

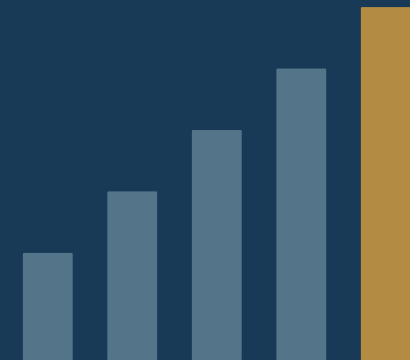
What Moves the Ghana Cedi?

A Decomposition of the Main Drivers

Receipts. Payments. Market conversion. Exchange-rate attribution.

Flow accounting, monthly proxy estimates and explicit causal boundaries

Authored by Dr. Felix Larry Essilfie
Executive Director, Institute of Development and Economic Research



EVIDENCE CUT-OFF
21 SEPTEMBER 2026

Monthly FX: 2019–August 2026
Model sample: March 2019–June 2026

Read receipts, market conversion and currency attribution separately

Three connected analytical pillars; the report does not treat an accounting flow as an identified price effect.

01 EXCHANGE-RATE EPISODES

A consistent end-period quotation, dated policy context, exact currency changes and transparent observation windows.

02 FX ORIGINS AND USES

Trade and current-account decomposition; gold receipts, import payments, remittances, public financing and reserve operations.

03 ATTRIBUTION AND DECISIONS

Evidence scorecards, identification requirements, conditional scenarios, business exposure and a SMART monitoring programme.

[Decision brief | pp. 4–5](#)

[Causal protocol | p. 70](#)

[FX history | p. 9](#)

[Scenarios | p. 75](#)

[External flows | p. 16](#)

[References | p. 93](#)

[Monthly analysis | p. 48](#)

[Synthesis | p. 97](#)

Question, evidence, method, findings and decision use

Dated external flows, a new monthly price-factor model, conditional dynamic responses and explicit identification limits.

QUESTION	Which receipts, payments and observable price factors accompany cedi movements, and how strong is the attribution evidence?
EVIDENCE	90 matched monthly levels, 2019–June 2026; 88 model observations; retained annual external accounts and BoG receipt records.
METHOD	Flow reconciliation; change regressions with dependence-robust intervals; fitted accounting; conditional local projections and sensitivity tests.
FINDINGS	2024–2025 current-account gain: US\$7.606 bn. Monthly R ² : 0.128; baseline 95% intervals include zero. No-change forecasts perform better.
DECISION USE	Track conversion and settlement; assess net currency exposure. Neither receipt-growth shares nor proxy coefficients are causal currency shares.

SCOPE & INTERPRETATION

Cut-off: 21 September 2026

Model: March 2019–June 2026.

Gold is a U.S. import-price proxy, not Ghana receipts.

Annual cash-flow accounts stay separate.

No national causal effect is identified.

Authored by Dr. Felix Larry Essilfie | Data, code and author’s notes: companion ZIP | Independent IDER research

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Sources: MoF (2026); IMF (2026); Nolin / IMF (2026); BoG monthly FX; BLS gold proxy / FRED; IDER calculations. [S01](#), [S02](#), [S03](#), [S13](#), [S15](#).

What to conclude—and what not to infer

An integrated two-page briefing for policy, corporate treasury and institutional investment decisions.

Table 1. What to conclude—and what not to infer

Currency measurement −28.96% / +40.77% The MoF/BoG selling quote fell 28.96% in 2025; the reciprocal dollar value of the cedi rose 40.77%. The same movement has different percentage expressions.	External resources +US\$7.606 bn The 2024–2025 current-account gain was US\$7.606 bn: goods added US\$9.882 bn and services offset US\$2.347 bn. These are dollar-flow contributions, not currency shares.
Gold and market delivery 82.7% Gold supplied about 82.7% of the 2023–2025 increase in BoG FX receipts. Export earnings and subsequent official sales must not be counted as independent inflows.	Public cash and timing −46.5% / +127.3% External loan receipts fell 46.5%; debt service rose 127.3%. US\$709m due in January 2026 was paid in December 2025, materially affecting the annual comparison.
New monthly evidence 88 model dates; $R^2=0.128$. Gold-proxy $\beta=-0.262$, 95% interval $[-0.630, 0.105]$. The lagged global forecast underperforms no change across 51 dates.	

The model uses a U.S. nonmonetary-gold import-price index—not Ghana gold receipts. No national causal allocation is identified.

Turn the evidence into a dated foreign-exchange control record

Proposed actions; the delivery timetable starts after institutional approval and authorised access.

Table 2. Turn the evidence into a dated foreign-exchange control record

Record / proposed lead	Minimum control and use
Exporters / authorised banks	Reconcile external receipts, offshore retention, domestic conversion and the origin of linked official sales. Count each source once.
Ministry of Finance / BoG	Maintain a rolling 13-week calendar of loans, grants, debt payments and direct imports. Compare expected with settled dates.
Banks / businesses / custodians	Match import invoices, hedges, cross-border security transactions and beneficial ownership to actual settlement; reconcile valuation separately.
BoG / statistical authorities	Distinguish gross purchases, gross sales, routine intermediation, discretionary intervention and the reserve-stock bridge.

IDER / research partners

Days 0–30: definitions and source checks.	Days 31–60: linked data and identification review.	Days 61–90: independent replay and supported release.
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Match obligations, currency, liquidity and time horizon. An annual surplus or appreciation is not an individual hedge recommendation.

The 2025 evidence points to stronger earnings, not a single-driver coefficient

Observed end-year currency movement and separate dollar-flow changes; different denominators are explicit.

GHS / USD QUOTE	CURRENT-ACCOUNT GAIN	BOG RECEIPTS INCREMENT	EXTERNAL DEBT SERVICE
-28.96% 2024 → 2025 selling-rate change	+7.606 US\$ billion; 2024 → 2025	82.7% Gold share; 2023 → 2025	+127.3% MoF annual payments; 2024 → 2025

Export growth outweighed higher imports, while the services deficit widened. Larger gold-related receipts reached the central bank alongside larger FX sales—but origin receipts and subsequent sales are not independent inflows.

No metric above is a causal percentage share of the cedi’s appreciation.

Three different questions require three different answers

Completed calculations, missing attribution and proposed causal research are not merged.

Table 3. Research questions, completed evidence and interpretation limits

Question	Completed evidence	Interpretation boundary
What moved?	Four annual selling-rate changes; separate 92-month interbank level series	Separate monthly series added; no full-year 2026 return
What changed in FX resources?	Annual current-account and central-bank receipt decompositions	Accrual flows and BoG receipts are not daily dealer supply
Which driver moved the cedi by how much?	Monthly conditional models plus period scorecards	Partial monthly proxy fit; no complete causal shares
Which intervention caused a response?	Defined candidate estimands and empirical release protocol	No verified Ghana treatment effect or intervention elasticity

Sources: MoF (2026); IMF (2026); Nolin / IMF (2026); IDER calculations. [S01](#), [S02](#), [S03](#).

Preserve source frequency and the actual observation window

Annual flow evidence remains separate from the new monthly price panel; no interpolation or forward-filling.

Table 4. Source coverage, frequency and treatment

Dataset	Numerical coverage	Treatment
End-year BoG selling rate via MoF	2021–2025; five observations	Quote-unit correction disclosed; source levels retained
IMF external accounts	2024 actual; 2025 preliminary	Same-vintage comparison; debt-accounting footnotes retained
BoG receipts and FX sales	2023 and 2025; rounded US\$ billions	Institution perimeter, not total national FX flows
Public loans and debt service	2024 revised; 2025 provisional	Central-government/guaranteed perimeter; cash timing checked
Monthly price-proxy model	90 matched levels; 88 model dates to June 2026	Separate BoG interbank, Fed, BLS and IMF series
Remittances / intervention microdata	No common monthly transaction panel	Monthly price proxies are not actual transaction flows

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A rise in cedis per dollar means cedi depreciation

The main series is the end-period BoG selling rate reproduced in MoF Table 8.1.

Table 5. Exchange-rate quotation and transformation conventions

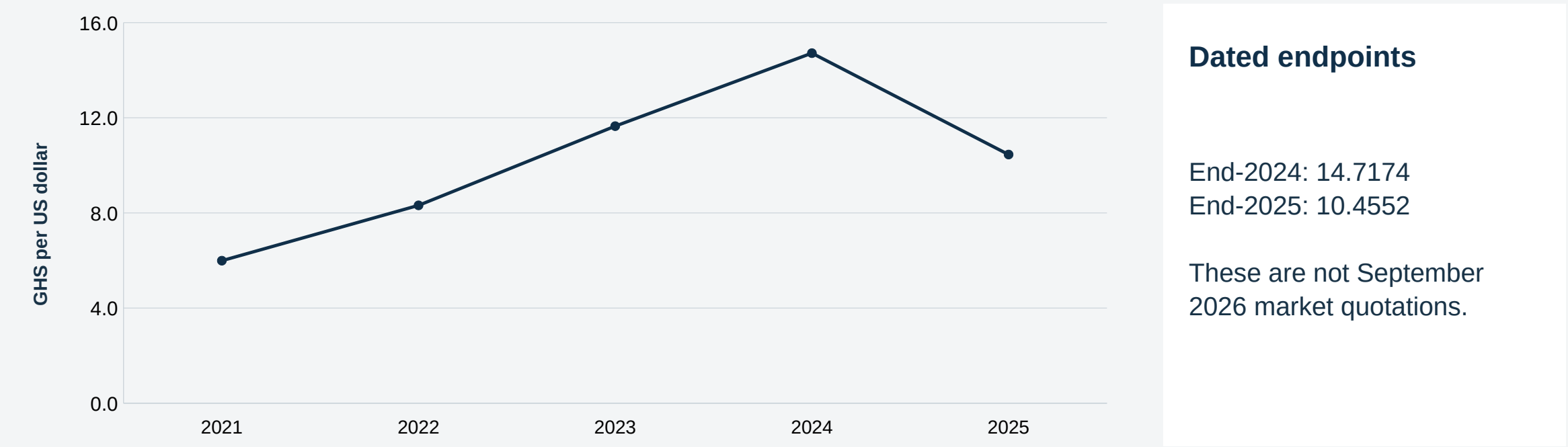
Measure	Interpretation	Use here
GHS per US dollar	More cedis required to purchase one dollar	Main quotation; positive change is depreciation
US dollars per cedi	Reciprocal external value of the cedi	Report separately; percentage changes are asymmetric
Log change × 100	Additive across adjacent periods	Used for exact cumulative movement accounting
Annual average / reference / retail rate	Different observation and execution concepts	Not substituted for the selected end-period selling series

MoF’s row label says “US\$/GHS”; the numerical scale and debt conversions imply GHS/USD. Only the unit label is corrected.

The end-year cedi quote rose through 2024, then fell in 2025

Five end-December selling-rate observations from one MoF table; no within-year path is implied.

Figure 1. End-year GHS/USD selling rates, 2021–2025



Sources: MoF (2026); IDER calculations. [S01](#).

Report the quotation, reciprocal and log movement together

Adjacent end-year comparisons; exact calculations from the same five source levels.

Table 6. Annual quotation, reciprocal and logarithmic changes, 2022–2025

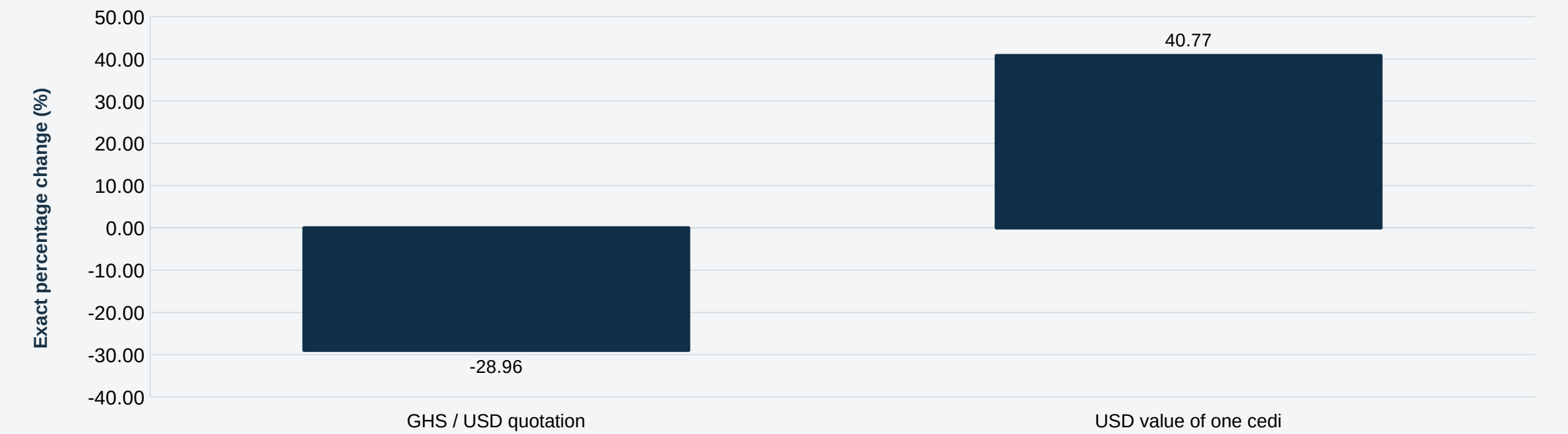
Year ending	GHS/USD change	USD value of cedi	Additive log change
2022	+38.86%	-27.99%	+32.83
2023	+40.02%	-28.58%	+33.66
2024	+26.34%	-20.85%	+23.38
2025	-28.96%	+40.77%	-34.19

Positive GHS/USD or log movement = depreciation; positive reciprocal movement = appreciation. Log units are not exact percent.

The same 2025 movement is –28.96% or +40.77%, depending on the quote

Exact percentage changes; the two measures are reciprocals and cannot be added.

Figure 2. Alternative expressions of the same 2025 exchange-rate movement



The main cumulative movement is –34.19 log points; it is neither of the exact percentages shown.

The 2022–2024 episodes combined financing stress and policy adjustment

Documented context, not an event-study treatment assignment or a causal period ranking.

Table 7. Institutional chronology and interpretation limits, 2022–2024

Period / event	Source-based development	What the chronology does not identify
2021–2022 financing stress	Loss of international market access, reserves pressure and debt vulnerabilities	Separate causal shares of global tightening and domestic policy
December 2022 restructuring	Comprehensive debt restructuring was launched	Announcement surprise versus anticipation and concurrent shocks
17 May 2023 ECF approval	US\$3 bn arrangement approved; about US\$600m immediately enabled	A US\$3 bn same-day inflow or isolated currency effect
2024 renewed exchange pressure	End-year quote rose; the IMF current account was still in surplus	That a current-account surplus guarantees appreciation

Sources: MoF (2026); IMF (2026); IMF (May 2023). [S01](#), [S02](#), [S05](#).

The operating framework changed during and after the appreciation episode

Keep the 2025 observations separate from later institutional changes.

Table 8. Gold and foreign-exchange operating-framework chronology, 2025–2026

Date / period	Documented arrangement	Interpretation control
2025 gold scale-up	Gold-related BoG receipts and FX sales expanded	Origin and market delivery are connected, not additive
November 2025	New framework separates routine outflows, reserve needs, intervention and intermediation	Do not classify every official sale as discretionary intervention
1 July 2026 transition	IMF paper describes full DGPP transfer to GoldBod under an MoU	Reported arrangement; execution not independently audited here
27 July 2026	Final ECF review enables about US\$371m; new PCI is non-financing	Do not count the PCI as a new loan disbursement

Sources: Nolin / IMF (2026); IMF (July 2026). [S03](#), [S06](#).

Inflation, monetary settings and the exchange rate moved jointly

December observations from the MoF vintage; no causal regression on five annual points.

Table 9. Selected end-year macroeconomic indicators, 2021–2025

Year	CPI inflation	Policy rate	M2+ growth	GHS / USD
2021	12.6%	14.5%	12.5%	5.9910
2022	54.1%	27.0%	33.0%	8.3192
2023	23.2%	30.0%	38.7%	11.6488
2024	23.8%	27.0%	31.9%	14.7174
2025	5.4%	18.0%	16.5%	10.4552

Inflation, currency movements and policy reactions are jointly endogenous; an observed coincidence does not establish direction.

A currency is a marginal price—not the sum of annual dollar inflows

Three mechanisms connect external accounts to the price observed in a market.

Origin of resources

Exports, household transfers, investment and official financing create different external claims and cash receipts.

Timing and availability

Retention abroad, debt payments, reserve accumulation, payment delays and local conversion determine what reaches dealers.

Price formation

Orders, dealer inventories, expectations, market depth and competing demand determine the exchange-rate response.

Link the national account to the domestic FX cash ledger

A two-layer bridge prevents receipts, reserves and official market sales from being counted repeatedly.

Table 10. Foreign-exchange origin, settlement, market and reserve ledgers

Ledger layer	Records to reconcile	Boundary
External transactions	Goods, services, income, transfers and financial-account entries	Includes accrual and debt-restructuring entries, not only cash
Actual settlement	Receipt date, currency, beneficiary, purpose and offshore retention	Announcement or shipment is not settlement
Domestic market supply	Customer conversion, dealer trades, official purchases and sales	An intermediary is not a second origin of foreign currency
Reserve and funding bridge	Transaction flows, valuation, asset swaps, debt payments and encumbrance	Reserve-stock growth is not net intervention

Sources: IMF (2026); Nolin / IMF (2026); IDER calculations. [S02](#), [S03](#).

The 2025 current-account surplus reflects several offsetting components

IMF Table 5; US\$ billion; 2024 actual and 2025 preliminary.

Table 11. Current-account components and annual changes, 2024–2025

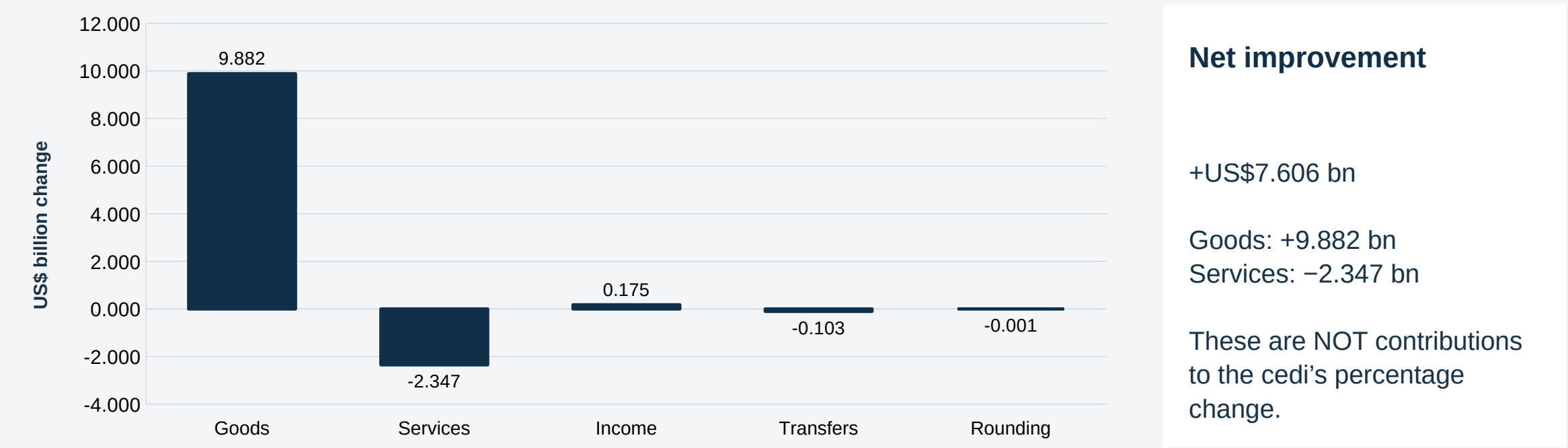
Component	2024	2025	Change
Goods balance	3.773	13.655	+9.882
Services, net	-2.225	-4.572	-2.347
Income, net	-5.496	-5.321	+0.175
Transfers	5.418	5.315	-0.103
Current account	1.471	9.077	+7.606

Components differ from the reported 2024 total by US\$1m because of source rounding; that residual is retained.

Goods gains more than explain the current-account improvement

Contribution to the 2024–2025 current-account change; US\$ billion; exact accounting plus rounding.

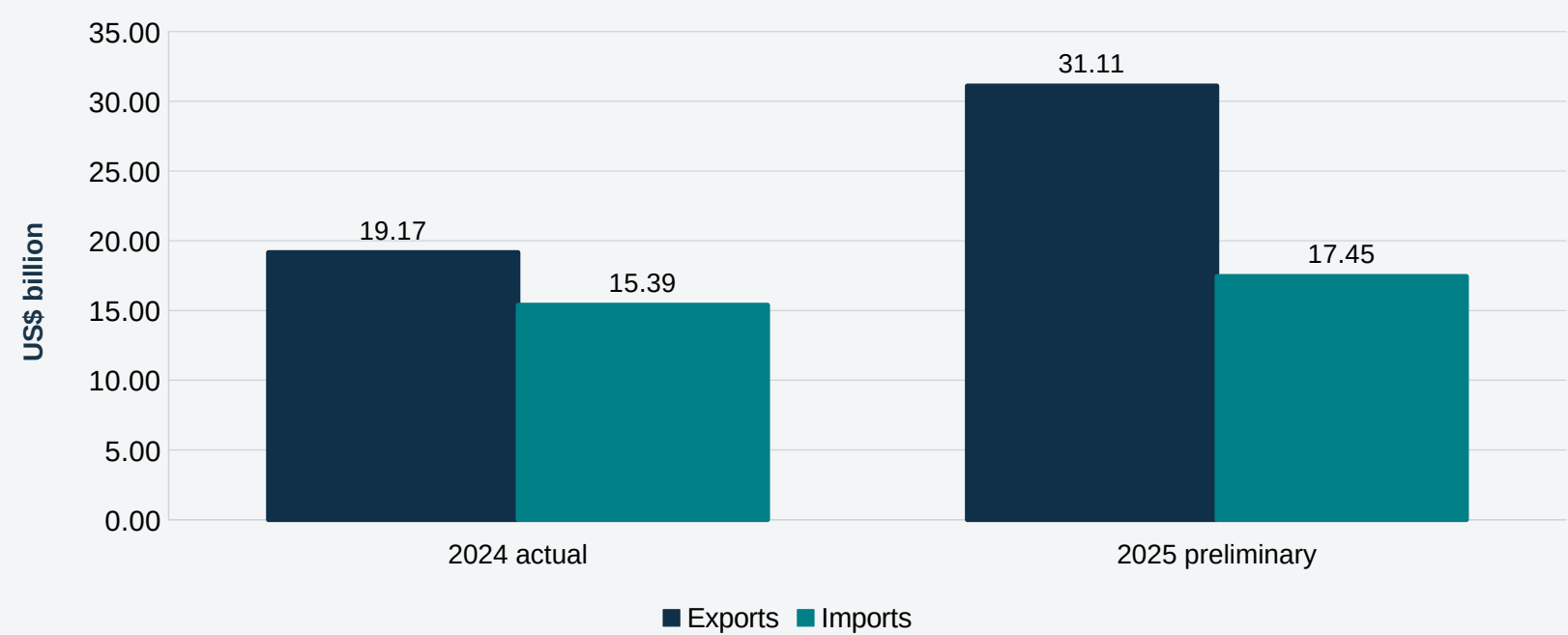
Figure 3. Contributions to the current-account improvement, 2024–2025



Goods export values rose faster than the import bill

Goods exports and imports, f.o.b.; US\$ billion; same IMF source vintage.

Figure 4. Goods export and import values, 2024–2025



Both increased

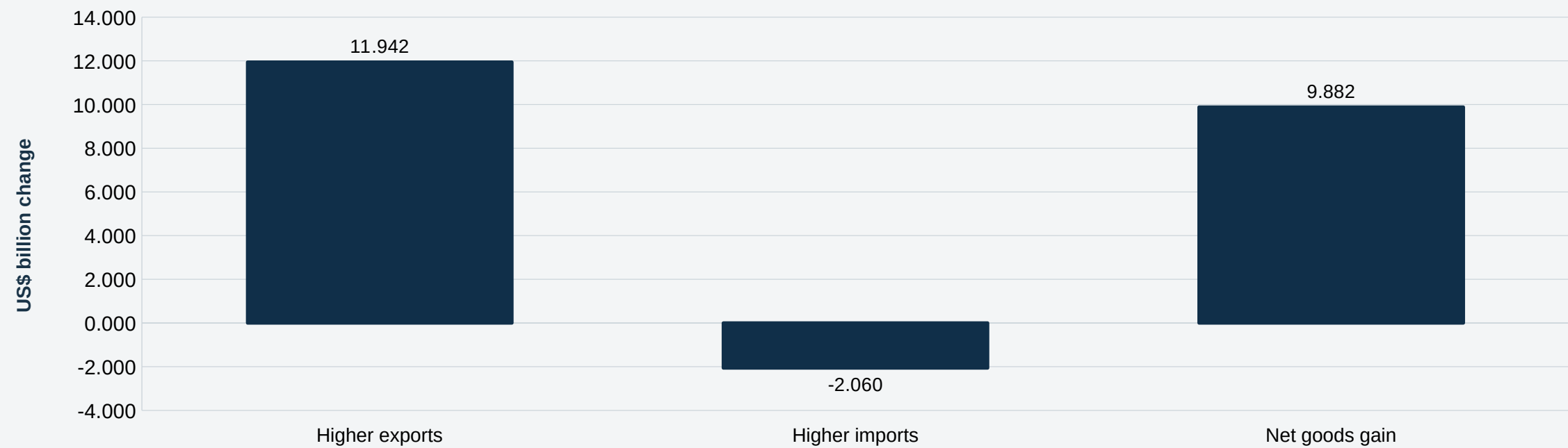
Exports: +62.3%
Imports: +13.4%

This comparison does not support an import-compression explanation of the goods-balance improvement.

The trade gain is export-led, with higher imports offsetting part of it

Year-to-year contribution to the goods-balance change; US\$ billion.

Figure 5. Export and import contributions to the goods-balance change



“Export-led” is an accounting description. Export values are not the amount necessarily converted domestically.

A stronger current account does not prove durable currency stability

The composition of the improvement matters for resilience and development.

Stronger external earnings

The goods balance improved substantially; official analysis identifies gold and recovering cocoa as important contexts.

Offsetting demand and income

The services deficit widened and income outflows persisted. More merchandise receipts do not eliminate all external uses.

Durability requires more evidence

Separate recurring production, global-price gains, formalisation, temporary bullion sales and changes in payment timing.

A negative overall balance can coexist with reserve accumulation under this accounting

IMF source sign conventions, US\$ billion; exceptional financing and debt treatment are essential.

Table 12. Balance-of-payments reconciliation under the IMF source convention

Source record	2024	2025	Interpretation
Current account	+1.471	+9.077	Current transactions; not only cash
Capital + financial account	−11.685	−12.404	Includes restructuring-related entries
Errors and omissions	+0.180	−0.169	Retained, not renamed sentiment
Overall balance	−10.034	−3.496	Sum of the preceding entries
Financing	+10.034	+3.496	Includes exceptional debt-related financing

Do not interpret the sign of the source overall balance as an independently identified currency-pressure shock.

Debt-exchange accounting is not capital flight

IMF Table 5 amounts, US\$ billion; retained source perimeter.

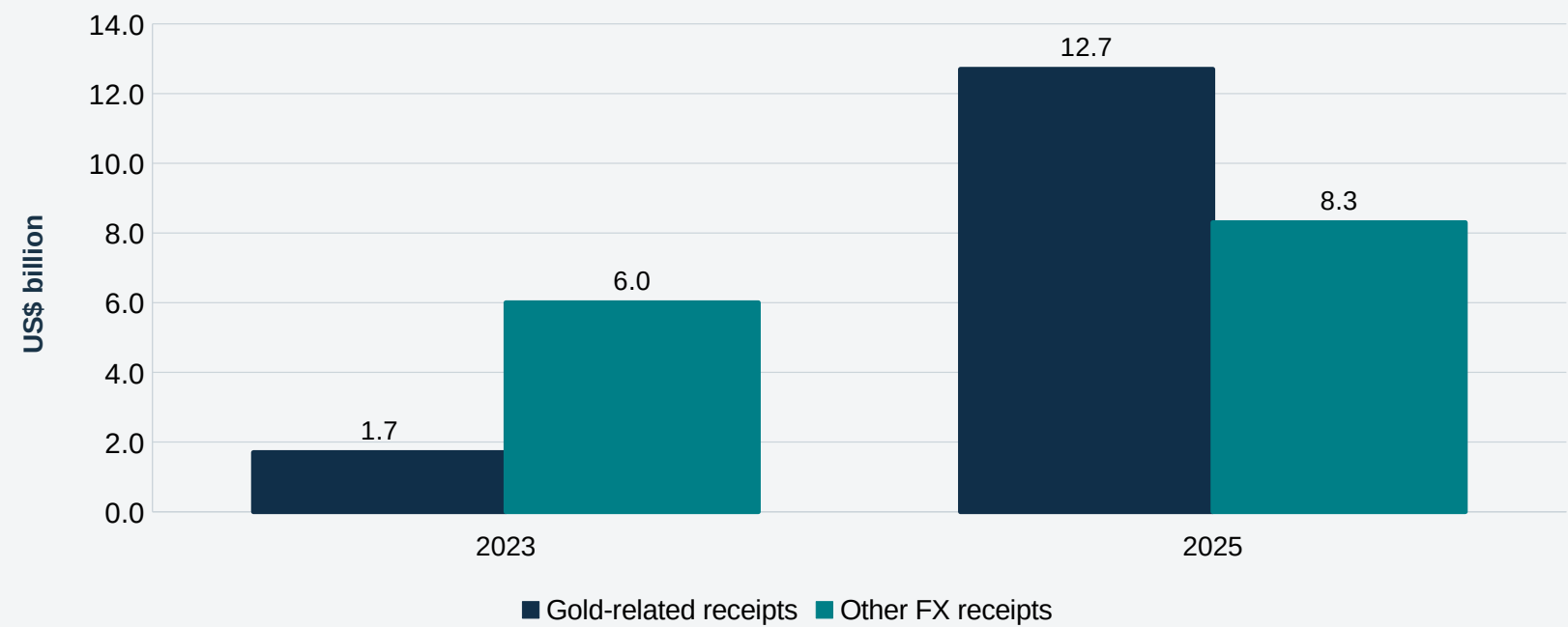
Table 13. Financial-account and exceptional-financing entries, 2024–2025

Record	2024	2025	Cash interpretation withheld
Net portfolio investment	−9.566	−0.977	2024 includes extinguishment of exchanged debt
Net other investment	−4.004	−13.466	2025 includes bilateral restructuring entries
Net FDI	+1.760	+1.884	Cash receipts and reinvested earnings not separated
Financing gap	+11.691	+8.619	Includes debt deferral and nominal exchanges

Gold-related receipts became the larger source of BoG FX inflows

Rounded central-bank cash-flow figures; US\$ billion; 2023 versus 2025.

Figure 6. Gold-related and other BoG foreign-exchange receipts, 2023 and 2025



Source perimeter

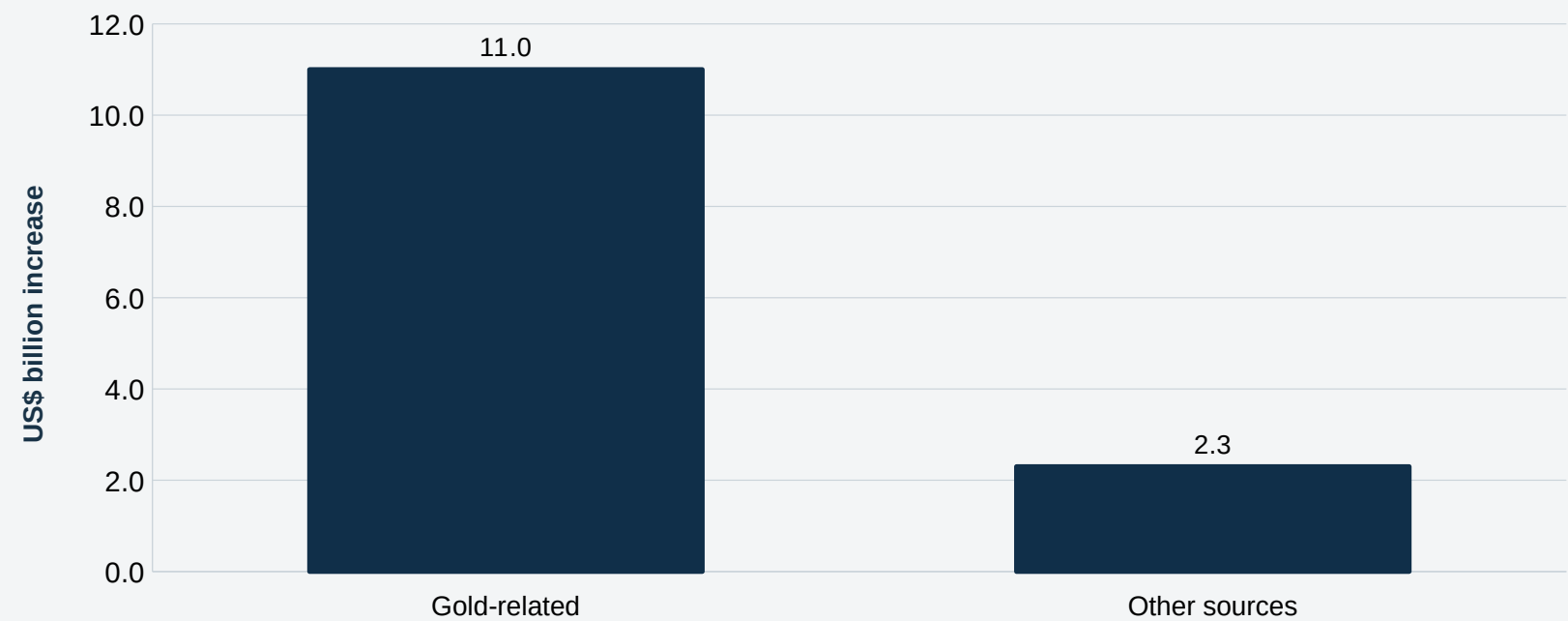
BoG receipts, not total national exports.

2025 gold-related receipts include US\$1.1 bn in net gains from bullion sales.

Gold supplied about 82.7% of the increase in measured BoG receipts

2023–2025 central-bank receipt growth; not a currency-effect decomposition.

Figure 7. Sources of the increase in BoG foreign-exchange receipts, 2023–2025



Denominator is crucial

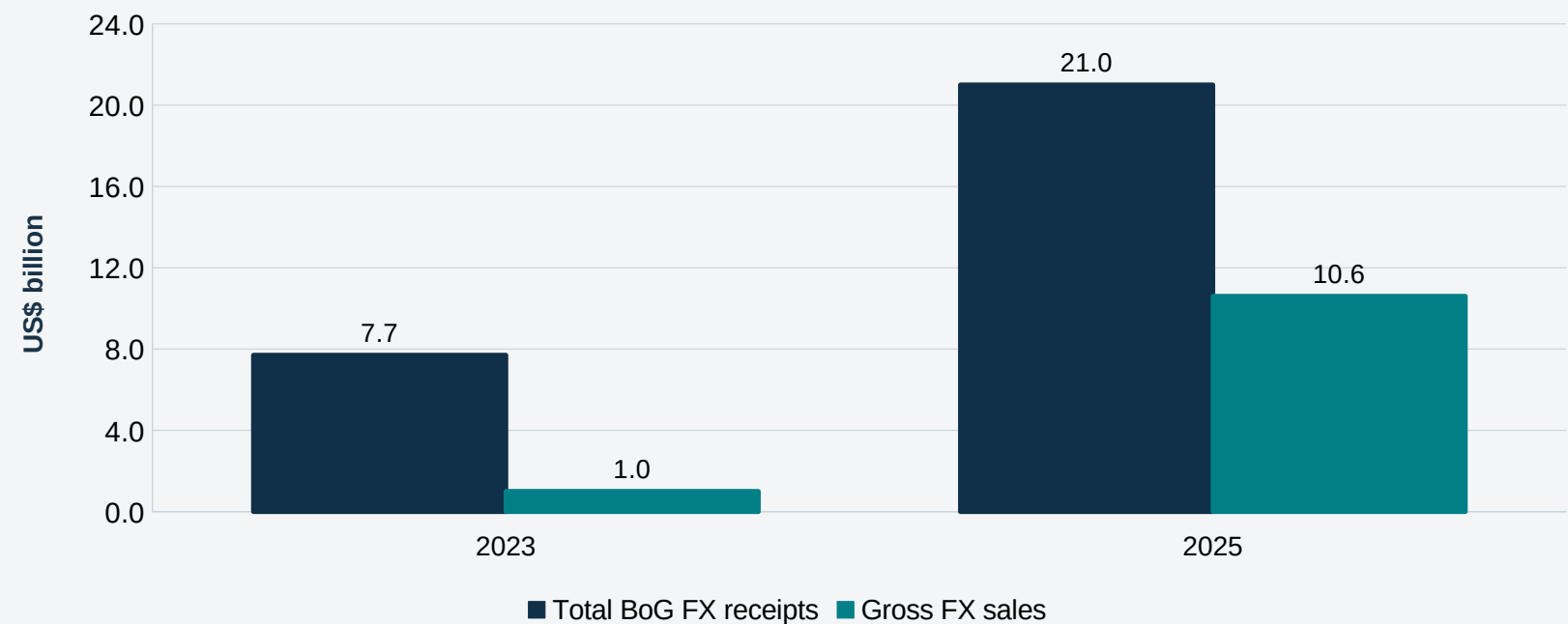
$$\text{US\$11.0 bn} / \text{US\$13.3 bn} = 82.7\%$$

This is an approximate share of receipt growth—not 82.7% of cedi appreciation.

Official FX sales rose alongside stronger receipts

US\$ billion; gross sales and gross receipts are different layers of the same cash chain.

Figure 8. BoG gross foreign-exchange receipts and sales, 2023 and 2025



Not net intervention

Sales / receipts:
13.0% → 50.5%

Gross sales do not disclose gross purchases, net discretionary intervention or its causal effectiveness.

Trace the resource once, from origin to final use

The accounting unit is the linked transaction—not each institution through which it passes.

Production and export

Quantity, realised unit price, shipment and actual external receipt identify the origin. Production and exports need not occur in the same period.

Official acquisition

Purchase, bullion conversion, reserve acquisition and associated cedi liquidity need dated records and consistent ownership.

Domestic market sale

A sale funded by an earlier export receipt changes the holder and availability of FX; it does not create a second export earning.

Greater market supply is not a cost-free policy outcome

The IMF paper documents both the operational channel and material balance-sheet costs.

Market availability

The gold programme channel supplied a large share of BoG inflows and supported scaled-up FX sales in the source account.

Costs and transfers

Purchase pricing, fees, assay costs, valuation conventions and sterilisation can affect who bears the cost of the operation.

Institutional transition

The paper describes a July 2026 transfer arrangement. Post-transfer costs and operations require their own fiscal/BoG/GoldBod bridge.

Price and quantity can be separated only on a matched export base

Hypothetical price rises 20%, quantity 10%; the export-value increase is 32%, not 30%.

Figure 9. Illustrative price–quantity decomposition of export-value growth

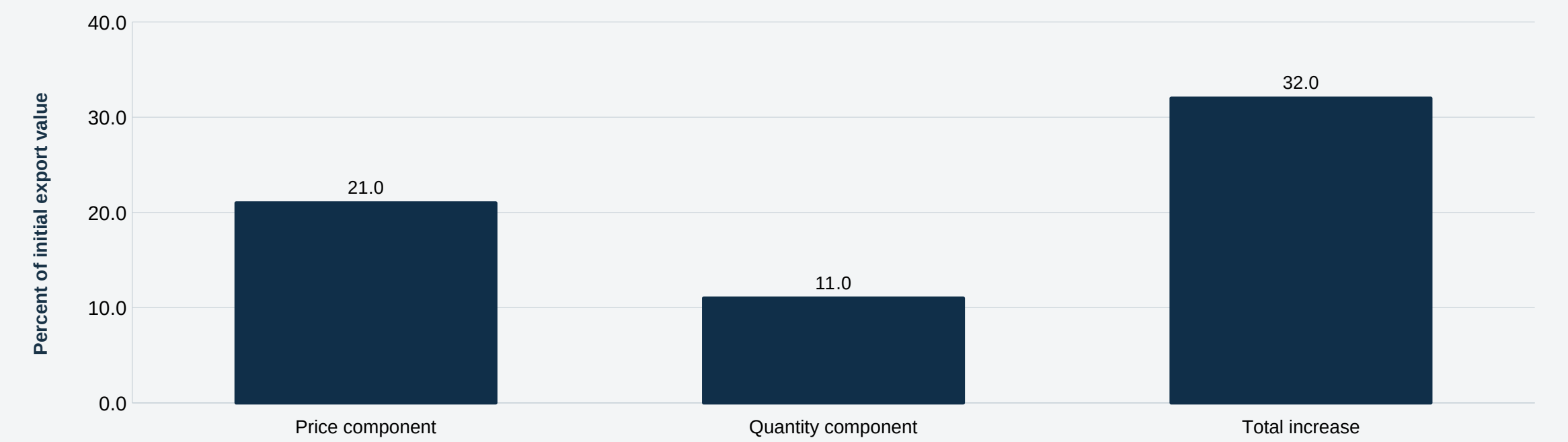


Illustration only. Symmetric accounting averages both factor orders; no observed Ghana price/volume decomposition is claimed.

Forward contracts separate world prices from current receipts

COCOBOD’s September 2025 account concerns the 2024/25 crop-season pricing arrangements.

Table 14. Cocoa forward-contract terms and cash-receipt limitations

Measurement	Source record / derived amount	Interpretation
Contracted quantity	About 500,000 tonnes	Crop-season commitment; not verified shipment or payment
Weighted contract FOB price	US\$4,850 per tonne	Not the contemporaneous world spot price
Derived contract notional	About US\$2.425 bn	Product of rounded terms; not cash received
Required receipt bridge	Shipment, receipts, pre-financing and conversion dates	Needed to estimate domestic FX availability

No cocoa receipt coefficient or separate cocoa share of the currency movement is estimated.

Oil has both export-receipt and import-payment channels

A global oil-price movement is not Ghana's net petroleum FX exposure.

Crude export receipts

Track physical exports, realised prices, ownership and repatriation. Fiscal petroleum receipts have a different reporting perimeter.

Refined-product payments

Track import quantities, contract prices, trade credit, settlement and any public-sector payment commitments.

Net currency exposure

A common price shock can raise both receipts and payments. Only matched flows can establish the sign and size of the net cash effect.

Net transfers are not the World Bank personal-remittance indicator

Preserve the concepts before making a numerical comparison.

Table 15. Remittance, transfer and settlement definitions

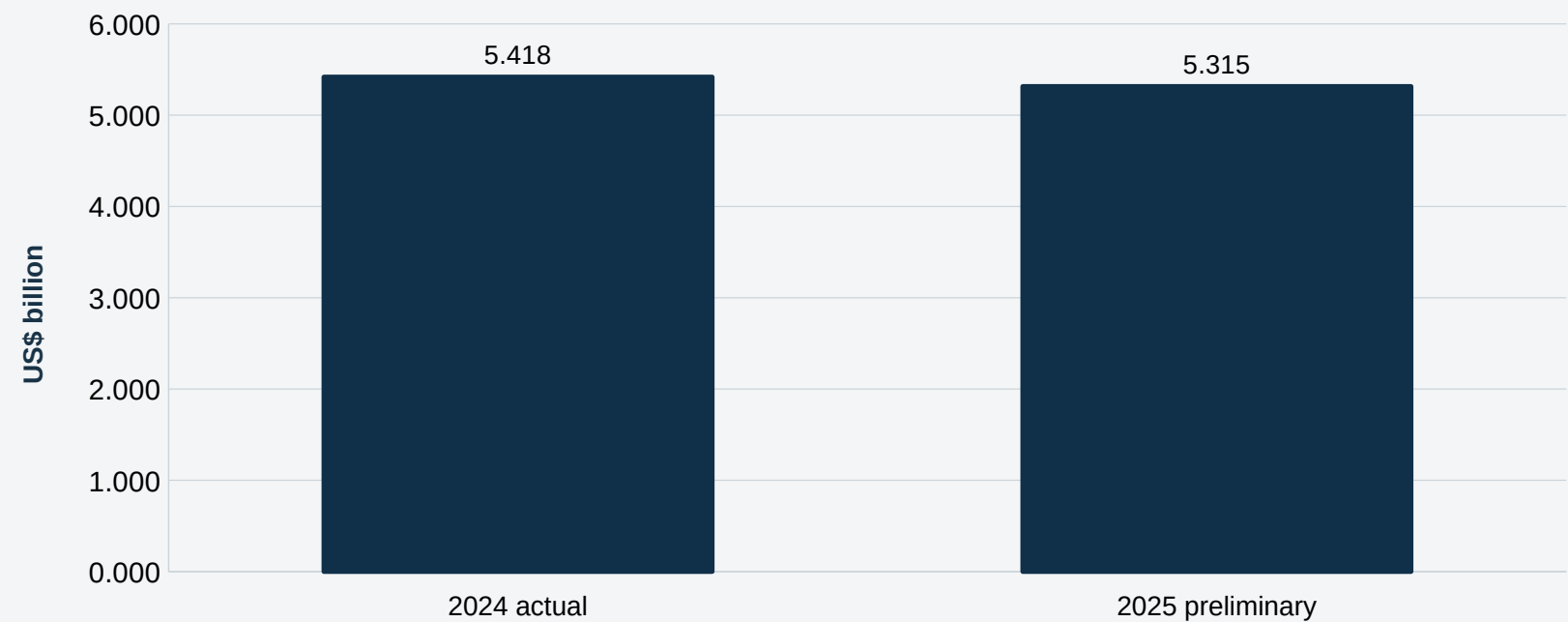
Series / concept	Coverage	Use in this report
WDI personal remittances received	Personal transfers plus compensation of employees; annual current US\$	Definition verified; no numerical common monthly panel
IMF current-account transfers	Broader source transfer account, with its own netting	US\$5.418 bn → US\$5.315 bn; not relabelled remittances
Bank inward-payment records	Recorded settlement channels and transaction purposes	Need channel coverage, recipient and conversion records
Domestic FX availability	Amount converted or paid through the local market	Not established by a gross foreign receipt alone

Sources: World Bank metadata; IMF (2026); IDER calculations. [S04](#), [S02](#).

The recorded transfer account did not drive the current-account increase

IMF Table 5 transfers; US\$ billion; not a household-remittance growth estimate.

Figure 10. IMF transfer-account values, 2024–2025



Measured change

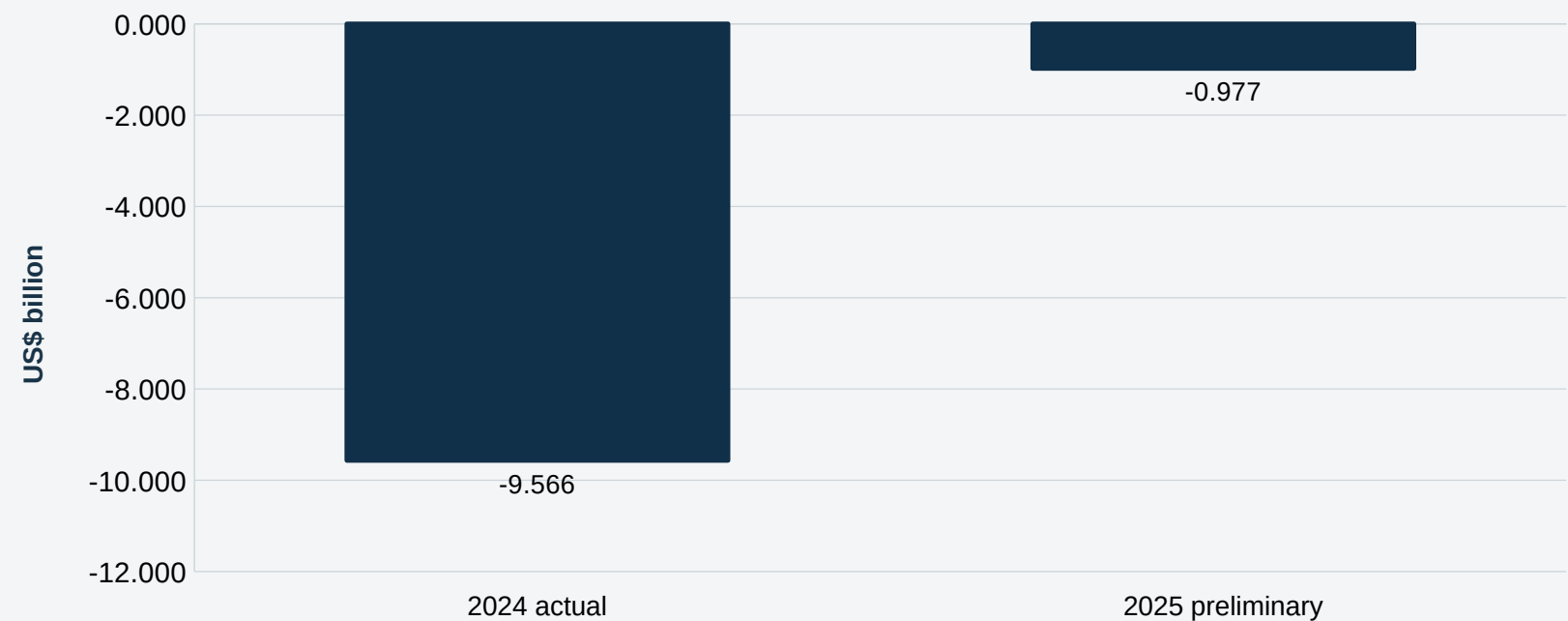
–US\$0.103 bn

The separate gross-remittance contribution cannot be isolated from this net account.

The portfolio line must be read with restructuring entries

IMF Table 5 net portfolio entries, US\$ billion; negative values retained.

Figure 11. Net portfolio-account entries, including restructuring, 2024–2025



Not a cash-flow ranking

2024 includes extinguishing exchanged debt.

The smaller negative entry is NOT a verified US\$8.589 bn return of portfolio cash.

A holding stock can rise without a new external cash inflow

Separate beneficial-owner transactions, prices and currency conversion.

Cross-border transactions

Record purchases, sales, redemptions, coupons, funding location and settlement. Dealer bids may be for clients.

Stock valuation

Price changes, currency conversion and debt exchanges can alter reported holdings without an equivalent flow of cash.

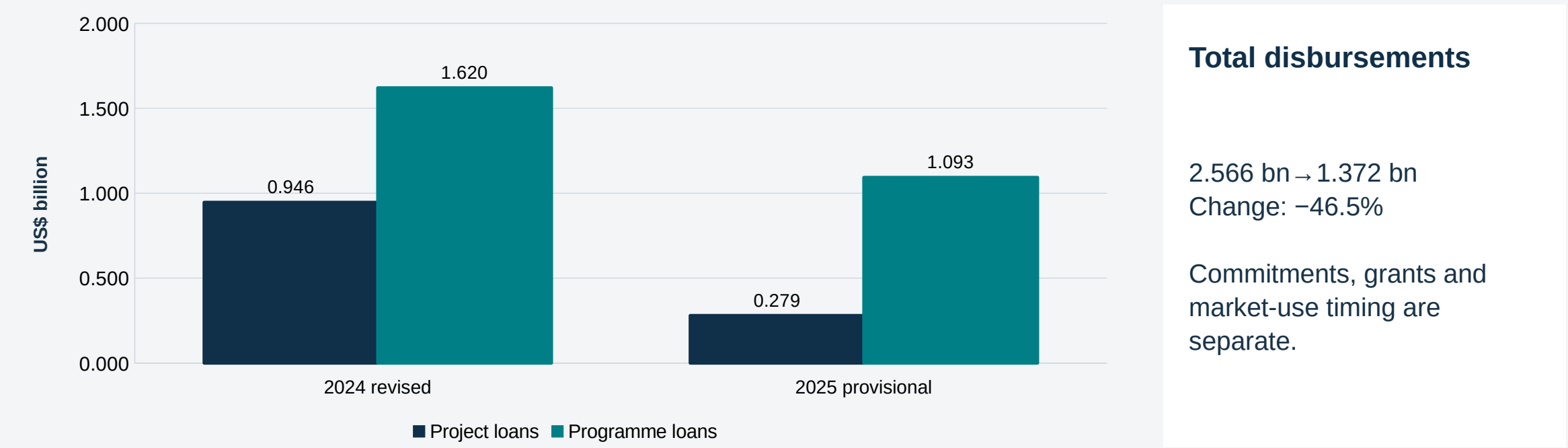
Expected return

Nominal interest, expected depreciation, default risk, hedging cost and exit liquidity jointly affect demand for cedi assets.

Actual public external loan disbursements fell in 2025

MoF external-loan perimeter; US\$ billion; programme and project components retain source rounding.

Figure 12. Public external loan disbursements by component, 2024–2025

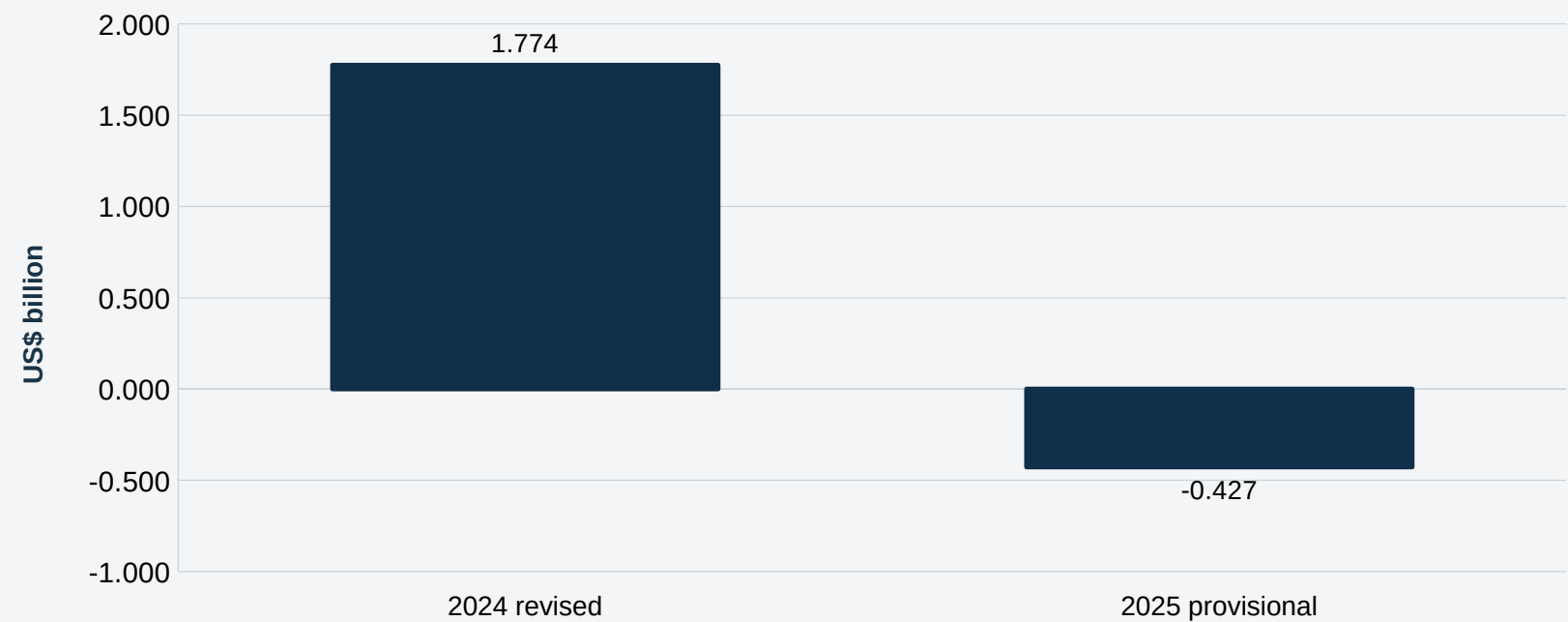


2025 component sum differs from the source total by US\$0.1m; no balancing flow is invented.

Loans less external debt service changed from positive to negative

MoF reported disbursements minus central-government/guaranteed external debt service; US\$ billion.

Figure 13. External loan disbursements less public debt-service payments



Not all official financing

+1.774 bn → -0.427 bn
Change: -2.202 bn

Excludes grants and other external public resources; not a complete net-market FX measure.

An early Eurobond payment changes the annual cash comparison

MoF cash payment date versus contractual due date; US\$ million.

Table 16. External debt service and the early-payment timing sensitivity

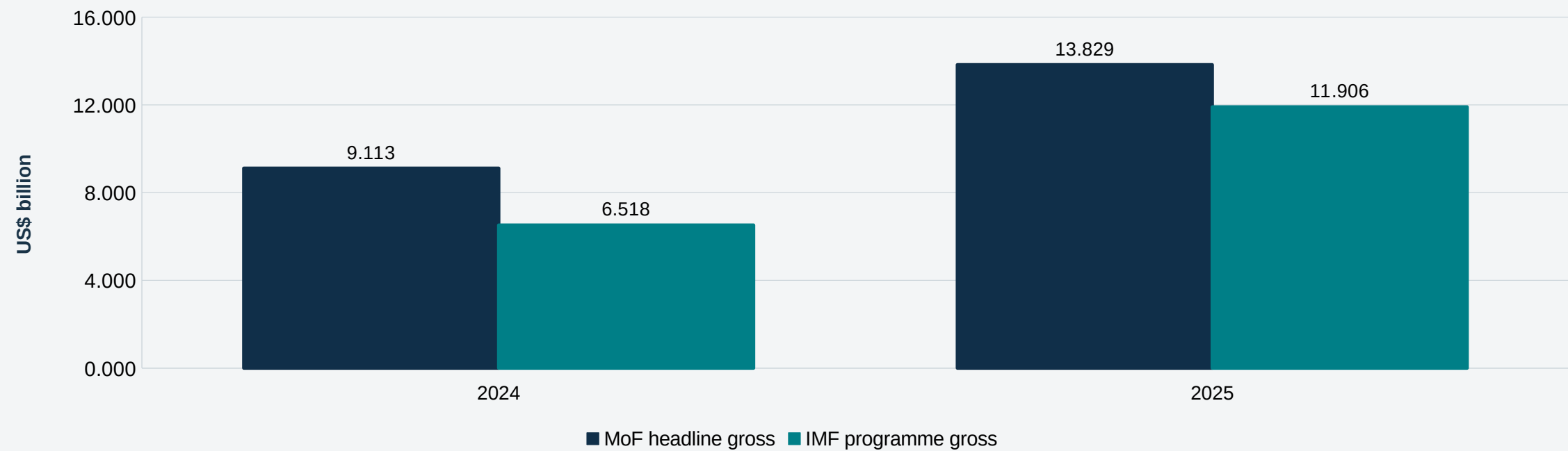
Record / calculation	Amount / date	Interpretation
External debt service 2024	791.6	Published revised annual cash total
External debt service 2025	1,799.4	Published provisional total; +127.3%
Payment for 3 January 2026	709.0; paid 30 December 2025	Included in 2025 cash outflow
Timing-shift illustration	1,090.4 excluding that prepayment	Still 37.7% above 2024; not a replacement for official 2025
Prepayment share of annual increase	70.4%	Timing contribution, not a causal cedi-effect share

The hypothetical timing adjustment changes the period allocation only; it does not erase the debt obligation.

Headline and programme reserve stocks are different measures

End-year gross reserves, US\$ billion; source definitions remain separate.

Figure 14. Headline and programme gross-reserve measures, 2024–2025

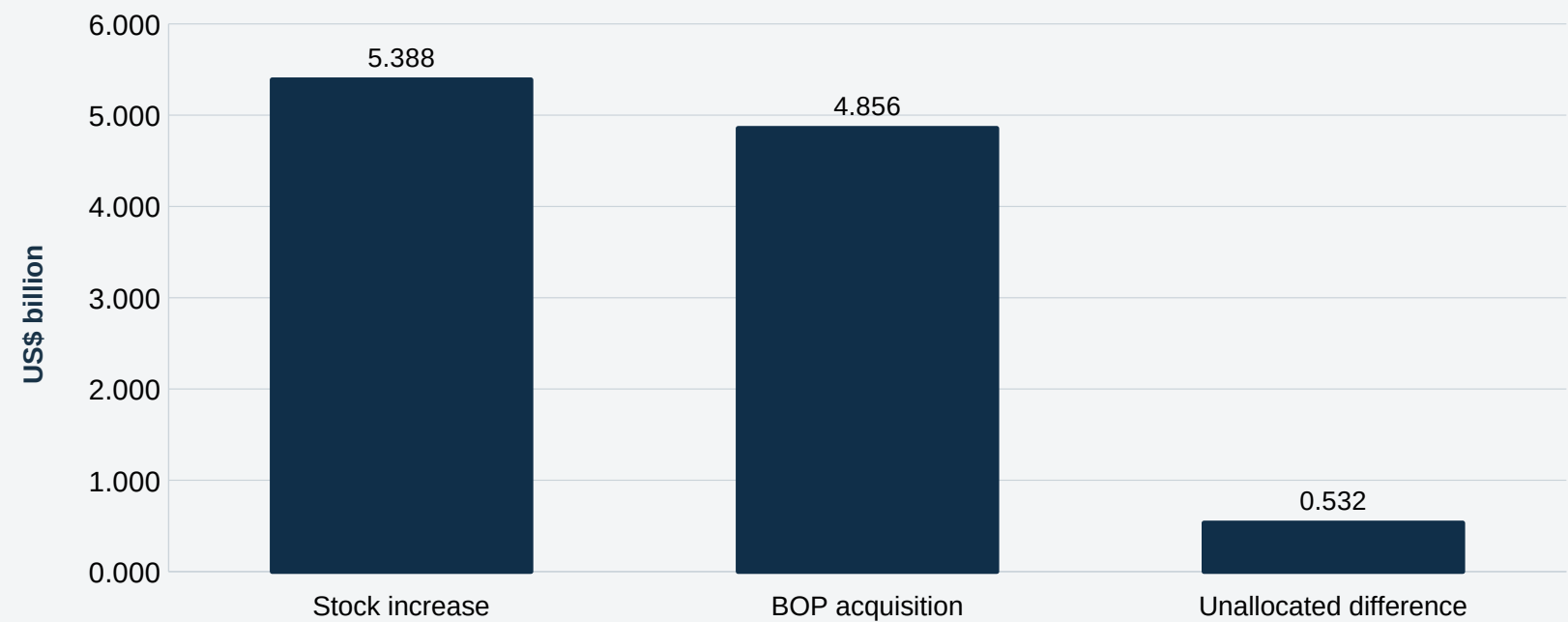


Programme exclusions include specified funds/deposits and encumbered or pledged assets; do not mix import-cover denominators.

The reserve-stock increase is not the BOP reserve-flow entry

2025, US\$ billion; programme reserve stocks versus IMF reserve-acquisition flow.

Figure 15. Programme reserve stocks and BOP reserve acquisition, 2025



Not net intervention

US\$0.532 bn is an unallocated stock–flow difference.

Domestic gold treatment, valuation, coverage and other adjustments need an explicit bridge.

Different published external accounts must not be silently spliced

2025 values, US\$ billion; each source’s accounting and coverage retained.

Table 17. Source-vintage comparison of external accounts and reserves

Record	MoF debt report	IMF CR26/212	Treatment
Current-account surplus	9.389	9.077	Difference 0.312 bn; preserve source vintage
Goods surplus	13.794	13.655	Difference 0.139 bn; same directional improvement
Overall balance	19.091	−3.496	Major financial/exceptional-financing conventions differ
Gross reserves	13.829	11.906	Headline versus programme scope

The current-account improvement survives the vintage comparison; overall-balance totals are not treated as comparable cash shocks.

Sources: MoF (2026); IMF (2026); IDER calculations. [S01](#), [S02](#).

Gross sales, net purchases and reserve use are distinct quantities

Identify the instrument, direction, settlement and economic purpose before estimation.

Table 18. Official foreign-exchange operation measures and coverage

Measure	Required definition	Available evidence
Gross FX sales	Currency sold by the authority; trade/settlement dates	2023 and 2025 rounded annual totals
Gross FX purchases	Currency bought; origin and counterparties	No matched aggregate purchase series assembled
Net discretionary intervention	Comparable purchases/sales under a defined policy objective	Not inferred from gross sales
Intermediation / agency transactions	Routing of pre-existing external receipts	Separate from a discretionary policy innovation
Reserve-stock movement	Transactions plus valuation, reclassification and other adjustments	Not substituted for net intervention

Sources: IMF (2026); Nolin / IMF (2026); IDER calculations. [S02](#), [S03](#).

Evaluate objectives before evaluating an FX operation

The November 2025 framework allocates incoming resources across distinct uses.

Routine obligations

External payments and operating cash needs compete with other uses of receipts. Settlement dates matter.

Reserve and intervention decisions

Reserve accumulation and an explicit intervention budget are not the same objective or transaction category.

Intermediation to banks

The residual available for auctions is a delivery channel.
Preannouncement changes predictability, not the origin of the dollars.

Domestic and global conditions can confound the receipt–currency relationship

Potential mechanisms; their separate coefficients are not estimated from the annual snapshots.

Table 19. Domestic and global driver blocks: observables and identification threats

Driver block	Relevant observable	Identification threat
Domestic prices and liquidity	CPI, money, sterilisation and bank liquidity	Currency depreciation also affects CPI and policy
Domestic rates and fiscal risk	Unexpected policy news, risk spreads, financing calendar	Raw rate changes respond to the economy
Global dollar and rates	Broad dollar, external yields, risk appetite	Gold prices and the cedi may react to the same global shock
Expectations and market depth	Quote spreads, turnover, inventories and order concentration	Residuals cannot be named confidence without measurement

Sources: Jarociński & Karadi (2020); IMF external-sector framework. [S08](#), [S11](#).

Evidence differs across the stress, adjustment and appreciation windows

Calendar-year endpoints are reproducible descriptive windows—not estimated structural breaks.

Table 20. Period-specific currency outcomes and channel evidence

Window	Measured currency outcome	Source-based channel context	Causal boundary
2022	Quote +38.86%	Market-access loss and external/domestic financing stress	Separate driver shares not estimated
2023	Quote +40.02%	ECF approval and debt-adjustment process	Annual path cannot isolate approval effects
2024	Quote +26.34%	Current-account surplus coexisted with pressure	Surplus is not sufficient for appreciation
2025	Quote –28.96%	Stronger goods balance, gold intermediation and higher debt payments	No exhaustive percentage allocation
2026 context	No full-year return supplied	Institutional transition and final ECF review	Announcements are not complete annual outcomes

Sources: MoF (2026); IMF (2026); Nolin / IMF (2026); IMF (May 2023); IDER calculations. [S01](#), [S02](#), [S03](#), [S05](#).

Quantify what is observed without disguising missing causal shares

The scorecard distinguishes financial magnitude from exchange-rate effect.

Table 21. Driver evidence scorecard: measured magnitude versus currency effect

Driver	Quantified record	Evidence strength / limit
Commodity / gold channel	BoG gold receipts +US\$11.0 bn,2023–2025	Approximate institutional cash contribution; not full gold export elasticity
Import demand	Goods imports +US\$2.060 bn,2024–2025	Accounting offset; settlement and volume split not observed
Remittances	Net transfer account –US\$0.103 bn	Not a gross personal-remittance measure; causal effect unestimated
Portfolio flows	2024 entries include exchanged-debt extinguishment	Cash effect cannot be inferred from reported net total
Official loans / debt service	Narrow net public comparison deteriorated US\$2.202 bn	Own perimeter and timing; not all official cash
Market operations	Gross FX sales rose US\$9.6 bn,2023–2025	No net-discretionary intervention coefficient

Transmission lags, persistence and confidence intervals are not invented for unestimated effects.

A new common monthly panel supports limited joint attribution

90 complete level observations; January 2019–June 2026. The main lagged-change model uses 88 months.

Table 22. Monthly model inputs, definitions and proxy limitations

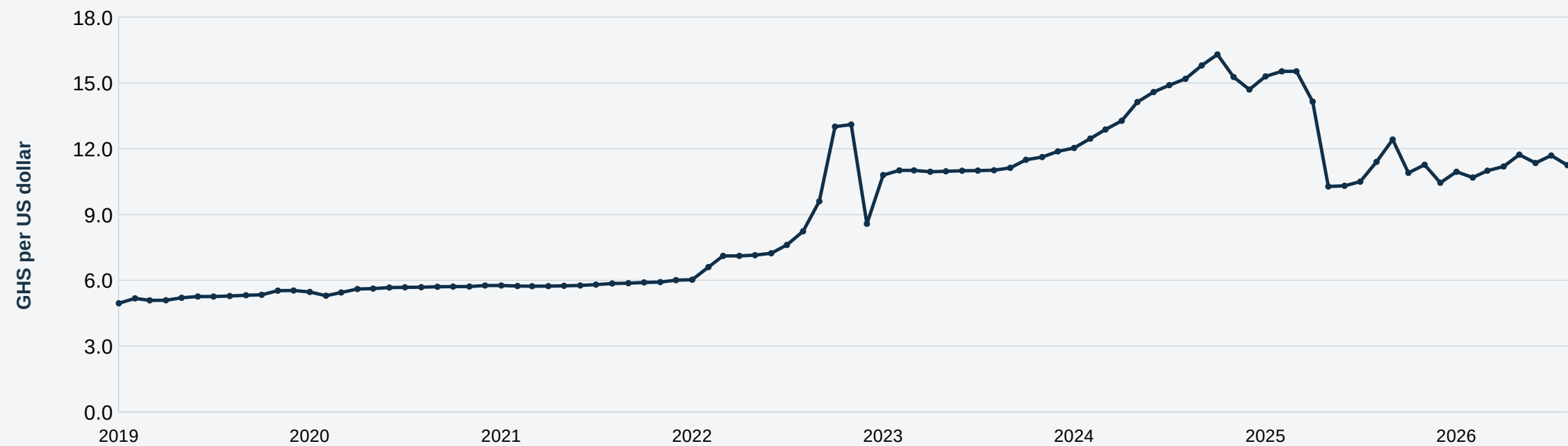
Variable / source	Measurement	Main limitation
BoG end-period GHS/USD	Monthly interbank table; 92 levels through August 2026	Separate from retained MoF selling rates; no universal executable quote
Fed broad dollar	Monthly index; stronger U.S. dollar means a higher index	Shared global conditions are not an identified external instrument
BLS gold import-price index	U.S. nonmonetary-gold import-price proxy; Dec 2024=100	Not a world spot quote, Ghana export receipt or local conversion
IMF Brent and cocoa	Monthly benchmark prices in U.S. dollars	Different intra-month timing; cocoa can respond to Ghana supply
Missing transaction channels	No joined monthly receipts, remittances, portfolio or net intervention	Their causal contributions are not estimated zero

New series were transcribed from official-domain/FRED text. Exact definitions, retrieval limits and precision are recorded.

Monthly observations reveal reversals hidden by year-end endpoints

BoG end-period GHS per US dollar; January 2019–August 2026; 92 observations.

Figure 16. Monthly end-period GHS/USD exchange rates, 2019–August 2026

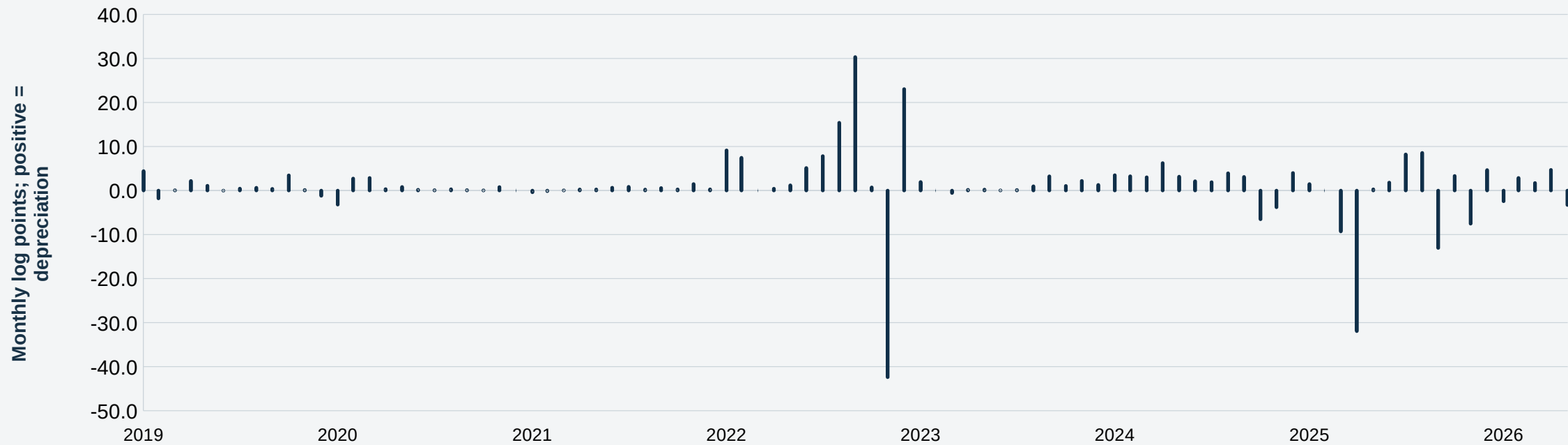


Every monthly observation is retained. Lines do not turn annual flow inputs into monthly data.

Crisis and reversal months remain in the primary estimation sample

100 times the change in log GHS/USD; February 2019–June 2026; 89 changes.

Figure 17. Monthly cedi log changes, February 2019–June 2026



Log changes are additive; they are not exact percentage changes. Genuine extreme months are not winsorised.

End-period, selling and average rates are not interchangeable

Overlapping December observations. The original MoF selling-rate calculations remain unchanged.

Table 23. End-period, selling-rate and period-average measurement comparisons

December	MoF selling rate	BoG end-period	Relative level difference
2021	5.9910	6.0061	+0.252%
2022	8.3192	8.5760	+3.087%
2023	11.6488	11.8800	+1.985%
2024	14.7174	14.7000	-0.118%
2025	10.4552	10.4500	-0.050%

2025 change: BoG end-period -28.91%; December-average -23.69%. Different measurement, not a corrected return.

A parsimonious change model separates four observable price proxies

OLS with intercept and one lag of cedi depreciation; 88 dates, six estimated coefficients; HAC(3) inference.

Table 24. Baseline monthly model specification and uncertainty conventions

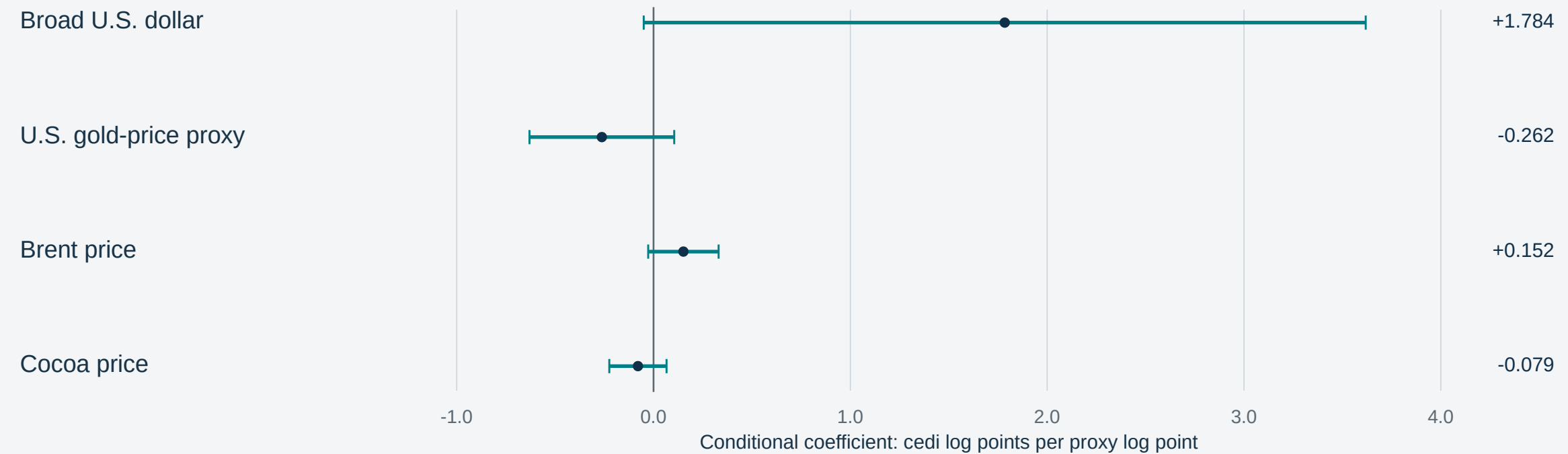
Design choice	Implemented treatment	Interpretation
Dependent variable	100 × log change in end-period GHS/USD	Positive values indicate depreciation
Regressor blocks	Broad dollar, U.S. gold-price proxy, Brent, cocoa; each in 100 × log changes	Not commodity receipts or identified shocks
Dynamics and sample	One lagged outcome; March 2019–June 2026	Retrospective exploratory specification; no claim of pre-registration
Uncertainty	Calendar-distance Bartlett HAC, n/(n-k) correction, t critical values	Approximate pointwise intervals; not exact finite-sample coverage
Limits	No domestic-flow panel; no validated excluded instrument	Common causes and policy feedback remain possible

Sources: BoG monthly FX; Federal Reserve / FRED; BLS gold proxy / FRED; IMF Brent / FRED; IMF cocoa / FRED; statsmodels HAC; IDER calculations. [S13](#), [S14](#), [S15](#), [S16](#), [S17](#), [S18](#).

Report each association estimate with its uncertainty

One log point in each price proxy; outcome is monthly cedi log change. Full sample, n=88.

Figure 18. Baseline price-factor coefficients and approximate 95% intervals



All four approximate pointwise 95% intervals include zero; no multiplicity adjustment. This does not establish zero causal effects.

Residual tails remain severe despite modest statistical fit

Tests are exploratory; non-rejection can reflect low power under a short, changing sample.

Table 25. Baseline fit, residual and model-diagnostic statistics

Diagnostic	Statistic	Approx. p	Reporting implication
BG serial correlation, 3 lags	4.860	0.182	Diagnostic only; does not validate identification
Breusch-Pagan heteroskedasticity	8.784	0.118	Diagnostic only; does not validate identification
CUSUM residual stability	0.673	0.756	Diagnostic only; does not validate identification
Jarque-Bera residual normality	350.639	<0.0001	Diagnostic only; does not validate identification
In-sample R ² / adjusted R ²	0.128 / 0.075	Not a p-value	Not a causal share of the cedi movement

Maximum regressor VIF: 1.20. Full integration-test results are supplied; no long-run equilibrium is imposed.

Signs and precision depend on timing, controls and the estimation window

Dollar coefficient and pointwise interval; gold-proxy point coefficient shown separately. Full register includes nine models.

Table 26. Specification and estimation-window sensitivity

Specification	n	Dollar β	Dollar 95% interval	Gold-proxy β
A: baseline HAC(3)	88	+1.784	[−0.050, 3.619]	−0.262
B: HAC(6)	88	+1.784	[0.018, 3.551]	−0.262
C: no gold proxy	88	+2.061	[−0.006, 4.128]	Not included
D: lagged global proxies	88	+1.790	[−0.755, 4.335]	−0.010
E: seasonal harmonics	88	+1.806	[−0.093, 3.705]	−0.251
F: through Dec 2022	46	+4.030	[−0.648, 8.709]	−0.195
G: from Jan 2023	42	+0.495	[−2.427, 3.416]	−0.156

Lagged coefficients address different timing. Subperiod samples are small; no specification is selected by significance.

Every one of the 88 estimation months is omitted once

The main estimate retains the full sample; diagnostic deletions do not redefine genuine observations as errors.

Table 27. Leave-one-month-out influence diagnostics

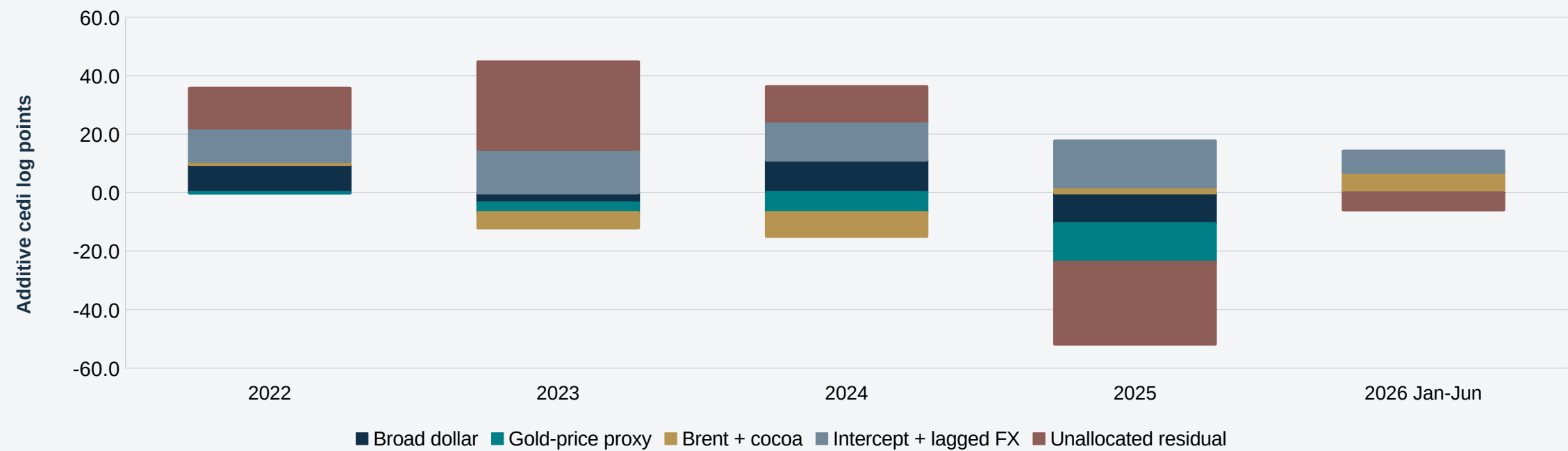
Omitted month	Cook distance	Dollar β after omission	Gold-proxy β after omission
2023-01	1.583	+2.146	-0.281
2022-12	0.414	+1.062	-0.140
2025-05	0.175	+1.393	-0.260
2022-10	0.149	+1.494	-0.251

Calendar-aware covariance uses the actual month distances after deletion. Complete estimates for all 88 omissions accompany the report.

Separate fitted price factors from persistence, baseline and residual

Primary model A; additive log-point sums; 2026 covers January–June only.

Figure 19. Period-by-period fitted-regressor contributions and residuals



Signed stacks are fitted-regressor accounting, not structural shocks, FEVD or causal shares. Net sums equal observed log changes.

Most of the 2025 appreciation lies outside this fitted proxy equation

BoG monthly end-period outcome: -34.12 log points in 2025; different from the retained MoF selling series.

Table 28. Fitted-regressor accounting for the 2025 exchange-rate movement

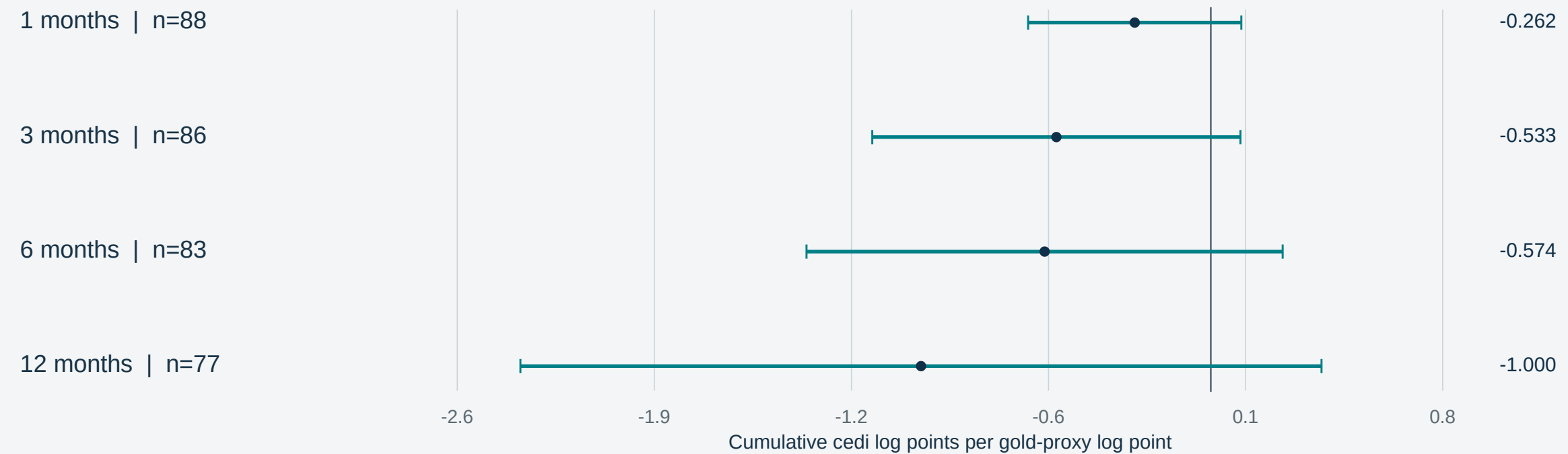
Model term	Contribution	Pointwise parameter-only 95% interval
Intercept	+14.43	[-3.62, 32.48]
Lagged cedi change	+1.15	[-10.85, 13.16]
Broad dollar	-10.64	[-21.59, 0.30]
U.S. gold-price proxy	-13.24	[-31.79, 5.31]
Brent	-2.57	[-5.60, 0.46]
Cocoa	+4.62	[-3.86, 13.09]
Unallocated residual	-27.87	[-56.84, 1.09]

Fitted sum: -6.25 log points; residual: -27.87. Pointwise interval endpoints need not sum to the observed movement.

Longer-horizon gold-proxy estimates remain imprecise

Local projections; cumulative cedi log changes over 1, 3, 6 and 12 months. No identified gold shock.

Figure 20. Conditional cumulative gold-proxy associations by horizon



H=1 includes the current month; H=12 ends eleven months later. Intervals are pointwise; no causal persistence is established.

Dollar and commodity associations are not interchangeable with receipt elasticities

Same local-projection controls; cumulative outcome windows, not individual future monthly changes.

Table 29. Conditional cumulative associations at stated horizons

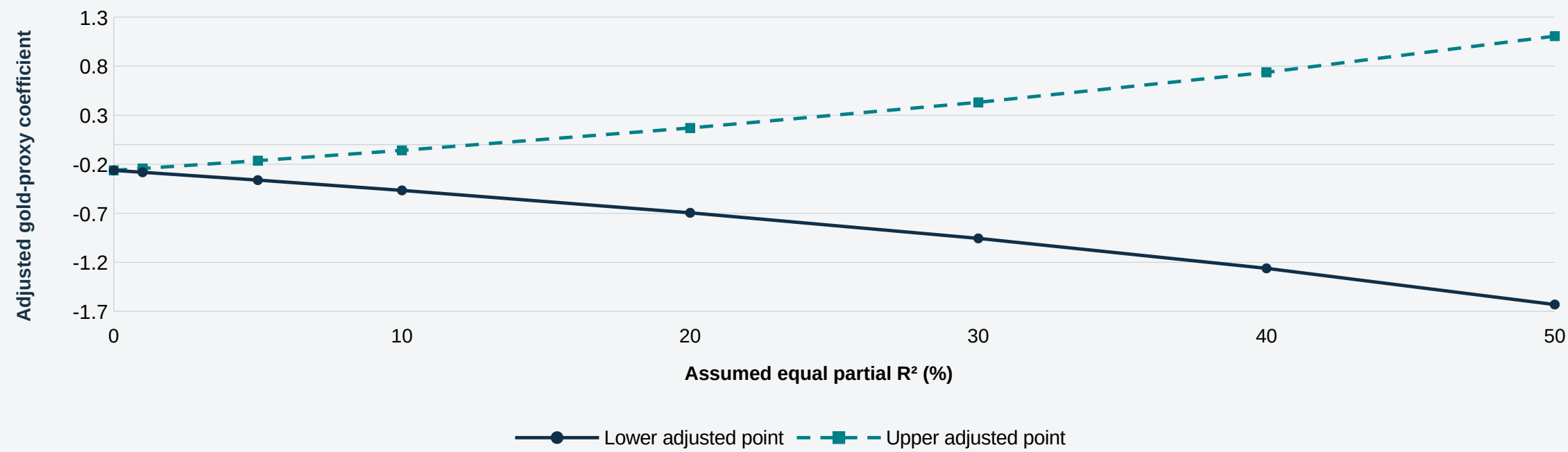
Horizon	n	Dollar β / 95% interval	Gold-proxy β / 95% interval
1 months	88	+1.784 [−0.050, 3.619]	−0.262 [−0.630, 0.105]
3 months	86	+3.133 [0.141, 6.126]	−0.533 [−1.168, 0.102]
6 months	83	+3.970 [−0.240, 8.180]	−0.574 [−1.395, 0.248]
12 months	77	+4.604 [−1.857, 11.064]	−1.000 [−2.382, 0.382]

An isolated interval excluding zero is not a discovery of causation, particularly across multiple exploratory horizons.

A modest omitted common driver can change the gold-proxy point estimate

Assumed equal partial R^2 in treatment and residual-outcome equations; not measured confounder strengths.

Figure 21. Gold-proxy coefficient sensitivity to assumed omitted confounding

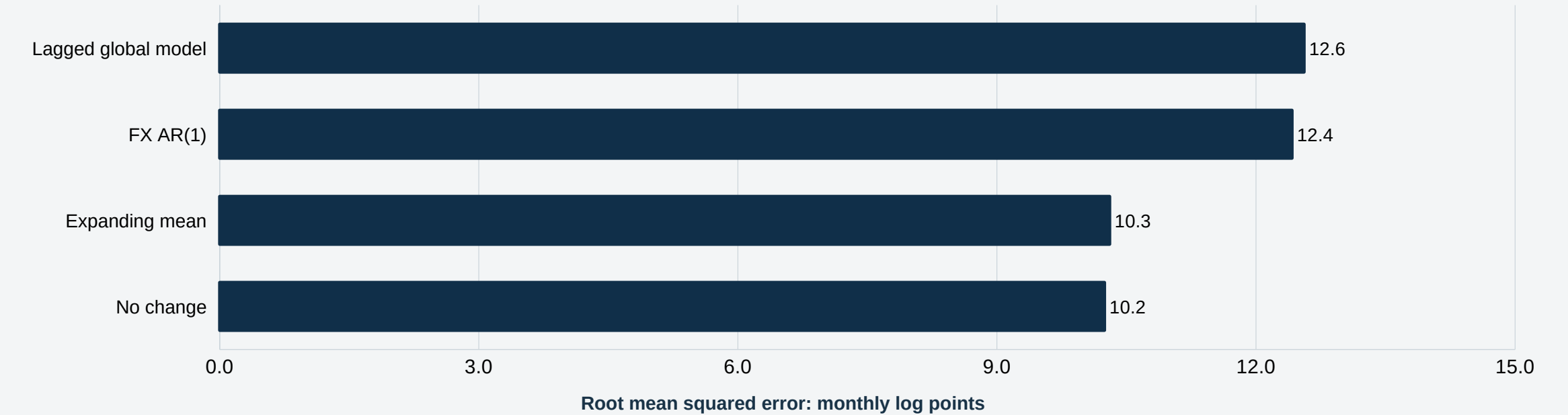


Equal residual explanatory strength of 12.7% can move the point to zero. Baseline uncertainty already includes zero.

The lagged global model does not outperform a no-change forecast

Expanding-window one-month forecasts; 51 common dates, April 2022–June 2026; frozen-vintage data.

Figure 22. Pseudo-out-of-sample forecast errors on common evaluation dates



At least 36 training observations. Global predictors lag two months; actual historical publication vintages are not reconstructed.

The stronger empirical result is a limitation—not a stable driver ranking

All tests are retrospective. Causal interpretation remains separate from model fit and numerical reproducibility.

Table 30. Robustness findings and interpretation limits

Question	Executed evidence	Conclusion
Baseline price associations	All four 95% baseline price-factor intervals include zero	Direction and magnitude remain uncertain
Gold proxy robustness	Negative point signs in the main contemporaneous sensitivities; low point robustness value	Not a validated gold-receipt effect
Regime and crisis dependence	Subperiod estimates and every-month deletions supplied	Full-sample average may not describe each regime
Historical accounting	Monthly identity and every parameter draw reconcile	Numerically exact; not causally exhaustive
Business forecasting	Lagged global RMSE exceeds the no-change benchmark	Do not market the model as a validated investment signal

A complete calendar does not imply complete economic coverage

No missing observations in the common proxy panel; key transaction classes and execution prices remain unobserved.

Table 31. Monthly calendar completeness versus economic coverage

Coverage mechanism	Treatment in this report	Next data requirement
End-period versus executed FX	Preserve rate-definition bridge; no retail generalisation	Dated dealer/customer executions and bid–ask quotes
Foreign gold-price proxy	Separate proxy specification and omission sensitivity	Matched Ghana unit values, volumes, receipts and conversion
Reporting and offshore retention	Do not weight public price rows as though they sampled FX transactions	Institution roster, missing reasons, channel coverage
Unobserved remittances / operations	Withhold named causal contributions and national selection corrections	Actual settlements, purchases/sales, purpose and beneficial owner
Missing-data remedies	Conditional observation weights require overlap and an observed response process	Sensitivity to unmeasured selection; no invented response rates

Sources: World Bank metadata; Jarociński & Karadi (2020); BoG monthly FX; BLS gold proxy / FRED; IDER calculations. [S04](#), [S08](#), [S13](#), [S15](#).

A causal exchange-rate response needs a defensible source of variation

Candidate designs remain conditional research protocols—not causal coefficients estimated by this module.

Table 32. Conditions for identifying a causal exchange-rate response

Target	Required identifying variation	Threat to test
Gold-receipt conversion	Unexpected settlement against a pre-existing payment schedule	Global dollar, risk, hedging and private-information timing
Official cash arrival	Timing separated from policy announcements and direct uses	Credibility/news effects violate a pure-cash exclusion
Intervention supply	Externally fixed rule or auditable assignment and override history	Authority responds to pressure; spillovers across dealers
Cocoa supply / price	Separate Ghana crop shocks from external demand/price innovations	Ghana is not negligible in the cocoa market
Full price attribution	Coherent joint model of actual flows with identified shocks	No adding upstream totals to downstream channel effects

Sources: IMF (2026); Nolin / IMF (2026); Jarociński & Karadi (2020); Jordà (2005); IDER calculations. [S02](#), [S03](#), [S08](#), [S21](#).

Every chart is built from versioned inputs and executed calculations

The companion pipeline regenerates the estimates, chart data, editable report and PDF navigation.

Table 33. Every chart is built from versioned inputs and executed calculations

Stage	Executable artifact	Control
Source intake	Eleven input CSVs: five retained, six added monthly series	Source IDs, observation dates, definitions and SHA-256 hashes
Empirical engine	empirical_analysis.py; complete model and diagnostic outputs	Independent OLS and calendar-HAC verification
Chart construction	build_report.py + empirical_slides.py + deck_helpers.py	Native chart workbooks; editable interval drawings from output rows
Publication rendering	LibreOffice PDF export and finalize_pdf.py	Numbered figures/tables, links, notes and PDF bookmarks
Replay / release	run_all.py and verify_enhanced.py	Same-input numerical replay and full file manifest

“Dynamic” means data-driven regeneration and editable charts—not a live market feed, automatic refresh subscription or trading system.

Keep measured receipts, proxy associations and missing causal effects distinct

The original external-flow results remain valid within their own perimeters; the monthly module answers a different question.

Table 34. Updated evidence scorecard and attribution limits

Driver / channel	Evidence delivered	Permitted decision use
Commodity receipts	2025 goods improvement and 2023–2025 BoG gold-receipt bridge	Plan receipt conversion; do not use 82.7% as appreciation attribution
Global price factors	Executed monthly coefficients, conditional horizons and period accounting	Monitor exposure; intervals and residuals limit a directional forecast
Remittances / import settlements	Definitions and annual accounts; no harmonised monthly cash series	Prioritise settlement and local-conversion records
Portfolio / official financing	Non-cash restructuring separated; public payment timing reconciled	Maintain cash calendar and transaction-valued flows
Market operations	Gross sales distinguished from net discretionary intervention	No effectiveness score from sales and exchange-rate coincidence

Sources: MoF (2026); IMF (2026); Nolin / IMF (2026); BoG monthly FX; BLS gold proxy / FRED; IDER calculations. [S01](#), [S02](#), [S03](#), [S13](#), [S15](#).

Model complexity must follow sample size and identification

A numerical fit is not an identification strategy.

Completed in this edition

Annual flow identities plus a new 88-observation monthly model, cumulative associations, fitted accounting, influence and forecast diagnostics.

Not estimated

No structural VAR, causal local projection or complete cash-flow driver decomposition is claimed. Monthly associations are estimated separately.

What would enable estimation

Actual receipt conversion, settlements, portfolio flows and net intervention, joined to defensible identifying variation and adequate independent events.

Observed movements reconcile to the fitted proxies and residual

BoG monthly end-period series; annual sums in additive log points. This is not the MoF selling-rate series.

Table 35. Observed log movements, fitted components and residuals by period

Year	Observed log movement	Fitted sum	Unallocated residual
2022	+35.62	+22.09	+13.53
2023	+32.59	+2.85	+29.74
2024	+21.30	+9.67	+11.63
2025	-34.12	-6.25	-27.87

Residuals may contain omitted flows, policy reactions, measurement differences and model error; none is assigned a causal label.

Define the intervention before selecting an estimator

Candidate designs require new authorised data and defended assumptions.

Table 36. Candidate interventions, identifying variation and falsification checks

Target	Potential identifying variation	Required falsification / safeguard
Export-conversion effect	Unexpected receipts against documented pre-event payment schedules	Reasons for delays; anticipation; global price/risk controls
Official cash-settlement effect	Disbursement timing distinct from programme announcements	Separate policy-information content and fiscal uses
Intervention supply effect	Externally fixed execution rule or defensible assignment	Policy reaction, discretionary overrides, sorting and spillovers
Remittance effect	Sending-country exposure or payment-cost variation	Exclude direct trade/global channels; address informal coverage

Sources: Jarociński & Karadi (2020); IMF external-sector framework. [S08](#), [S11](#).

Sales during depreciation do not prove that intervention caused it

An authority may act precisely when unobserved market pressure is strongest.

Before the operation

Record order imbalance, available information, inventories and the authority's stated reaction rule.

At execution

Separate planned intermediation from an unexpected discretionary operation, with trade and settlement timestamps.

After execution

Measure price, spreads, turnover and persistence against a defensible counterfactual; include reserve and liquidity costs.

The observed transaction sample may exclude economically important flows

Selection treatment begins with the reporting population and the difference between missing and zero.

Table 37. Transaction-coverage and selection safeguards

Coverage issue	Required record / method	Boundary
Bank/dealer nonreporting	Complete frame; entry, mergers, exits and missing returns	Analyse coverage, not just surviving reporters
Offshore retained receipts	Export receipt and conversion records	Unconverted is not unearned; domestic supply differs
Informal remittance channels	Representative transfer/channel evidence	Formal channel growth is not automatically total-flow growth
Missing outcomes	Reason codes; conditional weights and sensitivity	Weights need overlap and do not remove unmeasured confounding
Changing classification	Versioned source definitions and bridges	No mechanical splice across reporting regimes

Sources: World Bank metadata; IMF external-sector framework. [S04](#), [S11](#).

A full decomposition needs coherent dynamics and explicit identification

The monthly proxy diagnostics are completed; the additional requirements below concern a full causal flow model.

Table 38. Dynamic modelling and causal-inference release requirements

Component	Procedure when data support it	Do not claim
Common-frequency joint model	Parsimonious lag structure; stationary transformations or supported level relation	A long-run equilibrium merely because trends co-move
Historical decomposition	Reconcile every model draw to observed log changes, initial terms and residual	Exact percent contributions add across drivers
Causal shock identification	Surprise or external-instrument evidence; exclusion and weak-ID checks	All world prices or financing approvals are valid instruments
Uncertainty and stability	Dependence-aware intervals, break sensitivity and full specification register	Standard errors cure endogeneity
Prediction	Rolling/expanding evaluation respecting release lags	In-sample fit is an investment signal

Sources: Jarociński & Karadi (2020). [S08](#).

Robustness is assessed at the level of the completed calculations

No regression significance tests are attached to accounting identities.

Table 39. Completed accounting and scenario robustness checks

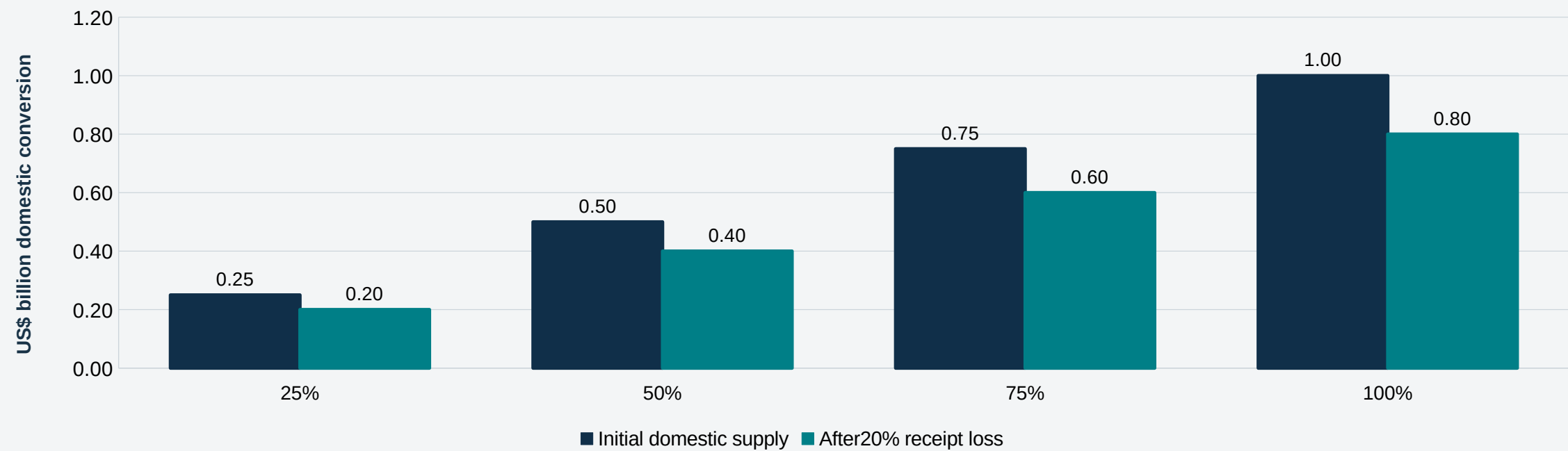
Check completed	Finding	Remaining uncertainty
Quote inversion and log identity	Exact quote, reciprocal and additive movement reconcile	Rate-market coverage remains source-specific
Current-account and goods bridges	Components reconcile with explicit rounding residue	Accrual-to-cash and domestic conversion unavailable
Source-vintage comparison	Both MoF and IMF show large goods/CA improvements	Overall BOP concepts are not interchangeable
Debt-service timing scenario	Prepayment changes the annual comparison materially	Other payment timing and financing uses unobserved
Receipt conversion / business stresses	Results change with explicit conversion and exposure assumptions	No scenario probability or causal price elasticity

Sources: MoF (2026); IMF (2026); Nolin / IMF (2026); IDER calculations. [S01](#), [S02](#), [S03](#).

The same gross receipt can produce very different domestic FX supply

Hypothetical US\$1 bn receipt; domestic conversion fractions 25–100%; not measured Ghana conversion rates.

Figure 23. Domestic conversion under assumed receipt and conversion rates



Source receipt, conversion fraction and subsequent market sale cannot be counted as separate additive inflows.

Stress the cash account before imposing an exchange-rate response

Assumed US\$ billion changes; no scenario probabilities; positive net means more available cash.

Table 40. Declared external-cash scenarios and net resource changes

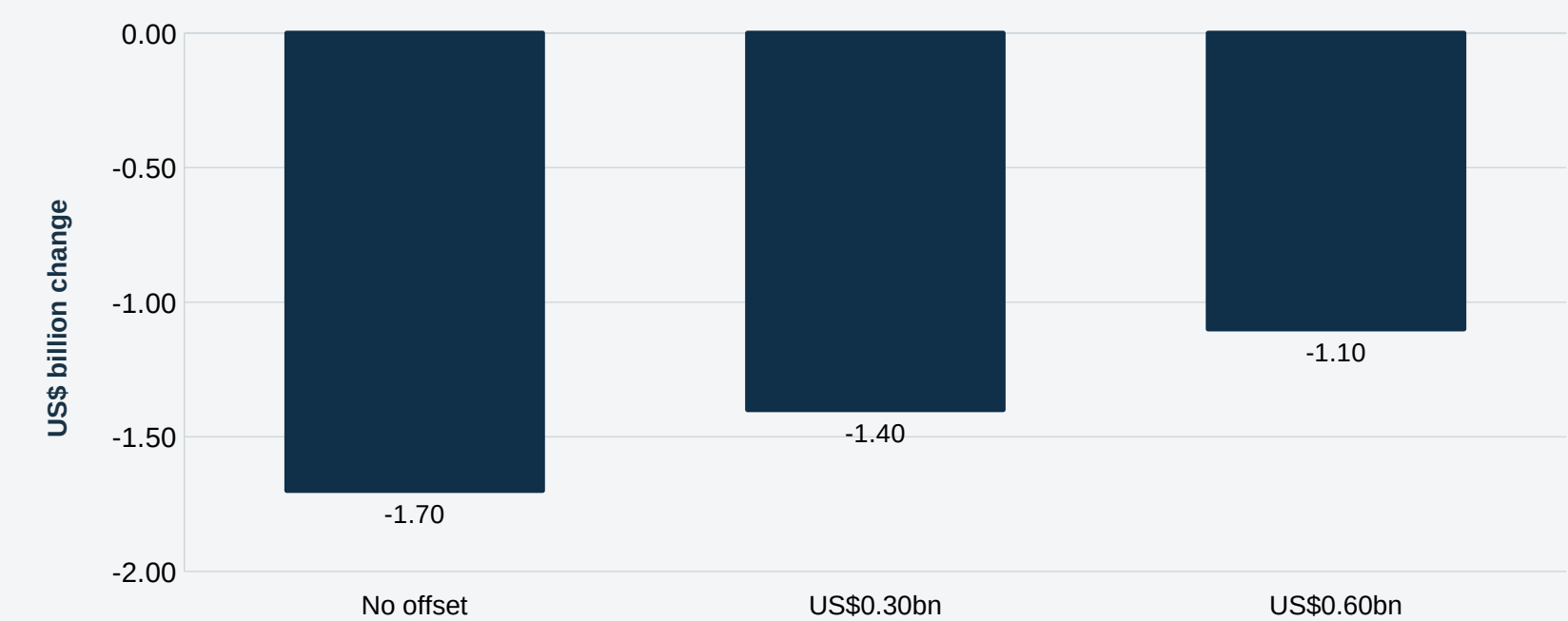
Scenario	Receipts / transfers	Imports / debt payments	Portfolio / official	Net origin change
Receipt delay	−0.50 /0.00	0.00 /0.00	0.00 /0.00	−0.50
Import pressure	0.00 /0.00	+0.30 /0.00	0.00 /0.00	−0.30
Combined squeeze	−0.50 /−0.10	+0.30 /+0.20	−0.40 /−0.20	−1.70
Receipt recovery	+0.50 /+0.10	+0.20 /+0.10	+0.20 /+0.10	+0.60

Imports and debt payments are uses and enter with a negative sign. These values are assumptions, not forecasts or observed flows.

An official offset reduces a cash gap but uses an existing resource

Combined hypothetical–US\$1.70 bn origin shock; alternative official supply from prior reserves.

Figure 24. Hypothetical cash-gap sensitivity to an official reserve offset



No price forecast

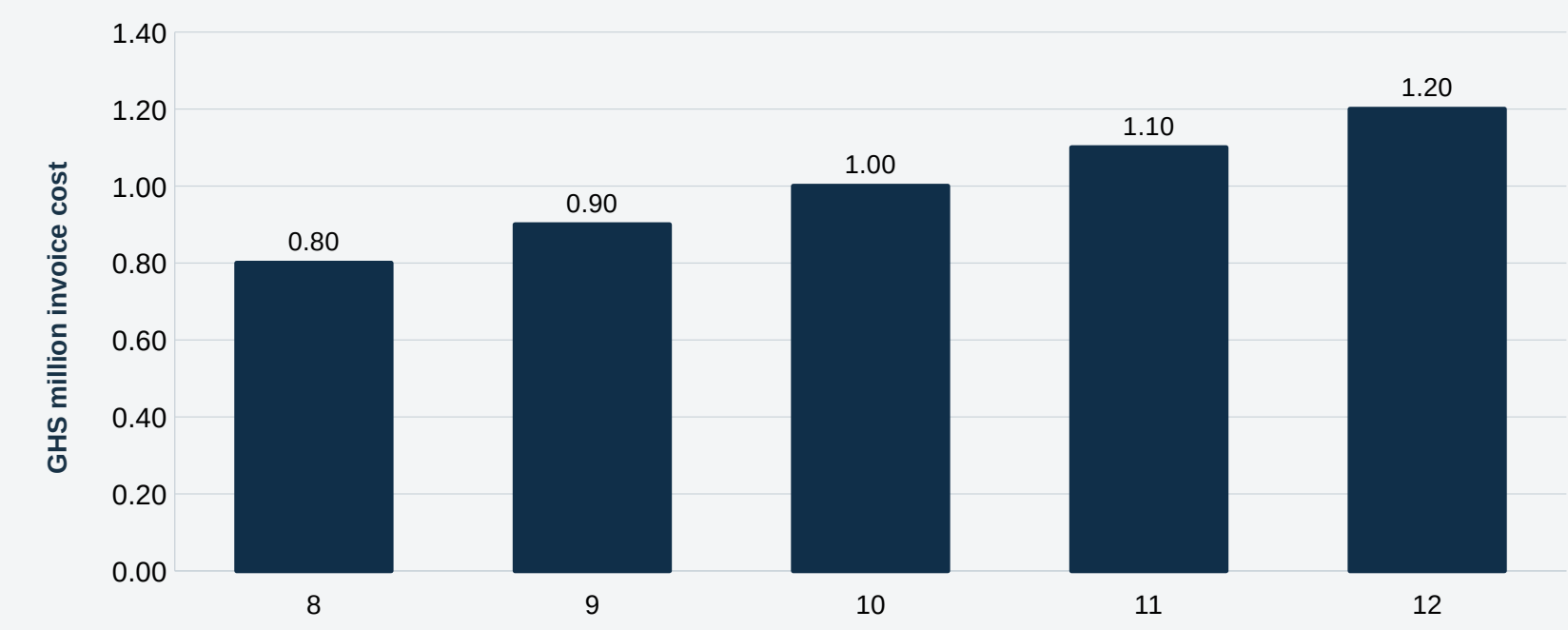
Net change:
–1.70 / –1.40 / –1.10 bn

An exchange-rate response cannot be obtained without market depth and a credible elasticity.

A contracted dollar invoice creates a direct cedi-cost sensitivity

Illustrative US\$100,000 invoice; no hedging, tax, finance charge or change in foreign price.

Figure 25. Cedi cost of a US\$100,000 invoice under alternative exchange rates



Operational record

Match invoice due dates with receipts, existing FX and hedge settlements.

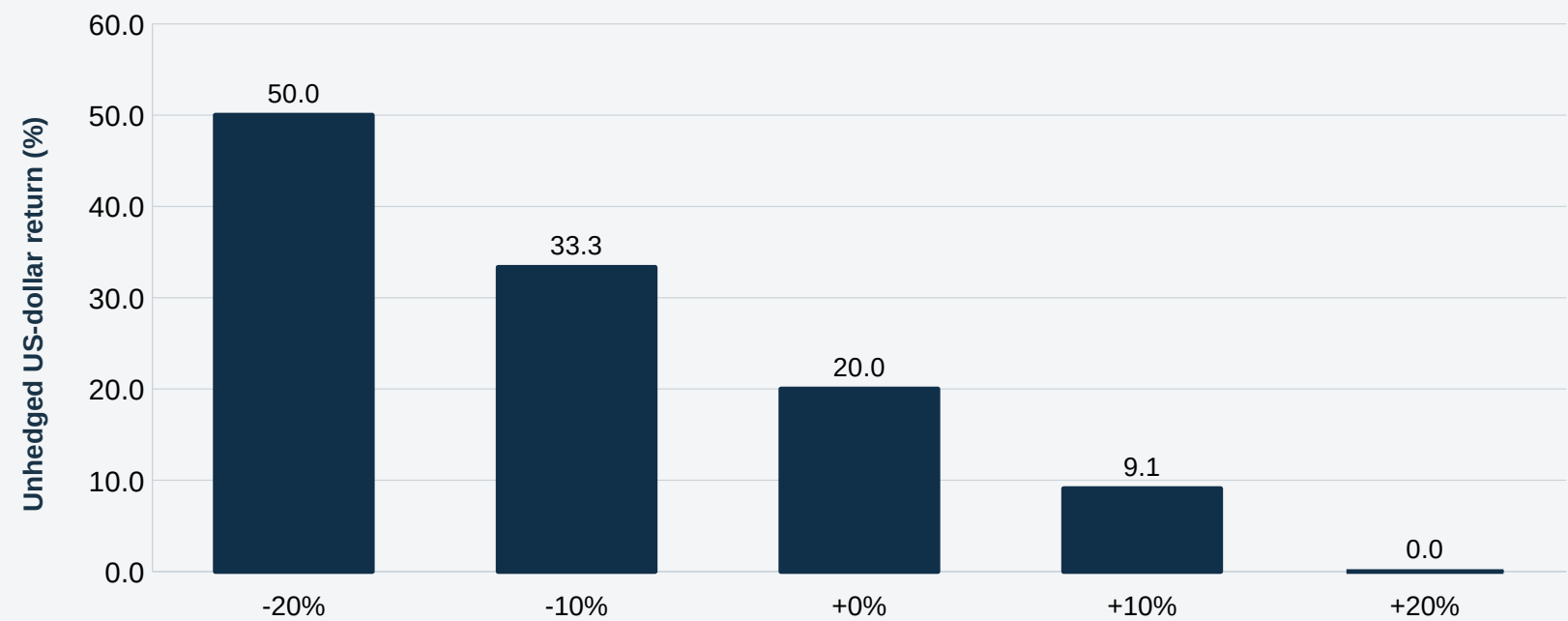
Annual import totals alone do not show cash-flow risk.

Horizontal labels are assumed GHS/USD quotations, not exchange-rate forecasts.

A 20% cedi return can be erased by 20% quote depreciation

One-year illustration; cedi total return 20%; exchange-rate change -20% to +20%; no fees or tax.

Figure 26. Currency-adjusted return on an assumed 20% cedi investment



Matched-period identity

$$\text{USD return} = (1 + \text{cedi return}) / (S_1 / S_0) - 1.$$

An advertised cedi coupon is not itself a currency-adjusted total return.

A stronger cedi changes net receipts—not every exporter’s profit in the same way

Hypothetical exporter: US\$150,000 receipts,US\$90,000 FX costs,GHS400,000 domestic costs.

Table 41. Illustrative exporter net cash under alternative exchange rates

Assumed GHS/USD	Receipts less FX costs, GHS	Net cash after domestic costs	Interpretation
8	480,000	80,000	Fixed prices, volumes and domestic costs
9	540,000	140,000	Fixed prices, volumes and domestic costs
10	600,000	200,000	Fixed prices, volumes and domestic costs
11	660,000	260,000	Fixed prices, volumes and domestic costs
12	720,000	320,000	Fixed prices, volumes and domestic costs

This is not a representative margin estimate. Households receiving dollars face analogous conversion exposure plus their own consumption mix.

Assess currency exposure against obligations, liquidity and borrower risk

A national appreciation episode does not imply the same result for every balance sheet.

Banks

Separate direct open FX positions from unhedged borrower exposure, customer settlement risk and dealer liquidity.

Pensions, insurers and funds

Match asset currency, liability currency, net returns, duration, hedging costs and actual investment mandates.

Businesses and retirees

Track contract dates, nominal income, imported consumption and obligations. Do not turn a macro scenario into a universal asset recommendation.

Build the evidence in stages with named owners and release conditions

Proposed timetable begins after institutional approval and data-access agreements.

Table 42. Proposed implementation roadmap and measurable deliverables

Horizon	Action / proposed lead	Proposed measurable deliverable	Risk / review trigger
0–90 days	BoG/MoF/data partners: align origin, settlement, reserve and public-cash ledgers	Document≥95% of captured gross value by origin and settlement; publish coverage	Missing large flows trigger reconciliation before modelling
3–12 months	Statistical authorities + IDER: verified monthly panel and method review	Versioned 12-month reporting history plus recovered past observations; release log	Do not interpolate if historical coverage is incomplete
1–3 years	Authorities + market institutions: durable transaction reporting and evaluation	Independent reviews, expanded informal-channel evidence and validated price models	Reassess after mandate, coverage or market-regime changes

Targets are proposed data-quality controls, not observed achievements, current legal duties or exchange-rate targets.

Keep a manageable dashboard of origins, uses and market delivery

Proposed reporting cadence, ownership and alert rules; economic thresholds require calibration.

Table 43. IDER Cedi Drivers Monitoring Dashboard

Indicator	Definition / proposed owner	Cadence	Review trigger
Receipt conversion	Converted FX / matched external receipts; banks/exporters	Monthly	Material missing or late settlement records
External public cash	Loans + grants – actual debt payments; MoF/BoG	Monthly/rolling 13 weeks	Large deviation from dated cash plan
Import payment pressure	Committed and settled FX invoices; bank sample	Weekly/monthly	Unfunded obligations within 30 days
Portfolio transaction flows	Cross-border purchases, redemption and repatriation; custodians	Monthly	Unexplained stock–transaction difference
Official market operations	Purchases, sales, purpose, instrument and reserve bridge; BoG	Monthly	Origin/valuation reconciliation does not close
Market conditions	Spreads, turnover and settlement delays; authorised reporting	Daily/weekly	Above prespecified historical percentile after data validation

Source: IDER calculations, declared scenarios or proposed research procedures; see author’s notes.

Use a clear headline without changing the meaning of the evidence

Quote the period, convention, source and level of inference.

Table 44. Evidence-consistent media wording and unsupported inferences

Supported wording	Unsupported leap
The selected GHS/USD quote fell 28.96% in 2025	The currency moved by the same percentage in either quotation
Gold accounted for 82.7% of incremental BoG receipts,2023–2025	Gold caused 82.7% of the cedi’s appreciation
Goods-balance gains exceeded the net current-account increase	Annual net FX supply mechanically sets the exchange rate
Gross sales expanded alongside gold-related receipts	Exports and sales are two independent external inflows
Source accounts contain debt-restructuring entries	Every negative portfolio entry is capital flight

Sources: MoF (2026); IMF (2026); Nolin / IMF (2026); IDER calculations. [S01](#), [S02](#), [S03](#).

Prioritise low-regret information improvements over unsupported price targets

The evidence supports better measurement and exposure control, not a point forecast.

For MoF and BoG

Integrate debt-service cash dates, official receipts, gold origin/use and reserve transactions. Distinguish intervention from intermediation.

For businesses and associations

Prepare dated net FX ledgers, compare executable quotes and stress both appreciation and depreciation with financing needs.

For institutional investors

Require risk-adjusted cash-flow analysis and documented scenario assumptions. Treat commodity concentration and regime change as monitoring risks.

Source differences are disclosed rather than silently repaired

The numerical analysis follows the controlling source for each separate measurement.

Table 45. Source exceptions and treatment decisions

Issue	Observed difference / gap	Treatment
Exchange-rate row label	MoF label US\$/GHS; values behave as GHS/USD	Correct label only; retain all original levels
Historical FX headline percentages	Narrative percentages do not all matchTable 8.1 ratios	Recalculate from one table; do not splice other series
MoF versus IMF BOP	Current-account vintage differences; major financial-account convention differences	No common “overall balance” cash series manufactured
Debt-service principal row	2025 subtotal conflicts with creditor sums and prose	Use published total; no silent repair of principal row
Source page images	Primary text available; screenshots failed	Record partial authentication and exact locators

Sources: MoF (2026); IMF (2026); IDER calculations. [S01](#), [S02](#).

Interpretation uncertainty is larger than display-rounding precision

An exact calculation does not make its inputs complete or its attribution causal.

Table 46. Interpretation, rounding and data-availability qualifications

Issue	Record retained	Implication
Reserve scope	Headline 13.829 bn versus programme 11.906 bn in 2025	No substitution of reserve levels or import-cover denominators
Rounded gold cash flows	1.7/12.7 and roughly 6.0/8.3 bn	Derived receipt-growth shares are approximate
Cocoa contract notional	500,000 tonnes×US\$4,850=US\$2.425 bn	Not actual cash receipts or an annual export statistic
Missing receipt/settlement panel	No harmonised monthly transaction sample	Price-proxy attribution does not identify the missing cash-flow effects
Original manuscript model claims	Numerical coefficient/input archive not authenticated	Not carried into this PowerPoint as established results

Sources: MoF (2026); IMF (2026); Nolin / IMF (2026); COCOBOD; IDER calculations. [S01](#), [S02](#), [S03](#), [S07](#).

The full current-account input block is reproduced for checking

IMF Table 5; US\$ million; actual/preliminary columns, not forecasts.

Table 47. Retained current-account input values, 2024–2025

Source row	2024 actual	2025 preliminary
Goods exports,f.o.b.	19,165	31,107
Goods imports,f.o.b.	15,392	17,452
Goods balance	3,773	13,655
Services,net	-2,225	-4,572
Income,net	-5,496	-5,321
Transfers	5,418	5,315
Current account	1,471	9,077

Public-cash inputs retain their original annual perimeter

US\$ million; MoF Tables 8.6–8.7; 2024 revised, 2025 provisional.

Table 48. Retained public external-cash input values, 2024–2025

Source row	2024	2025
Project loans	945.9	279.4
Programme loans	1,620.0	1,092.5
Total external loan disbursements	2,565.9	1,372.0
External debt service	791.6	1,799.4
Of which: Eurobond service	500.7	1,408.1
2025 payment for 3 January 2026 obligation	Not applicable	709.0

Project plus programme disbursements differs by US\$0.1m from the 2025 total. “Not applicable” is not a measured zero payment.

Calculation definitions used throughout the report

Ratios, units and population denominators remain explicit in the data and code.

Table 49. Calculation definitions, units and interpretation

Quantity	Calculation / convention	Interpretation
Quote change	$100 \times (S1/S0 - 1)$, $S = \text{GHS/USD}$	Positive=cedi depreciation
Reciprocal value change	$100 \times (S0/S1 - 1)$	Positive=cedi appreciation
Additive log movement	$100 \times \ln(S1/S0)$	Adds over adjacent time periods
Current-account change	Goods + services + income + transfers + rounding changes	Dollar-flow accounting, not an FX-price coefficient
BoG gold contribution	Gold receipt increase / total BoG receipt increase	Institution-specific approximate growth share
USD investment return	$(1 + \text{cedi return}) / (S1/S0) - 1$	Matched-horizon illustration before costs/taxes

Inputs, calculations and the report’s data can be checked separately

The package contains executable code, source records, scenario inputs and author’s notes.

Table 50. Reproducibility controls and verification limits

Layer	Evidence supplied	What it does not certify
Source traceability	Exact documents, table locators, selected columns and retrieval status	Complete visual authentication or original regulatory submissions
Arithmetic	Independent quotient, identity and component checks; unrounded outputs	Causal validity or missing transaction coverage
Report integrity	Native chart data, tables, page/figure registers and render review	External World Bank / IMF approval
Replay	Deterministic scripts, versions and repeat-output hashes	A real-time investment forecast
Next-stage research	Empty transaction templates and identification protocol	Confidential records or already-estimated causal results

Source: IDER calculations, declared scenarios or proposed research procedures; see author’s notes.

The strongest conclusion is a quantified flow story with an incomplete price attribution

Causal claims remain conditional on evidence that is not yet in this common sample.

What is supported

Substantial goods-balance improvement, larger gold-related central-bank receipts and market sales, and higher public external debt payments.

What remains unidentified

Separate causal cedi contributions from commodity receipts, remittances, import settlements, portfolio flows and intervention.

What must happen next

Add dated cash transactions and identification evidence to the completed proxy analysis. Retain residuals, uncertainty and unsuccessful forecast checks.

References and source links 1 / 4

Clickable external titles; exact versions, locators and verification status are in the companion source register.

- S01** Ministry of Finance, Ghana | 2026
[Annual Public Debt Report for the 2025 Financial Year](#)
Tables 2.1–2.2 (PDF pp.15–17), 8.1 (p.37), 8.6–8.7 (pp.43–44), para.120 and Table 8.7 footnote.
- S02** International Monetary Fund | 2026
[Ghana: 2026 Article IV Consultation and Sixth ECF Review](#)
Country Report 26/212; Table 5, printed p.51 / PDF p.56, and its footnotes; Table 6, p.57; Annex IV; programme reporting requirements.
- S03** Nolin, Guillaume / International Monetary Fund | 2026
[Lessons from the Bank of Ghana's Domestic Gold Purchase Programme](#)
Selected Issues Paper 26/084, August; paras.9–15, PDF pp.9–12. DOI 10.5089/9798229055536.018.
- S04** World Bank | accessed 21 September 2026
[Personal remittances, received \(current US\\$\): indicator metadata](#)
WDI indicator BX.TRF.PWKR.CD.DT: definition and annual periodicity.
- S05** International Monetary Fund | 2023
[Executive Board Approves US\\$3 Billion Extended Credit Facility Arrangement for Ghana](#)
Press Release 23/151, 17 May 2023.

References and source links 2 / 4

Clickable external titles; exact versions, locators and verification status are in the companion source register.

S06

International Monetary Fund | 2026

[Executive Board Completes Sixth Review of Ghana’s ECF Arrangement](#)

Press Release 26/260, 27 July 2026: final ECF tranche and PCI.

S07

COCOBOD | 2025

[Ghana’s Cocoa Pricing Mechanism vs Global Market Prices: Who Truly Benefits?](#)

2024/25 forward sales: approximately 500,000 tonnes at weighted average FOB price US\$4,850 per tonne.

S08

Jarociński, Marek, and Peter Karadi | 2020

[Deconstructing Monetary Policy Surprises—The Role of Information Shocks](#)

American Economic Journal: Macroeconomics 12(2): 1–43. DOI 10.1257/mac.20180090.

S09

Bank of Ghana | accessed 21 September 2026

[Foreign Exchange Market Reference Rate](#)

Official methodology notice: source-location record.

S10

World Bank | accessed 21 September 2026

[Official exchange rate: period-average metadata](#)

WDI PA.NUS.FCRF; local currency units per US dollar, period average.

References and source links 3 / 4

Clickable external titles; exact versions, locators and verification status are in the companion source register.

- S11** International Monetary Fund | 2026
[Ghana external-sector assessment and reporting framework](#)
Country Report 26/212, Annex IV (PDF pp.72–75), and reporting requirements (pp.134–137).
- S12** Institute of Development and Economic Research | 2026
[Cedi Drivers: Calculation, Scenario and Release Protocol](#)
Companion package: definitions, input/output mapping, assumptions, reproducibility and next-stage design.
- S13** Bank of Ghana | accessed 21 September 2026
[Monthly Exchange Rates Indicators: end-period and monthly-average GHS/US dollar](#)
2019–2026 end-period rows; 2024–2025 monthly averages. 92 end-period and 24 average values; not the separate MoF selling-rate series.
- S14** Board of Governors of the Federal Reserve System / FRED | July 2026 vintage
[Nominal Broad U.S. Dollar Index, monthly \(TWEXBGSMTH\)](#)
G.5; index January 2006=100; monthly, not seasonally adjusted. January 2019–July 2026 extracted; common model ends June.
- S15** U.S. Bureau of Labor Statistics / FRED | June 2026 vintage
[Import Price Index \(End Use\): Nonmonetary Gold \(IR14270\)](#)
Index December 2024=100; monthly, not seasonally adjusted. January 2019–June 2026. U.S. import-price proxy, not LBMA spot or Ghana export receipts.

References and source links 4 / 4

Clickable external titles; exact versions, locators and verification status are in the companion source register.

- S16** International Monetary Fund / FRED | June 2026 vintage
[Global price of Brent Crude \(POILBREUSDM\)](#)
 IMF Primary Commodity Prices; U.S. dollars/barrel; monthly average; January 2019–June 2026.
- S17** International Monetary Fund / FRED | June 2026 vintage
[Global price of Cocoa \(PCOCOUSD\)](#)
 IMF Primary Commodity Prices; U.S. dollars/metric tonne; monthly average; January 2019–June 2026.
- S18** statsmodels developers | official documentation accessed 2026
[HAC/Newey–West covariance: cov_hac](#)
 Bartlett kernel; regular time series. Installed software version recorded. Calendar-distance extension independently coded for gaps.
- S19** Cinelli, Carlos, and Chad Hazlett | 2020
[Making Sense of Sensitivity: Extending Omitted Variable Bias](#)
 JRSS Series B 82(1):39–67. DOI 10.1111/rssb.12348. Point-estimate sensitivity only; no causal correction claimed.
- S20** Hyndman, Rob J., and George Athanasopoulos | 2021; online edition accessed 2026
[Forecasting: Principles and Practice, third edition—Time Series Cross-Validation](#)
 Section 5.10; expanding training windows. Our two-month global release lag is an explicit approximation, not an audited historical availability calendar.
- S21** Jordà, Òscar | 2005
[Estimation and Inference of Impulse Responses by Local Projections](#)
 American Economic Review 95(1):161–182. DOI 10.1257/0002828053828518. This report estimates conditional associations, not identified impulse responses.

Judge the cedi through external resources, market delivery and credible attribution

The largest measured receipt channel is not automatically the largest identified currency effect.

External resources

Exports more than offset higher imports in 2025; services and other outflows matter. The net current-account improvement is reproducible.

Market delivery

Gold-related BoG receipts and gross sales expanded. Conversion, timing, routine uses and reserve objectives connect—but must not duplicate—the resources.

Decision standard

Use dated cash and exposure records now. Assign causal shares only after the common data, counterfactual and dynamic model pass explicit validity checks.



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ACCRA OFFICE

Suite 402, 4 th Floor, Atlantic Tower
Airport City, Accra, Ghana

TELEPHONE +233 302 955 289

WHATSAPP +233 24 317 9345

EMAIL info@iderafrica.com

WEBSITE www.iderafrica.com



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