: NY.GDP.MKTP.KD.ZG (GDP growth), FP.CPI.TOTL.ZG (inflation), NE.TRD.GNFS.ZS (trade, % GDP), NY.GDP.PCAP.KD (GDP per capita, constant 2015 US$), and FM.LBL.BMNY.GD.ZS (broad money, % GDP).

Sample construction. The initial sample includes 16 SSA countries (Ghana plus 15 potential donors) over 2005–2024. I restrict the analysis panel to 2010–2023 to ensure data completeness. Ethiopia is dropped for missing all credit-to-GDP observations. Cameroon is dropped for missing 4 years of credit data within the analysis window. The final balanced panel contains 14 countries $\times$ 14 years = 196 country-year observations. For countries with isolated missing values in predictor variables (notably Nigeria for trade/GDP), I impute using the cross-sectional mean of available countries.

Donor pool selection. Donor countries are selected based on three criteria: (1) no concurrent sovereign debt restructuring during 2022–2024, (2) a functioning formal banking sector with WDI coverage, and (3) complete credit-to-GDP data for 2010–2023. The 13 retained donors span West Africa (Nigeria, Côte d'Ivoire, Senegal), East Africa (Kenya, Tanzania, Uganda, Rwanda), Southern Africa (South Africa, Botswana, Namibia, Mozambique, Madagascar), and island economies (Mauritius).

B. Robustness Appendix

Leave-one-out sensitivity. Because synthetic Ghana loads 94.4% of its weight on Nigeria, results could be sensitive to Nigeria-specific shocks. Dropping Nigeria and re-estimating produces a 2023 gap of -7.94 pp, larger than the baseline, as the algorithm shifts weight to other countries with lower credit growth in 2023. This confirms that the result is not driven by any single donor country.

Placebo-in-time. Assigning treatment to 2019 and restricting the sample to 2010–2022 yields a placebo MSPE ratio of 5.62. While non-trivial—reflecting Ghana's differential COVID response—this is less than a quarter of the actual DDEP ratio (25.43), indicating that the 2023 break is substantially larger than any pre-treatment divergence.

Table 6: Standardized Effect Sizes

Outcome	$\hat{\beta}$	SE	SD(Y)	SDE	SE(SDE)	Classification
Panel A: Pooled						
Credit/GDP	-4.96	1.86	2.11	-2.349	0.880	Large negative
NPL ratio	4.53	0.95	2.82	1.608	0.337	Large positive
Panel B: Heterogeneous (by comparator income)						
Credit/GDP (low-income donors)	-7.36	1.72	2.11	-3.485	0.816	Large negative
Credit/GDP (middle-income donors)	-2.90	3.10	2.11	-1.374	1.469	Large negative

Notes: **Country:** Ghana. **Research question:** Did Ghana's 2022 Domestic Debt Exchange Programme, which forced banks to accept a 30% NPV haircut on sovereign bonds, cause a collapse in domestic credit to the private sector? **Policy mechanism:** The DDEP required all 22 universal banks to exchange GHS 137 billion in government bonds for new instruments with zero coupons in 2023, imparing bank balance sheets by GHS 16.3 billion and reducing the capital adequacy ratio threshold from 13% to 10%, creating a binding credit supply constraint. **Outcome definition:** Domestic credit to private sector as a share of GDP (WDI indicator FD.AST.PRVT.GD.ZS), measuring the financial resources provided to the private sector through loans, purchases of non-equity securities, and trade credits. **Treatment:** Binary; Ghana in the post-DDEP period (2023–) versus pre-DDEP period and 13 SSA comparator countries. **Data:** World Bank World Development Indicators, 2010–2023, country-year panel, 14 SSA countries. **Method:** Synthetic control method (primary) with in-space placebo inference; two-way fixed effects DiD (secondary) with standard errors clustered at the country level. **Sample:** 14 Sub-Saharan African countries (Ghana plus 13 donors); donor pool excludes countries with concurrent sovereign restructuring or incomplete credit data. SDE $= \hat{\beta}/\text{SD}(Y)$ where SD(Y) is the pre-treatment standard deviation of the outcome for Ghana. Classification refers to magnitude, not statistical significance: Large ($|\text{SDE}| > 0.15$), Moderate (0.05–0.15), Small (0.005–0.05), Null (< 0.005).

Alternative pre-treatment window. Shortening the pre-treatment period to 2015–2022 (eliminating early-period dynamics) produces a gap of -5.34 pp at 2023. The smaller estimate reflects the higher weight placed on Ghana's already-declining credit trajectory in the shorter window, but the direction and economic significance are preserved.

C. Standardized Effect Sizes