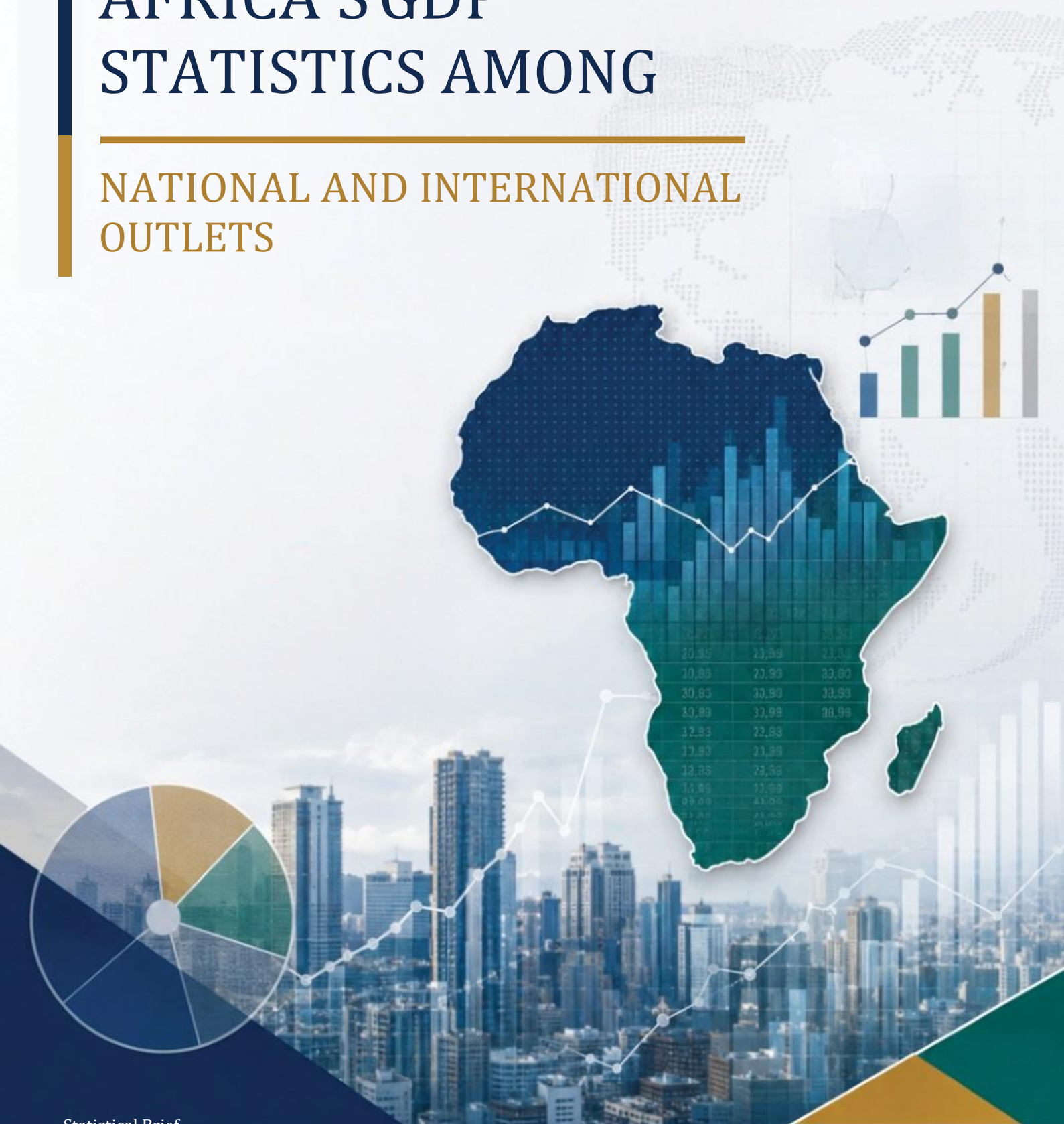


# COMPARABILITY OF AFRICA'S GDP STATISTICS AMONG

## NATIONAL AND INTERNATIONAL OUTLETS



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# 1. INTRODUCTION

Gross Domestic Product (GDP) remains a priority development economic indicator at both the micro (per capita GDP) and macro levels and retains its foundational importance across different well-being measures. This includes the Human Development Index, the Multi-dimensional Poverty Index and the ongoing discussions on a “Beyond-GDP” metric. In Africa, the centrality of GDP is more pronounced, especially at a time when many countries are managing rising debt-service burdens, tighter financing conditions, exchange-rate pressures, and urgent demands for jobs, infrastructure, and social investment. GDP shapes how debt sustainability is rated, how fiscal space is understood, how countries are compared, and how economic performance is communicated to markets, development partners, and citizens. This makes the quality and suitability of GDP figures especially important for the continent. When different sources report different values for the same country and year, even modest differences can alter the reading of ratios such as debt-to-GDP, deficit-to-GDP, and tax revenue-to-GDP.

Across Africa, GDP is generally compiled within national statistical systems, most often by the National Statistical Office. Compilation methods are broadly standardized around internationally recognized national accounts frameworks, specifically the 2008 System of National Accounts. Publication practices, however, are less uniform. Countries first report GDP in their local currency, while international organizations republish the series in both local currency and current United States dollars. In that process, differences arise from timing, rebasing, conversion practices, revisions, the revision status of the estimate (whether it is provisional, revised, or final), and how data are updated across institutions. What appears to be one familiar indicator, therefore, becomes a set of closely related, but not always identical, numbers.

This brief documents and explains differences in GDP figures disseminated for African countries by national statistical offices and three international outlets over the period 2010-2024. It has four objectives: first, to establish how large cross-source differences are and where they persist; second, to distinguish differences in the underlying reported local-currency GDP series from those attributable to conversion to current USD, while considering timing and revisions as possible explanations; third, to draw out the implications for the United Nations Economic Commission for Africa's (ECA) use and publication of GDP figures in policy analysis, projections, forecasts, research and external communication; and fourth, to provide evidence for a future ECA protocol on selecting, documenting and reconciling GDP statistics. The brief does not propose or construct a separate ECA GDP series; such an exercise would require a separate technical process and consultation with member States and partner institutions. The sections that follow clarify the scope, concepts and methodology, present the main findings, and conclude with implications for the transparent

and consistent use of GDP figures.

## 2. SCOPE OF GDP AND KEY CONCEPTS

This section clarifies the scope of GDP as used in the brief and defines the main concepts employed in the comparison. The focus is on GDP at current prices because it is a foundational measure from which most other GDP-family indicators are derived, including GDP at constant prices, GDP per capita, size comparisons, fiscal ratios, and headline current-USD figures. Beyond-GDP indicators are acknowledged to mark the limits of GDP-based analysis, but they are not themselves compared across dissemination outlets here. This exercise is best understood as a cross-source comparability check.

### 2.1. GDP at current and constant prices

GDP can be measured at both current prices and constant prices. GDP at current prices reflects the nominal value of economic output at the prices prevailing in the year of measurement. In contrast, GDP at constant prices adjusts for changes in price levels over time to show movements in real output. Together, these two measures help distinguish changes driven by inflation from those driven by actual production growth.

### 2.2. GDP in LCU (Local Currency Units)

LCU GDP in current prices is the nominal value of economic output recorded in a country's domestic currency. It is the natural benchmark for identifying whether sources already differ before any conversion into current United States dollars is applied.

### 2.3. GDP in current United States dollars

Current-USD GDP is the series most often used in cross-country comparison and external communication. It combines the nominal GDP level with a conversion factor, usually expressed as local currency per United States dollar.

### 2.4. Observed USD gap

The observed USD gap is the published difference in current-USD GDP between any two sources for the same country and year. It captures the spread that users see directly in reported statistics.

### 2.5. Reconstructed USD gap and unexplained parts

The reconstructed gap uses recorded LCU GDP and exchange-rate inputs reported by each publisher (outlet) to reproduce the published USD difference. The remaining unexplained portion is what is left after that mechanical reconstruction and reflects other outlet-specific construction differences not captured by those inputs alone.

## 3. DATA SOURCES AND METHODOLOGY

### 3.1 Data Sources

The analysis is based on a harmonized annual panel covering 54 African countries over 2010-2024. It draws on four source families: National Statistical Offices (NSOs), the United Nations Statistics Division (UNSD), the World Bank (WB), and the International Monetary Fund (IMF). The NSO benchmark is a compiled current-price GDP series in LCU. The international series are drawn from the UNSD National Accounts Main Aggregates database; the World Bank's World Development Indicators, including GDP in current USD (NY.GDP.MKTP.CD), GDP in current LCU (NY.GDP.MKTP.CN), the official exchange rate (PA.NUS.FCRF), and the alternative conversion factor (PA.NUS.ATLS); and the IMF World Economic Outlook (WEO), October 2025, using current-price GDP in USD (NGDPD) and in LCU (NGDP). The WEO was selected for the decomposition because it provides broad country coverage and paired LCU and USD series in a single release; its inclusion does not designate it as the IMF's preferred database for final historical official statistics. The WEO supports surveillance and includes historical observations, staff estimates and projections, whereas UNSD and WDI have different collection and dissemination functions and update schedules. For the official exchange rate, the World Bank series is sourced from the IMF, so the two series are the same.

### 3.2. Coverage and analytical sample

The active panel covers 54 African countries from 2010 to 2024, yielding a balanced grid of 810 country-year observations. All 810 country-years are retained in the consolidated panel, but source availability varies across outlets. In LCU terms, UNSD covers all 810 observations, IMF covers 803, WB covers 788, and the NSOs benchmark covers 542. The usable overlap between the NSO series and the international outlets is therefore 542 country-years with the UNSD, 541 with the IMF, and 536 with the WB. In USD terms, UNSD again covers all 810 observations, IMF covers 803, and WB covers 788, with pairwise overlaps of 803 (IMF–UNSD), 788 (UNSD–WB), and 786 (IMF–WB).

### 3.3. Analytical approach and percentage-gap measure

The analysis combines two comparisons and an accounting reconstruction. NSO–international comparisons in LCU show whether differences exist before USD conversion. Comparisons among WB, IMF WEO and UNSD in current USD show how published values differ across international outlets. The reconstruction then assesses how much of each USD difference can be reproduced from the recorded LCU and conversion inputs. For both USD and local-currency comparisons, the gap is expressed relative to the average size of the two reported values. This gives the same result

whichever outlet is listed first and avoids treating either source as the benchmark. A larger percentage means that the two reported levels are further apart; it does not show how far one source is from a presumed correct value. Very large gaps are therefore treated as validation flags for units, denomination, country-year alignment, statistical status and source vintage. See Annex A.1–A.2 for the formal definition and interpretation.

### 3.4. Accounting reconstruction and decomposition

The accounting reconstruction compares the published USD difference with the difference obtained from each outlet's reported local-currency GDP and conversion factor. The reproduced part is separated into a local-currency contribution and an exchange-rate contribution using a symmetric allocation that does not depend on which input is considered first. Any outstanding value is recorded as a residual.

The three components should be read together. The local currency and exchange-rate contributions may work in opposite directions and offset one another; the residual shows how much of the published USD difference the selected inputs do not reproduce. A small residual indicates close accounting consistency, and it should not be interpreted as a small, published gap. A large residual prompts checks of units, timing, country-year alignment, conversion conventions, and source vintage. Timing and revisions may also affect either recorded input. The residual should be interpreted as a diagnostic signal. Annex A.3–A.6 provides the complete equations and internal-consistency checks.

### 3.5. Data status, revisions and vintage limitations

The panel compares one assembled vintage from each source, as available at the time of brief preparation. Sources update on different schedules, and the harmonized file does not contain a complete observation-level register of release dates, retrieval dates, revision status, rebasing events or source age. Revisions and rebasing are therefore reflected only to the extent that they were incorporated in the source vintage used; the analysis does not backcast a common vintage or separately compare same-date snapshots with latest available values.

The October 2025 WEO contains historical observations as well as IMF staff estimates and projections. For some countries, 2024 may not represent a final historical observation. Because the analytical file does not contain a sufficiently complete observation-level actual/estimate/projection classification, the current comparisons cannot be systematically restricted to final or historical observations. Results involving recent WEO years should therefore be read as descriptive comparisons of disseminated values, not as final-versus-final reconciliation. A follow-up reproducibility dataset should add statistical status fields, source release and retrieval dates, a source-age measure, and separate same-date and latest-available panels; it should then report actual/historical observations separately from estimates and projections

### 3.6. Thresholds and interpretation

The main practical thresholds used in the revised figures are 1 percent and 3 percent, with higher bands used to identify more serious cases. These thresholds are not intended to imply that smaller gaps are irrelevant; rather, they provide a consistent way to separate cases of broad agreement from differences that may change the interpretation of the results or warrant further review. They should be understood as descriptive screening tools rather than statistical inference bounds. Many small or isolated differences may not materially alter broad macroeconomic readings, but persistent, large, or residual-heavy gaps can affect ratios, rankings, and interpretation and should therefore be reviewed before dissemination.

## 4. POTENTIAL SOURCES OF DIFFERENCES AND WHY THEY MATTER

Differences in current USD GDP across sources may reflect several potentially overlapping factors: differences in the underlying GDP series in local currency, differences in the exchange rate used to convert that GDP into USD, and differences in timing and revision practices, including whether the reported figure is provisional, revised, final, or an institutional estimate. These factors may operate separately or simultaneously. They can also reflect the distinct mandates of the institutions involved: NSOs compile and release national official statistics; UNSD collects and disseminates national accounts and may supplement missing recent values; WDI assembles development indicators from recognized sources; and WEO combines historical information with IMF staff analysis, estimates and projections for surveillance. Accordingly, a difference is not, by itself, evidence that one source is of lower statistical quality.

### 4.1. Differences in the underlying LCU GDP series

Sources may rely on different National Accounts vintages, benchmark years, or revision rounds. As a result, the GDP estimate in local currency may already differ before any USD conversion takes place. Such differences can reflect rebasing, methodological changes, incorporation of new surveys or administrative data, fiscal-year versus calendar-year treatment, and, in some cases, currency redenomination or inconsistent alignment of old and new currency units. After rebasing, countries do not always revise the full historical series. Where official revisions cover only a limited backward span, international outlets may extend earlier years using their own linking, smoothing, or interpolation procedures, which can generate cross-source differences in periods not directly revised by the country.

Rebasing can also create a continuity dilemma: applying revised levels only from the rebasing year may introduce an artificial break, while fully back-casting revised levels may alter historical GDP per capita profiles and related policy classifications. Different outlets may therefore make different back-series choices depending on their analytical purpose. The current scope of this work examines the differences observed in the LCU data without investigating the underlying causes of the issue.

## 4.2. Differences in exchange-rate conversion

Even when the underlying local-currency GDP series is the same, current-USD GDP can differ because sources apply different exchange-rate conventions. Divergence may result from using annual averages versus end-period rates, fiscal-year versus calendar-year exchange rates, or different treatments of official, market, or multiple exchange-rate systems. Sharp devaluations, exchange-rate regime shifts, and multiple-rate environments can magnify these differences where outlets apply different conversion conventions or different exchange-rate series. This brief focuses on discrepancies in published GDP at current prices in current USD. PPP-based measures are important for real cross-country volume comparisons, but they are outside the scope of the present analysis.

## 4.3. Timing, alignment and source-specific revisions

Sources are updated on different schedules and do not necessarily incorporate revisions simultaneously. For the same country and reference year, one source may still carry a provisional figure or staff estimate while another has incorporated a revised or final national release. Differences in status and vintage can therefore contribute to observed gaps even where the broader National Accounts methodology remains the same. Current-USD GDP series may also differ because one source reflects a newer National Accounts release, a revised exchange-rate series, or a different alignment between the GDP reference year and the exchange-rate year. In practice, observed differences often reflect a combination of institutional purpose, publication timing, underlying GDP revisions and exchange-rate choices rather than a single cause. Meaningful reconciliation should therefore align data status and vintages wherever possible before attributing a discrepancy to methodology or quality.

## 5. KEY FINDINGS

### 5.1. Prevalence of Differences Between Official and Internationally Reported GDP Estimates

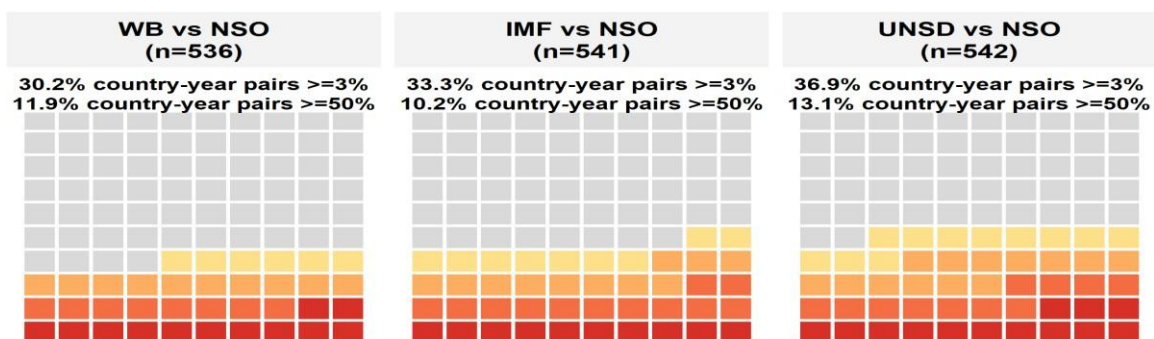
About one-third of the country-year data-point comparisons between NSOs' LCU GDP statistics and the three international outlets are at least 3.0 percent apart. The share of comparisons meeting this threshold ranges from 30.2 percent for WB-NSO to 36.9 percent for UNSD-NSO.

Figure 5.1: Prevalence of Official vs. Internationally Reported GDP Estimates

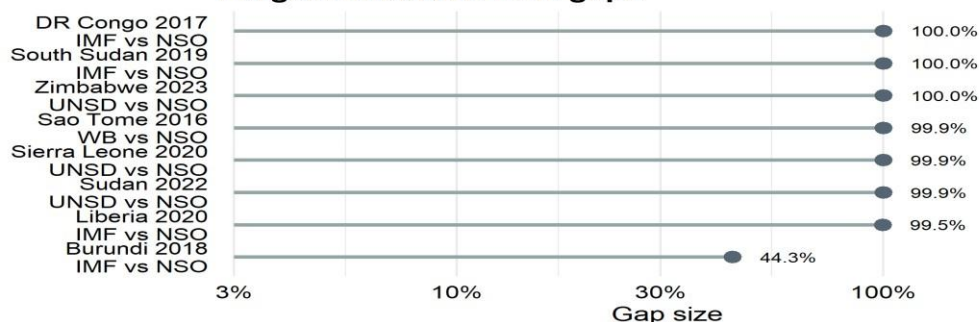
#### LCU gap distribution

Each tile = 1% of country-year pairs; colors show gap bands for one comparison.

Gap band    Below 1%    1% to <3%    3% to <10%    10% to <50%    50% to 100%



#### Largest observed LCU gaps

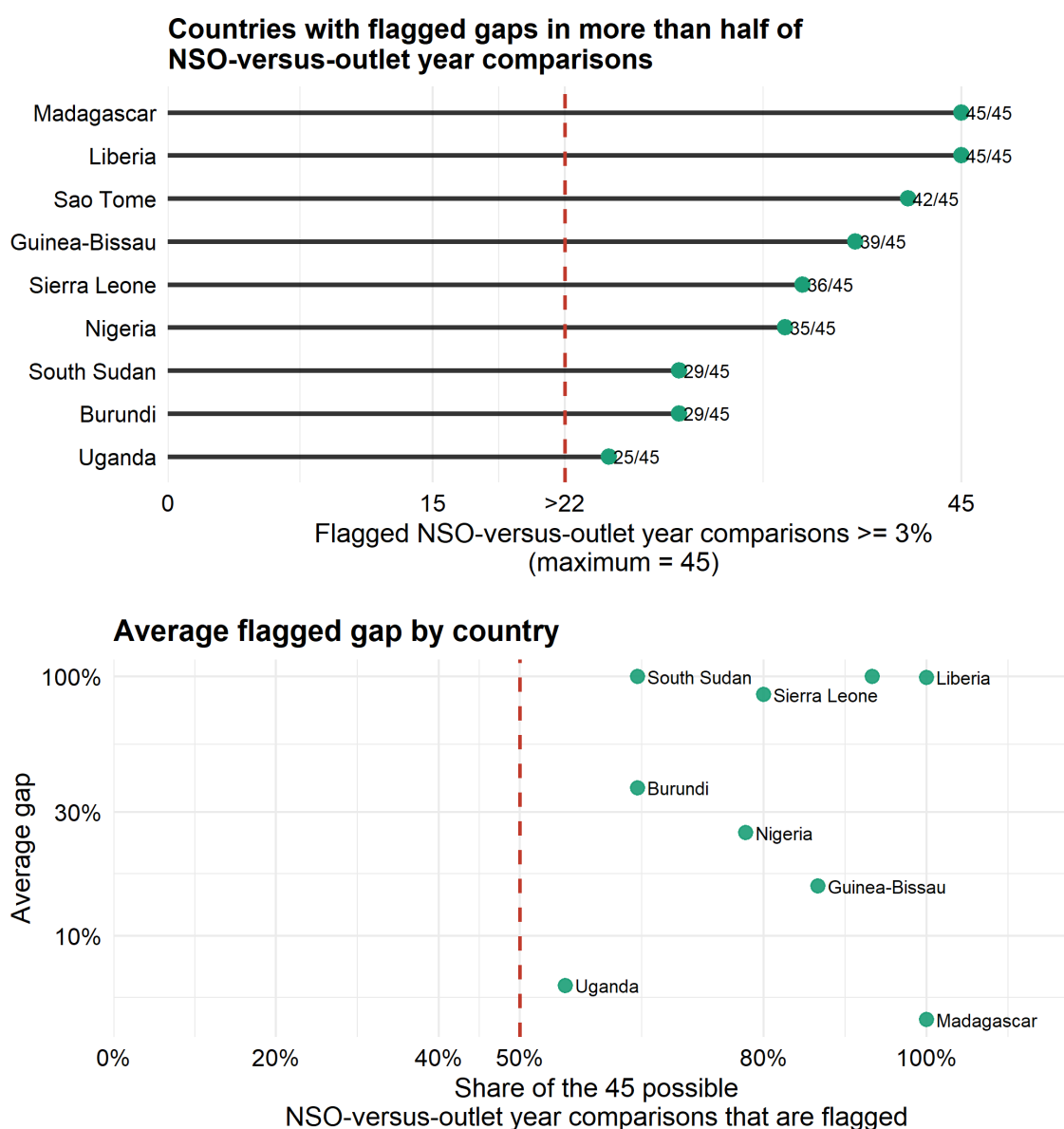


**Note:** Percentage gaps use the symmetric denominator defined in Section 3.3. Values approaching 100 percent are mathematically possible when the compared levels differ by roughly a factor of three, but they are treated here as validation flags requiring checks of units, denomination, country-year alignment, status and source vintage.

## 5.2 Repeated Local-Currency Gaps of 3 Percent or More

Nine countries meet the repeated-gap threshold, defined as more than half of the 45 possible NSO-versus-outlet country-year comparisons being flagged: Liberia, Madagascar, Sao Tome and Principe, Guinea-Bissau, Sierra Leone, Nigeria, South Sudan, Uganda and Burundi. Across these countries, the average flagged gap in local-currency GDP is about 52.6 percent.

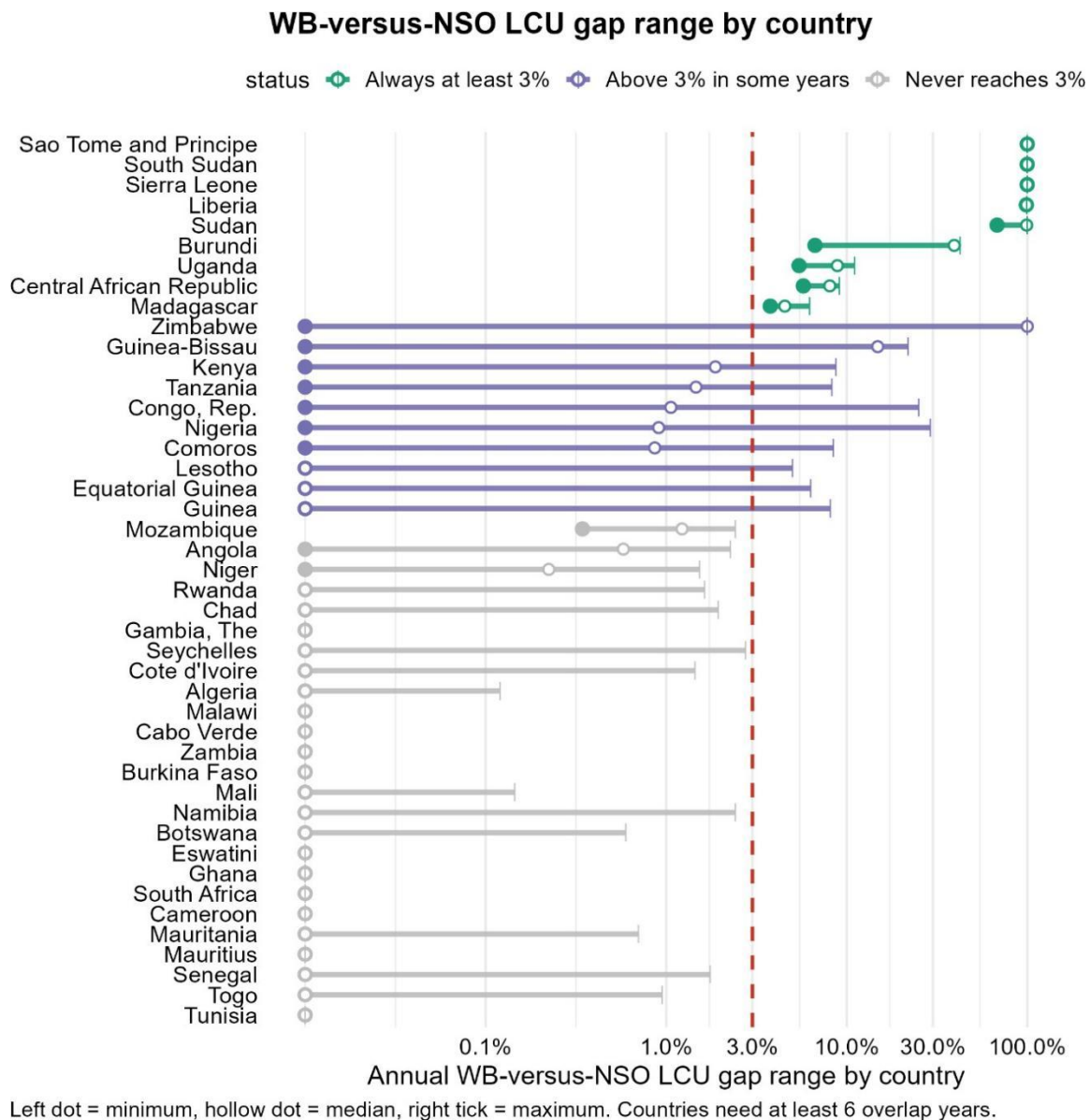
Figure 5.2: Intensity of Local-Currency Gaps in NSO Comparisons



## 5.3 World Bank-NSO Local Currency Gaps

In 9 African countries, namely Burundi, Uganda, the Central African Republic, Madagascar, Liberia, Sierra Leone, South Sudan, Sudan, and São Tomé and Príncipe, NSOs and the World Bank LCU GDP statistics consistently differ by at least 3.0 percent in every available overlapping year, with at least 6 years of overlap.

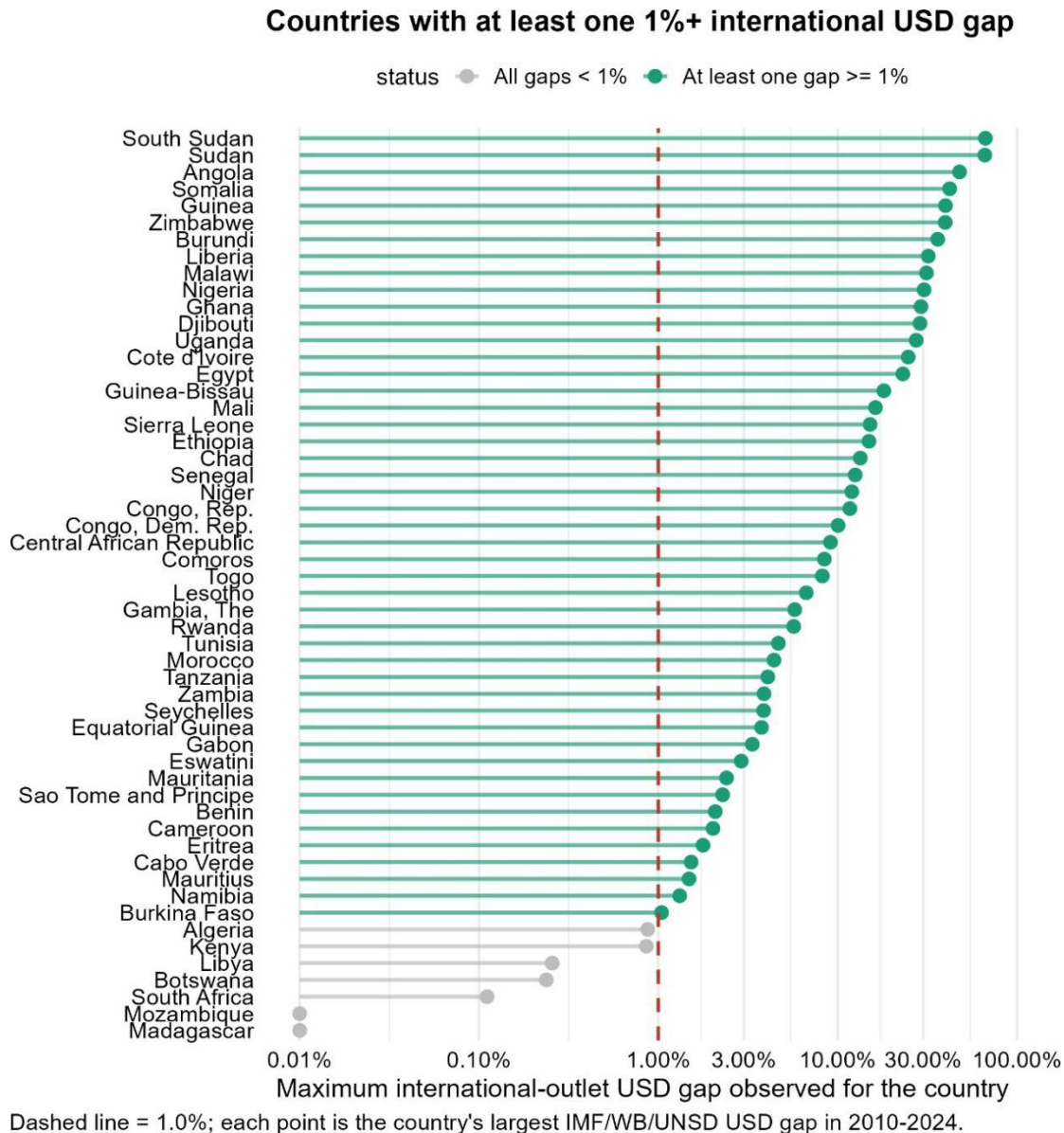
Figure 5.3: Distribution of Annual WB-NSO Local-Currency Gaps by Countries



## 5.4 Country Coverage of Material International USD Gaps

Differences of at least 1.0 percent exist in 47 African countries when comparing USD GDP statistics across the three international outlets.

Figure 5.4: Maximum international-outlet USD gap by country



## 5.5 Distribution and Largest International USD Gaps

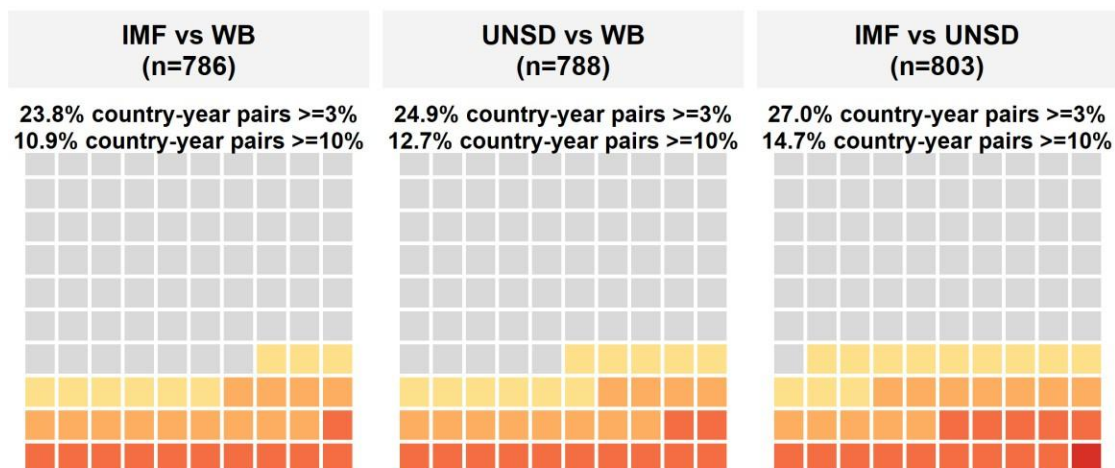
Across the three international outlet pairs, 23.8 to 27.0 percent of country-year comparisons differ by at least 3.0 percent. The IMF-UNSD pair has the highest share at 27.0 percent; the largest individual observed USD gap in the panel is 66.7 percent for South Sudan in 2017 (IMF-UNSD).

Figure 5.5: Distribution of international USD gaps and largest observed values

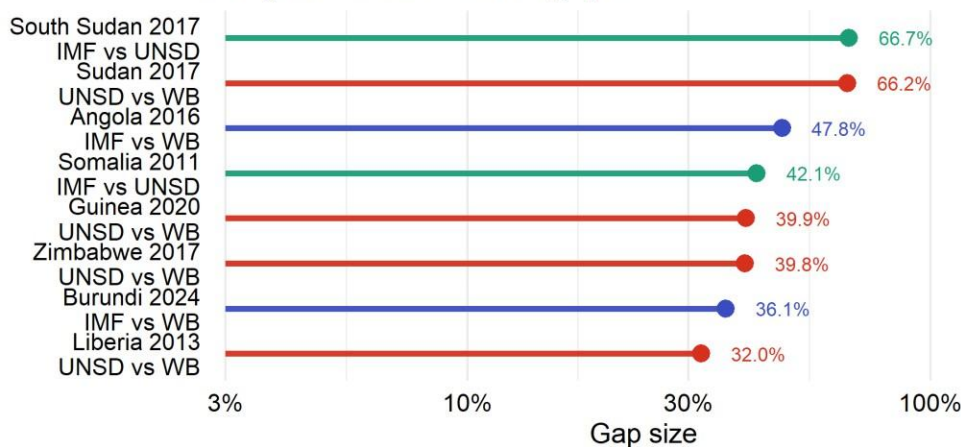
### USD gap distribution

Each tile = 1% of country-year pairs; colors show gap bands for one outlet pair.

Gap band    Below 1%    1% to <3%    3% to <10%    10% to <50%    50% to 100%



### Largest observed USD gaps

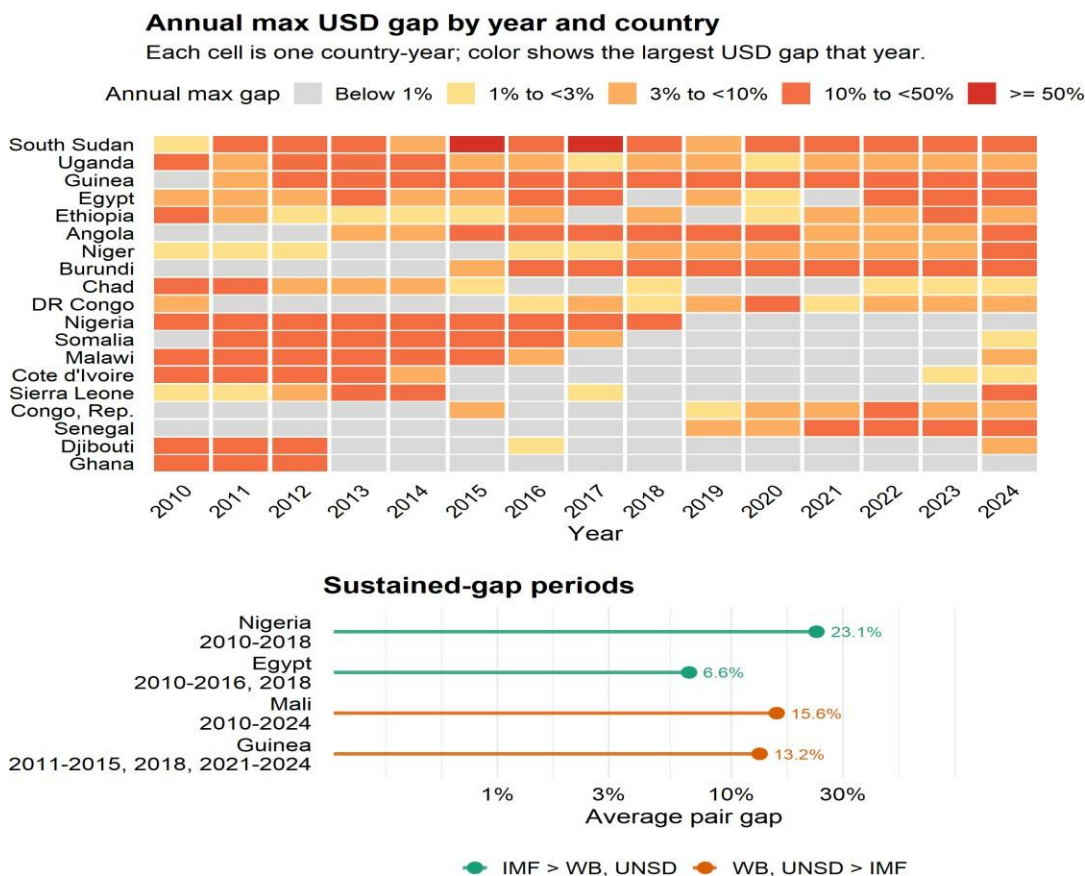


## 5.6 Outlet Patterns and Episodic USD Gaps

USD GDP statistics from the IMF, the World Bank, and the UNSD show several distinct patterns.

- IMF is above both the World Bank and UNSD for Nigeria in 2010-2018, with an average pair gap of 23.1 percent; Egypt has the relevant IMF-above-both window in 2010-2016 and 2018, with an average pair gap of 6.6 percent.
- The World Bank and UNSD are both above the IMF for Mali throughout 2010-2024, with an average pair gap of 15.6 percent; for Guinea, the joint-above pattern holds in 2011-2015, 2018, and 2021-2024, with an average pair gap of 13.2 percent.
- The clearest episodic cross-outlet USD swings are seen in South Sudan, Angola, Somalia, Ghana, and Djibouti, where annual maximum gaps reach about 66.7, 47.8, 42.1, 26.2, and 28.8 percent, respectively.

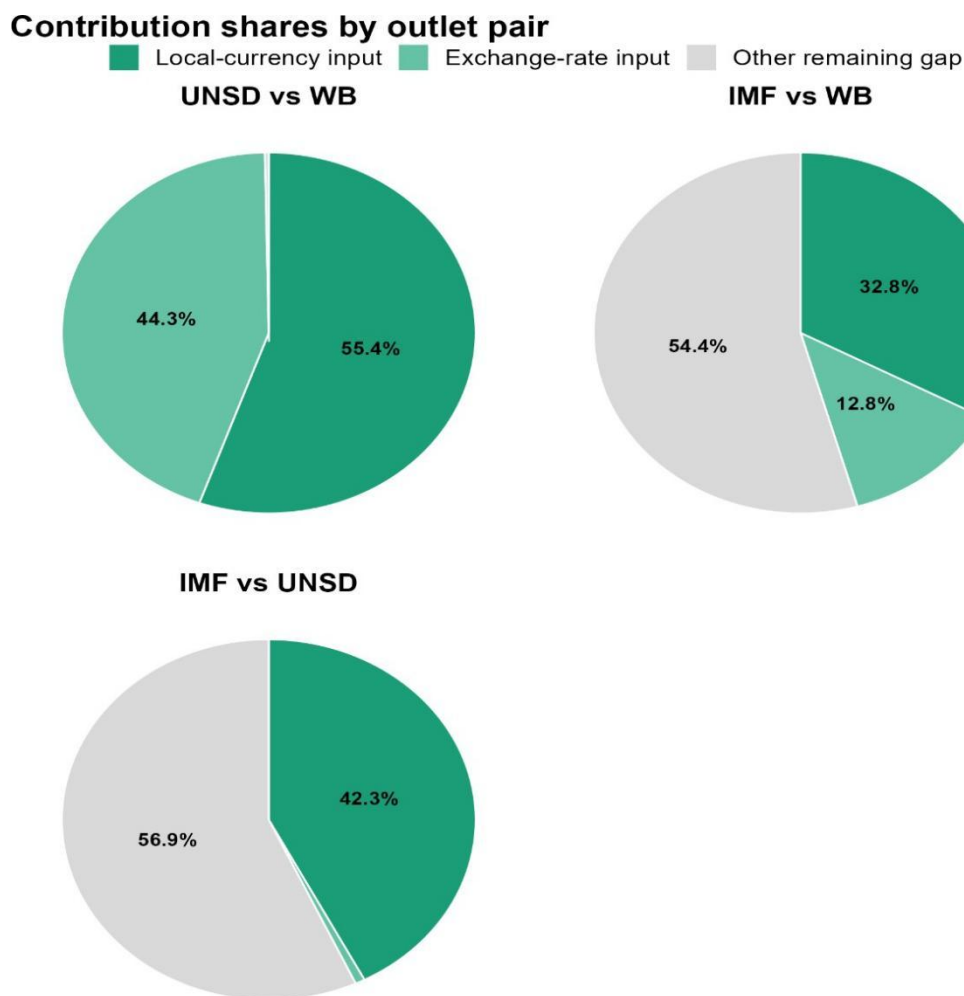
*Figure 5.6: Outlet-pattern windows and USD-gap episodes*



## 5.7 Sources of Differences in GDP Across International Estimates

Averaging across comparable country-year observations, local-currency and exchange-rate inputs jointly account for about 99.7 percent of the difference between UNSD and WB, 45.6 percent of the gap between IMF and WB, and 43.1 percent of the gap between IMF and UNSD. For the UNSD-WB pair, the contribution is split almost evenly between local-currency inputs (55.4 percent) and exchange-rate inputs (44.3 percent).

Figure 5.7: Average contribution of local-currency and exchange-rate inputs by outlet pair

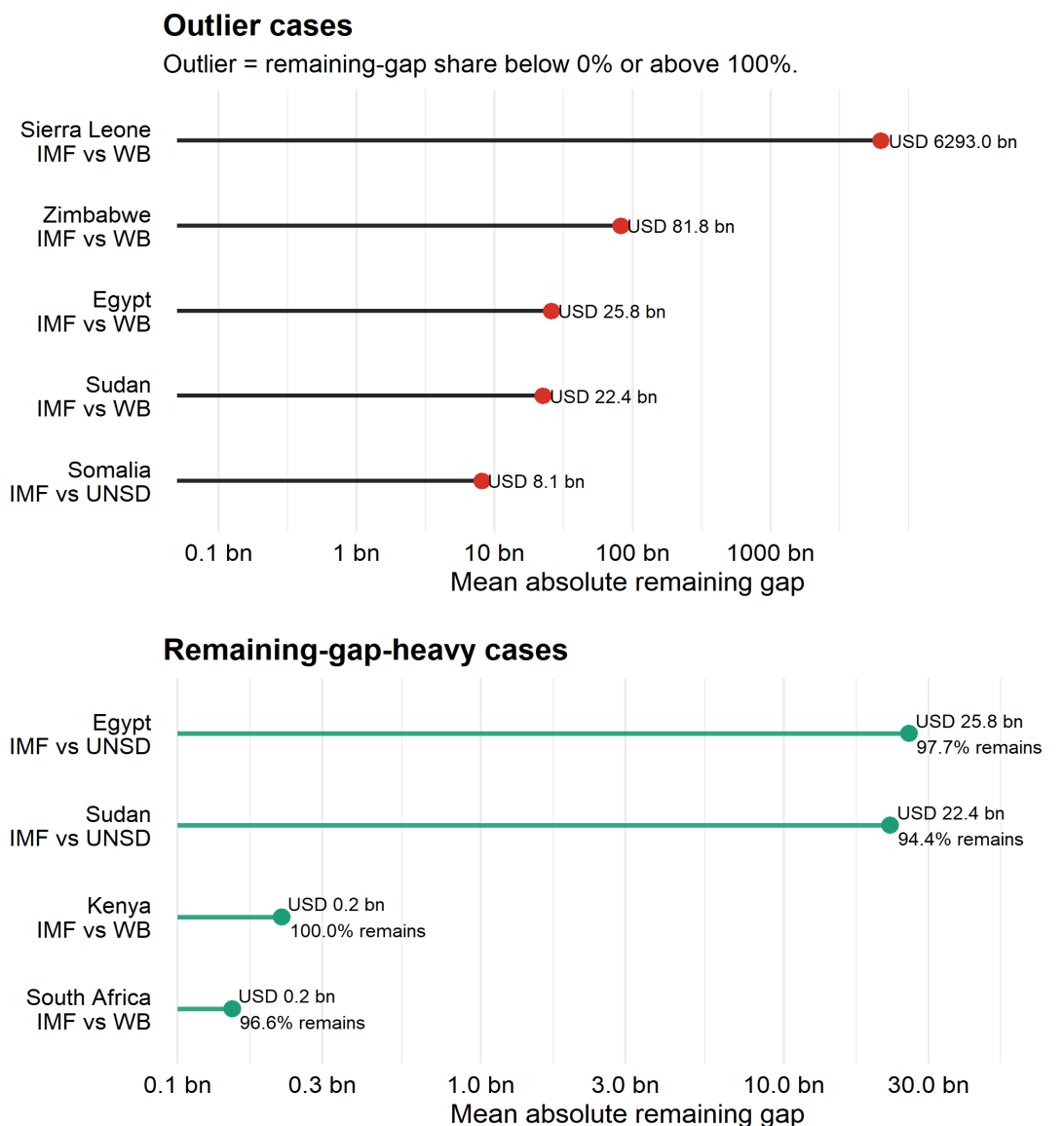


*The contribution shares are decomposition diagnostics. Because the underlying components are signed and can offset one another, they should be interpreted together with the observed gap and residual rather than as independent measures of source accuracy.*

## 5.8 Remaining Differences in GDP Across International Outlets

Among the non-outlier, remaining-gap-heavy cases shown in Figure 5.8, Egypt records the largest mean absolute residual: in the IMF-versus-UNSD comparison, the remaining component averages about USD 25.8 billion and represents 97.7 percent of the observed gap.

**Figure 5.8: Outlier and remaining-gap-heavy cases in international USD gaps**



**Interpretation of the Sierra Leone outlier:** the USD 6,293.0 billion value is a mean absolute residual from the accounting reconstruction, not a published GDP difference and not an estimate of Sierra Leone's GDP. Its implausible economic scale indicates incompatibility among one or more reconstruction inputs - potentially the LCU unit, conversion factor, country-year mapping or source vintage. It is retained only as a high-priority data-consistency flag and should not receive an economic interpretation until the underlying annual records are audited. The observed published USD gap remains the relevant measure of the scale of the dissemination difference.

## 6. IMPLICATIONS FOR THE USE OF GDP FIGURES

The findings point to a practical statistical-governance issue: users need to understand which GDP value they are using, its provenance, status and vintage, and why it may differ from another published value. The objective is not to identify a universal 'single source of truth', but to make differences transparent, reproducible and subject to proportionate reconciliation before publication.

National publication remains the basis of official statistical authority, while international outlets provide indispensable harmonized series for regional and global comparison. Their values may differ because they serve different purposes and incorporate releases, revisions and estimates at different times. The appropriate response is therefore neither automatic source substitution nor an unsupported credibility judgment, but clear metadata, documented provenance, consistent analytical use and direct consultation with the relevant producer or disseminator when a material difference is detected

Where current and sufficiently documented NSO data are available, they should be the starting point for country-level official reporting and policy analysis. For cross-country comparison, regional aggregation or situations in which national data are delayed, missing or difficult to access, an international outlet may be used, provided the outlet, reference year, release or retrieval date, statistical status and any material conversion choice are disclosed. This brief provides guidance for consistent source use; it does not initiate an ECA GDP estimation series.

### **Preliminary Guidance on Source Selection and Use of GDP Figures**

Source choice should be governed by use case, coverage, statistical status, vintage and transparency. For country-level policy analysis, fiscal ratios and official national reporting, the NSO publication should be the starting point where it is current and methodologically documented. International datasets remain necessary for continental analysis, cross-country comparison and standardized coverage, but their use should be disclosed, especially where national data are delayed, missing or not readily accessible.

Current-USD GDP figures should be accompanied by clear source metadata. Publications should identify the originating producer and dissemination outlet, reference year, release or retrieval date, data vintage, and whether the value is provisional, revised, final, estimated or projected where this is known. Any relevant conversion or proxy method should be stated when it materially affects interpretation. This is especially important in rankings, tables and headline comparisons, where users may otherwise assume that current-USD values from different outlets are directly interchangeable.

The findings suggest a practical review rule before dissemination. Persistent local-currency gaps, current-USD differences above the 3 percent screening threshold, or large residuals should trigger verification against the latest NSO release and available notes on revisions, rebasing, denomination changes or methodological updates. Analysts should also check the statistical status, source vintage, exchange-rate treatment and fiscal-year alignment, and should document the outcome of any reconciliation before deciding which value to publish.

Consistency within an analytical exercise is also essential. A chart, ranking or time-series comparison should rely on one clearly identified outlet throughout unless a documented reason requires otherwise. Mixing sources across countries or years can create artificial differences and weaken interpretation. ECA should maintain an internal protocol covering source selection, metadata disclosure, vintage recording and review of flagged cases, while supporting regular, timely and transparent NSO publication. The aim is not to eliminate all differences across outlets, but to make them visible, interpretable and less likely to distort analysis or obscure the official national statistical record

### **Opportunity for a common African reconciliation protocol**

ECA, AfDB, AUC/STATAFRIC, UNSD, IMF, the World Bank and NSOs could jointly develop a practical African protocol for managing and communicating significant GDP differences. The protocol should preserve national statistical authority while clarifying the responsibilities of compilers and disseminators.

- Record the originating producer, dissemination outlet, release date, retrieval date, reference year, statistical status and vintage for every published value.
- Establish a proportionate review process for persistent LCU gaps, material current-USD differences and large reconstruction residuals, including direct country validation where required.
- Document revisions, rebasing exercises, currency-unit or denomination changes, exchange-rate conventions, fiscal-year alignment and any linking or back-series method.
- Communicate revisions to member States and partner institutions through agreed focal points, with a short reconciliation record that explains whether the difference arises from status, vintage, method, conversion or unresolved input incompatibility.
- Maintain comparable same-date snapshots alongside latest-available series so that users can distinguish genuine methodological differences from asynchronous updates.

## 7. CONCLUSION

This brief shows that GDP figures for African countries are often close across NSOs, UNSD, the World Bank and the IMF, but they are not always interchangeable. A nontrivial share of country-year comparisons differs enough to affect fiscal ratios, cross-country rankings and narratives about economic size. The analysis does not attribute these differences to a single cause or to statistical quality alone. Some begin in the underlying local-currency series; some arise at the conversion stage; some reflect institutional purpose, revision timing, rebasing or back-series choices; and some remain only partially reproduced by the selected LCU and exchange-rate inputs.

The conclusion is therefore one of disciplined and transparent use rather than source hierarchy. National publication remains the basis of official statistical authority, while international datasets remain indispensable for comparability and access. ECA and its partners should preserve this balance through clearer source labelling, explicit status and vintage metadata, consistent source use, and practical protocols for reviewing and communicating significant differences. A common African reconciliation protocol, developed with member States and partner institutions, would make revisions and discrepancies easier to interpret without displacing the official national statistical record. The present results should be read as a screening and diagnostic exercise; completing the next methodological stage will require observation-level status metadata, a release-and-vintage register, same-date and latest-available comparison panels, and source-by-source validation of the residual outliers.

# ANNEX A. TECHNICAL DEFINITIONS AND DECOMPOSITION

## A.1. Notation and comparison universes

Let  $c$  denote a country,  $t$  a reference year and  $j$  a dissemination outlet. The international comparison set  $\mathcal{O}$  contains WB, IMF and UNSD; NSO data are denoted separately.

$U_{j,c,t}$  is GDP at current prices in current USD;  $L_{j,c,t}$  is GDP at current prices in LCU; and  $X_{j,c,t}$  is the annual conversion factor in LCU per USD.

The international USD universe requires at least two available international USD values. The NSO-alignment universe requires both an international LCU value and an NSO LCU value. The decomposition universe additionally requires the relevant USD, LCU and conversion-factor inputs for both outlets.

## A.2. Symmetric comparison measure

We use the same symmetric measure for current-USD and LCU comparisons. Let  $V_{j,c,t}$  represent either type of value for outlets  $a$  and  $b$ :

$$\begin{aligned} D_{c,t}^{a,b} &= |V_{a,c,t} - V_{b,c,t}| \\ \overline{V}_{c,t}^{a,b} &= \frac{|V_{a,c,t}| + |V_{b,c,t}|}{2} \\ R_{c,t}^{a,b} &= 100 \times \frac{D_{c,t}^{a,b}}{\overline{V}_{c,t}^{a,b}} \end{aligned}$$

Reversing the outlets does not change  $R_{c,t}^{a,b}$ , so neither source is designated as the benchmark. For non-negative GDP values,  $0 \leq R_{c,t}^{a,b} \leq 200$ . A 100 per cent gap corresponds to a 3:1 level ratio, not a statement that a source is 100 per cent wrong. Material difference in USD can also be read from  $|U_{a,c,t} - U_{b,c,t}|$ .

## A.3. Accounting reconstruction and residual

The decomposition uses signed rather than absolute differences. Direction must be retained so that the components add up exactly. The conversion map and reconstructed

USD value are, respectively:

$$f(L, X) = \frac{L}{X}, \quad \hat{U}_{j,c,t} = \frac{L_{j,c,t}}{X_{j,c,t}}$$

For outlets  $a$  and  $b$ , the published signed gap, the gap reproduced from the selected inputs, and the residual wedge are:

$$\begin{aligned} g_{c,t,a,b}^{\text{obs}} &= U_{a,c,t} - U_{b,c,t} \\ \hat{g}_{c,t,a,b} &= \frac{L_{a,c,t}}{X_{a,c,t}} - \frac{L_{b,c,t}}{X_{b,c,t}} \\ r_{c,t,a,b} &= g_{c,t,a,b}^{\text{obs}} - \hat{g}_{c,t,a,b} \end{aligned}$$

$g^{\text{obs}}$  is the difference users see in published USD values;  $\hat{g}$  is the part reproduced by the selected LCU and conversion-factor inputs; and  $r$  is the balance. A small residual indicates close accounting consistency. A large residual identifies the inputs and metadata that require review.

#### A.4. Symmetric allocation of the reconstructed gap

The reconstructed gap is dependent on both LCU GDP and the conversion factor. Any change in the ratio can be mapped to a path that changes either LCU GDP first or the conversion factor first. The two-order Shapley allocation averages those paths and therefore removes order dependence:

$$\begin{aligned} c_{c,t,a,b}^{\text{LCU}} &= \frac{1}{2} \left[ \frac{L_{a,c,t} - L_{b,c,t}}{X_{a,c,t}} + \frac{L_{a,c,t} - L_{b,c,t}}{X_{b,c,t}} \right] \\ c_{c,t,a,b}^{\text{XR}} &= \frac{1}{2} (L_{a,c,t} + L_{b,c,t}) \left( \frac{1}{X_{a,c,t}} - \frac{1}{X_{b,c,t}} \right) \\ g_{c,t,a,b}^{\text{obs}} &= c_{c,t,a,b}^{\text{LCU}} + c_{c,t,a,b}^{\text{XR}} + r_{c,t,a,b} \end{aligned}$$

$c^{\text{LCU}}$  and  $c^{\text{XR}}$  are signed contributions measured in USD, and one can offset the other, so they must be interpreted jointly with the observed gap and residual. Figure 5.7 is a descriptive outlet-pair summary of this accounting measure.

#### A.5. Implied conversion-factor and scale checks

Reported LCU and USD values imply an effective conversion factor. Comparing it with the recorded factor provides a direct internal-consistency check:

$$X_{j,c,t}^{\text{impl}} = \frac{L_{j,c,t}}{U_{j,c,t}}, \quad \rho_{j,c,t} = \frac{X_{j,c,t}^{\text{impl}}}{X_{j,c,t}}$$

A ratio near one means that the recorded factor reproduces the outlet's published LCU-

USD pair. Persistent departures can indicate a stable scale or denomination relationship; varying departures can indicate timing, exchange-rate, year-alignment or source-method changes.

For positive overlapping LCU values, the outlet-to-NSO ratio and its country-level median are:

$$q_{c,t,j} = \frac{L_{j,c,t}}{L_{\text{NSO},c,t}}, \quad m_{c,j} = \text{median}_t(q_{c,t,j})$$

A compact power-of-ten review compares the median ratio with the closest candidate  $k_{c,j} \in \mathcal{K}$ :

$$\mathcal{K} = \{10^h: h = -9, -8, \dots, 8, 9\}, \quad \delta_{c,j} = \left| \log_{10} \left( \frac{m_{c,j}}{k_{c,j}} \right) \right|$$

A small distance together with a stable ratio through time provides strong evidence for a unit or denomination review.

## A.6. Mean absolute residual and outlier interpretation

For a set of years  $\mathcal{T}_{c,a,b}$  with  $n_{c,a,b}$  observations that satisfy the data requirements outlined at the beginning of the annex, Figure 5.8 reports the mean absolute residual:

$$\overline{|r|}_{c,a,b} = \frac{1}{n_{c,a,b}} \sum_{t \in \mathcal{T}_{c,a,b}} |r_{c,t,a,b}|$$

Taking the absolute value before averaging retains the size of every annual mismatch and removes its direction. One extreme year can therefore dominate the mean. The Sierra Leone off-chart value is an accounting-inconsistency signal, not a published GDP value and not the published GDP gap. It should be traced to the annual LCU unit, conversion factor, country-year mapping and source vintage. The observed published USD gap remains the relevant measure of the dissemination difference.