



AFRICAN
DEPARTMENT

HOW TO

NOTES

**How to Assess the Benefits of Nonperforming
Loan Disposal in Sub-Saharan Africa Using a
Simple Analytical Network**

African Department

How to Assess the Benefits of Nonperforming Loan Disposal in Sub-Saharan Africa Using a Simple Analytical Framework

Prepared by Irina Bunda, Luc Eyraud, and Zhangrui Wang

I N T E R N A T I O N A L M O N E T A R Y F U N D

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Using a Simple Analytical Framework

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The coronavirus (COVID-19) crisis, which has hit financial systems across Africa, is likely to deteriorate banks' balance sheets. The largest threat to banks pertains to their loan portfolios, since many borrowers have faced a sharp collapse in their income, and therefore have difficulty repaying their obligations as they come due. This could lead to a sharp increase in nonperforming loans (NPLs) in the short to medium term.

Elevated NPLs can generate macroprudential and financial stability risks and impair banks' ability to support the economy during the recovery. NPLs raise capital requirements, dent banks' net interest margins, and generate service and management costs, thus potentially weakening the ability of banks to grant new loans. In sub-Saharan Africa, there are various structural impediments to the resolution of NPLs, partly related to weak debt enforcement procedures and legal rights, and financial infrastructure gaps.

This note and the accompanying Excel template look at the implications of NPL disposal strategies on credit provision in sub-Saharan Africa. Specifically, the template estimates how cleaning banks' balance sheets by disposing of NPLs could create space for new loans, unlock credit, and support economic activity.

This note builds and expands on earlier work published by the IMF and others. Jobst, Portier, and Sanfilippo (2015) conducted similar simulations in the context of NPL resolution in Europe following the global financial crisis. To the authors' knowledge, such work has never been applied to African countries.

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HOW TO ASSESS THE BENEFITS OF NONPERFORMING LOAN DISPOSAL IN SUB-SAHARAN AFRICA USING A SIMPLE ANALYTICAL FRAMEWORK

Introduction

Purpose of the Note

Loan resolution entails various strategies. These strategies can be grouped in broad categories (Figure 1; and Alvarez and Marshall 2016). When an NPL is kept on a bank's balance sheet, the bank can either recover the loan through *legal proceedings* (by going to court to enforce the loan contract and sell the collateral, or in the context of borrower insolvency proceedings) or try to recover part of it via a *consensual route* (cash settlement, traditional loan workout or out-of-court debt restructuring). The latter option has the potential for higher recovery and lower cost given that it eliminates lengthy and costly legal processes and preserves value for viable borrowers with a temporary inability to pay. It can also lead to a decline in the NPL ratio if the borrower starts repaying and the loan is upgraded back to performing. However, some consensual options, such as out-of-court arrangements, are still at an early development stage in sub-Saharan African countries. Alternatively, the bank may prefer to remove the NPL from its balance sheet either by *writing it off* or through a *sale* to another entity, which could be private, public, or mixed. In this case, the sale price of the NPL should, by arbitrage, reflect the amounts that would have been recovered otherwise through either the legal or consensual approaches.¹

This note and the attached Excel template attempt to quantify the capital relief and increase in credit capacity that would occur when banks remove NPLs from their balance sheets by selling them to third parties. The recent literature on the valuation of problem loans has focused on the substantial pricing gap between the banks' book value of these assets and the price investors are willing to pay for them (for example, Aiyar and others 2015; and Ciavoliello and others 2016). The NPL sale often takes place at a haircut, which is the amount by which the "sale price" of the NPL falls short of its "net book value" accounted

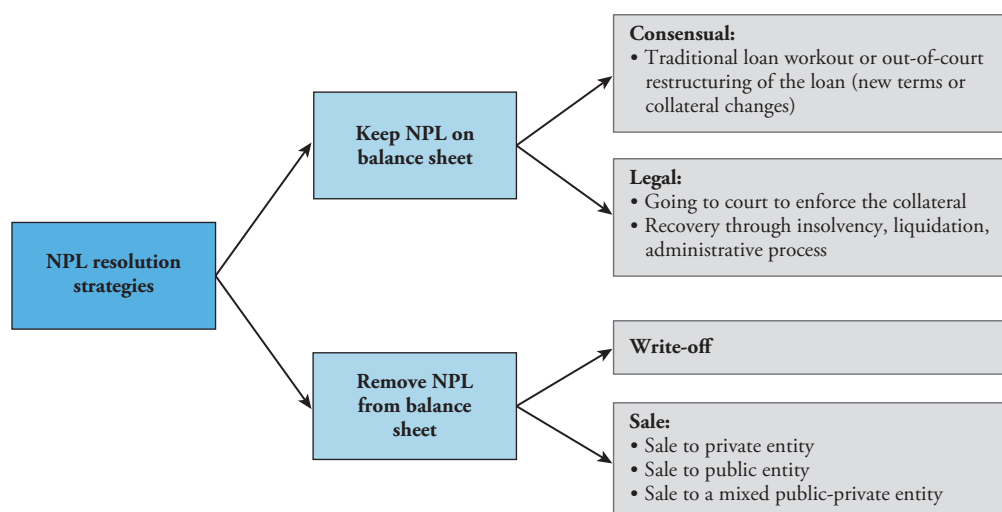
for in the bank balance sheet. The "net book value" is defined as the gross book value net of specific loan loss reserves (LLR).² The "sale price" of an NPL reflects, among other elements, the expected time to recovery and the residual value possibly recovered from the distressed loan.

In the case of African countries, where there is no liquid market for banks' distressed assets, the sale would typically be to the government or other public entities. Contrary to several advanced and emerging economies, the market for distressed debt is underdeveloped in sub-Saharan Africa, partly because court systems are weak and private loan recovery companies lack such legal enforcement mechanisms. Also, governments have rarely encouraged the development of these private markets. However, past experiences show that, even in Africa, there are ways for banks to remove bad loans from their balance sheets, via accelerated write-offs, securitization, or sale to publicly-owned asset management companies (Box 1). Even if, in the past, the government has tended to be the sole agent in the market for distressed assets, there have also been examples of purchases by private buyers (with government guarantees).

This note and template focus on one particular benefit associated with NPL disposal strategies (the capital relief channel), but NPL resolution can have broader micro and macroeconomic implications. In countries where provisions are high, like in most sub-Saharan African economies, the regulatory capital released by NPL disposal can be relatively limited—since risk weighted assets and hence capital requirements are based on net NPLs (NPLs minus LLR). This means that, following NPL resolution and after new loans have been originated, a bank may end up with fewer additional performing loans (at least in the short run) than the bad loans that were disposed of. This should not be seen as a failure of the strategy since the direct capital relief is not the only benefit from NPL disposal. By reducing uncertainty, generating efficiency gains, restoring banks profitability, and lowering the huge

¹In the framework of this note, the write-off is considered a special case of sale in which the sale price is zero.

²LLR are the cumulation (stock) of provisions over time.

Figure 1. Simplified NPL Resolution Framework

Source: IMF staff.

Box 1. Examples of NPL Sales and Write-Offs in Sub-Saharan Africa

(1) *Accelerated write-offs to reduce the backlog of NPLs on banks' balance sheets.* In Malawi, starting in 2017, a new regulation has forced banks to step up loan recovery and write off NPLs from their balance sheets. The NPL ratio declined from 15.7 percent at the end of 2017 to 3.6 percent in September 2019, largely due to write-offs, loan recovery, and overall growth in bank lending. In Tanzania, to increase private sector credit and contain NPLs, the Bank of Tanzania (the regulator) issued a directive to banks in 2018 requiring them to write-off credit accommodations (such as NPLs) and other risk assets that remained in the loss category for more than four consecutive quarters, compared to more than 12 consecutive quarters previously. As a result of the directive (which also included new rules for restructuring, reclassification, and NPL reduction strategies for banks), the NPL ratio declined from 11.5 percent at the end of 2017 to 9.8 percent at the end of 2019.

(2) *Securitization by a Special Purpose Vehicle (SPV) to widen the pool of potential buyers.* Faced with mounting banking sector difficulties, the Central Bank of Nigeria set up in 2010 a market-financed SPV to acquire NPLs and recapitalize weak banks, thus boosting confidence and liquidity in the Nigerian banking

sector. The SPV acquired NPLs with an original book value of N4.02 trillion at a price of N1.76 trillion or 1.7 percent of GDP (reflecting a 56 percent haircut) and gave government securities to the banks in exchange. Afterwards, NPLs were pooled, tranching, and sold on the market by the SPV. Following the transfer and securitization of NPLs, the country's NPL ratio dropped from 38 percent at the end of 2010 to below 5 percent at the end of 2012.

(3) *Centralized asset management companies (AMCs) to recover the value of the assets, while helping build a liquid market for NPLs.* AMCs buy bad assets from problem banks and are tasked with managing the NPL portfolio. For instance, in 2016, Angola set up Recredit, a state-owned AMC, to acquire distressed assets from commercial banks. Recredit was initially set up as a conduit for the disposal of about a third of system NPLs, which were on the balance sheet of one systemic state-owned bank. Its mandate was expanded in late 2016 to acquire impaired but recoverable loans from the entire banking system, with a view to freeing up lending capacity. At the end of 2016, Recredit purchased NPLs from one bank associated with six large borrowers for a total of Kz480 billion, equivalent to about 3 percent of GDP.

costs associated with NPLs (including operational and funding costs), resolving problem loans can have medium-term beneficial effects on banks' bottom lines and eventually boost banks' lending capacity. The demand for new loans is also likely to increase as NPL resolution tends to promote more viable projects. More generally, healthy banks with smaller balance sheets are more conducive to growth and financial stability than banks with larger but lower-quality balance sheets.

The approach proposed in this note is relatively simple and has clear limitations. The note describes a simplified analytical framework for estimating regulatory capital released by NPL disposals and the potential quantum of fresh credit that could be provided from the capital released. The model has inherent limitations, but could be adapted to produce more reliable analysis at both bank and country levels by applying more recent and validated data inputs; customizing according to regulatory capital rules that apply for each of the various asset classes; and estimating sale haircuts based on past experiences of NPL disposals. Important caveats should be kept in mind: (i) data quality can substantially impact the results and conclusions. For instance, NPL and provision definitions may differ across countries, although the databases used in this paper try to harmonize the concepts; (ii) outputs of the template are very sensitive to the assumptions made (for example, the percentage of loan exposures that is collateralized, the rate at which collateral value decays over time, and so on), which means that results should be interpreted with caution and sensitivity analyses should be conducted; (iii) the proposed tool approaches the issue of credit shortages in sub-Saharan Africa through the angle of capital needs and credit supply constraints. But private sector credit scarcity may also stem from other factors, such as fiscal dominance, poor financial market infrastructure, financial inclusion bottlenecks, and the lack of financially viable ("bankable") projects carried out by the private sector; and (iv) the template is based on a stylized macroeconomic framework. In practice, the NPL resolution strategy is a more complex subject, including many variables that depend on country-specific and bank-specific circumstances, legal and regulatory systems, and the type of NPL portfolio. For instance, the recovery rate and duration for corporate versus household NPLs may differ significantly due to different insolvency regimes and different types of collateral used for the loans. This makes the valuation of the NPL portfolio and the choice of the resolution route

highly specific and difficult, with a high level of uncertainty about the outcome—dimensions that the simple model proposed in this note cannot fully capture.

A Glimpse of the Analytical Framework

This note and attached template estimate the amount of capital that would be released by removing NPLs from bank balance sheets, where they are recorded at their net book value.³ The framework builds and expands on previous work done at the IMF, in particular by Jobst, Portier, and Sanfilippo (2015). Under this approach, the NPL disposal operation has two main effects:

- *Capital requirement effect.* The sale of NPLs reduces banks' regulatory capital charge (capital requirement), freeing up resources to provide new loans. This is the most common channel: disposing of bad loans, which bind some of the banks' capital resources, creates space for new loans. Formally, NPL sales reduce the capital requirement for the bank in proportion to the value of the loan net of LLR. This is because, at the time of the sale, NPLs, which have high risk weights, are exchanged against cash, which has a zero risk weight.
- *Capital resource effect.* The sale of NPLs can also affect the banks' capital resources. For instance, the sale of NPLs can lower the bank's capital if the NPL is sold at a price that lies below its net book value, that is, if there is a (positive) haircut. The haircut can vary significantly across countries depending on various factors, including provisioning practices, the effectiveness of the legal system, and investors' return expectations on NPL recovery.

Thus, the ability to free up capital depends on these two effects. This paper defines "capital relief" as the difference between the change in the bank's capital resources (pre and post NPL sale) minus the change in its capital requirement (pre and post NPL sale). If the haircut is small or nonexistent, the capital requirement effect dominates, and the capital relief is positive. On the contrary, if there is a large positive haircut and the capital resource effect more than offsets the capital requirement effect, capital falls more than risk-weighted assets and the capital relief becomes negative. Finally, if there is a negative haircut, the NPL sale price exceeds its net book value, resulting in a

³Net book value is defined as gross book value net of LLR.

capital gain; then, both effects go in the same direction of increasing the amount of capital relief.

Key Concepts: Haircut, Capital Loss, and Unprovisioned Loss

Definition of the Haircut and Equivalence with “Capital Loss”

This note defines the haircut (expressed in level) as the difference between the net book value of the loan and its sale price, both measured at the time of the sale. This paragraph elaborates on these concepts:

- Banks calculate the *gross book value* (GBV) of loans according to the amortized cost method, which is based on discounting future expected cash flows over the lifetime of the loan. The discounting considers the time value of money; according to the international financial reporting standards for banks (IAS/IFRS), the original effective interest rate of the loan itself must be used as a discount factor. The *net book value* (NBV) is defined as the GBV corrected by a value adjustment (LLR) if the borrower has difficulties paying the loan.
- If the sale happens on the market, the *NPL sale price* could be proxied by the sum of discounted cash flows (at the bank’s expected return rate) taking into account the costs of managing NPLs. The recoverable amount largely depends on the collateral backing the loan, while the cash flow recovery time usually differs from that stated in the loan contract. Note that the sale price may not be a true “market price” if the NPL is sold “off market” to a single public buyer in the context of bank restructuring plans. In this case, a perhaps more accurate term would be “transfer price.”

If positive (respectively negative), the level of haircut corresponds to the amount of capital loss (respectively gain) associated with the NPL sale. Indeed, according to standard accounting rules, when an asset is sold below its net book value, the bank records a loss on its capital resources. Conversely, when the loan is sold above its net book value, the negative haircut translates into an increase in the bank’s capital. Note that the haircut could, alternatively, be expressed as a ratio, in percent of the net book value of the loan that is sold.⁴

⁴The Excel template uses the concept of haircut expressed as a ratio (defined as $[NBV - \text{market price}] / NBV$), when simulating NPL sales with ad hoc haircut rates (for example, 10 percent). See Section below titled “Step 2: Calculation of the Capital Relief.”

$$\text{Haircut (level)} = \text{NBV} - \text{sale price} = \text{capital loss}$$

Equivalence with “Unprovisioned Loan Loss”

An alternative way of seeing the potential capital loss associated with the NPL sale is to relate it to the difference between total versus provisioned loan losses. This alternative approach will be useful to compute a model-based estimate of the haircut.

To start, we define the concept of “unprovisioned loss” as the difference between the total projected loss on the loan portfolio in net present value (that is, what banks *should* set aside when anticipating the total future loss) and the amount of loan loss reserves (that is, what banks *have* set aside, with the possibility that it may not be sufficient to cover all the future loss).⁵

The haircut value can be proxied by the unprovisioned future loss on the loan. This deserves a short explanation. From the perspective of the bank selling the NPL, the total projected loss on the loan (in net present value at the time of the sale) can be approximated by the shortfall of the sale price relative to the gross book value of the loan (that is, $GBV - \text{sale price}$). This is because the sale price of the loan reflects the most recent anticipated repayment schedule, which does not necessarily correspond to the initial schedule agreed at loan origination (reflected in the GBV). Hence, the haircut (level) can be rewritten as the difference between the total projected loss and the provisioned loss (LLR).⁶

$$\begin{aligned} \text{Haircut (level)} &= \text{NBV} - \text{sale price} = (\text{NBV} - \text{GBV}) \\ &\quad - (\text{sale price} - \text{GBV}) \approx -\text{LLR} + \text{total} \\ &\quad \text{projected loss} = \text{unprovisioned loan loss} \end{aligned}$$

Computation of Unprovisioned Loan Loss

To compute the unprovisioned loan loss, the first step is to estimate the total projected loss on the NPL in net present value terms at the time of the sale (from

⁵Both the projected losses and the level of provisions are measured at the same (initial) period, which is assumed to be the year of the disposal of the NPL. In the template, this year is the most recent date for which data is available (2018 at the time of writing this note but the template could be updated after publication).

⁶This is an approximation since the original effective interest rate of the loan (to be used for calculating its gross book value) is likely to differ from the market interest rate used to compute the sale price as the sum of discounted cash flows. Therefore, the difference in the interest rate environment between the loan origination (most of the time before the economic shock) and loan sale (after the economic shock) could be another important factor affecting haircut levels.

the point of view of the bank selling the NPL). This can be proxied by the loss anticipated under various possible recovery approaches if the loan was kept on the bank's balance sheet.

To simplify, the assumption is that there are only two options for the future NPL recovery. For a bank having an NPL on its balance sheet, recovery can take the following forms:

- *Consensual*: standard loan workout, out-of-court restructuring (new terms or collateral changes) or cash settlement, with probability p . Let α be the fraction of the loan that can be recovered during the restructuring process.⁷
- *Legal enforcement*: with probability $(1-p)$, the borrower defaults and the projected loss for the bank is the sum of the full loss on the unsecured portion of the loan, plus a partial loss on the secured portion of the loan (since the collateral, which will decay, is eventually sold by the bank). The partial loss on the secured portion also considers the management and legal costs related to the enforcement procedures (see below).

Therefore, total projected loss on the sold NPL is the loss under these two states of the world. The projected loss is expressed, per unit of gross NPL, as:

$$= \begin{cases} \text{consensual recovery: } (1 - \alpha), \text{ with probability } = p \\ \text{legal route: Loss under default, with probability } = 1 - p \end{cases}$$

The final step is to deduct loan loss reserves from this amount. The unprovisioned loss can be written, in percent of the GBV (that is, per unit of gross NPL sold), as:

$$\text{Unprovisioned loss per unit of gross NPL} = p * (1 - \alpha) + (1 - p) * \text{Loss under default} - llr$$

with $llr = LLR/GBV$.

Computation of the Loss Under Default

We assume that the NPL sale by the bank to the investor takes place in the initial period. The projected “loss under default” is then computed at the initial period in net present value, with the resolution process taking t periods in the future. It is further assumed

⁷ α measures the fraction of the loan that is expected to be recovered in the future expressed in net present value. We also assume that this ratio incorporates all indirect costs associated with the management of the loan during the recovery period.

that the loan comprises a secured part (*collat*) and an unsecured part (*uncollat*), expressed in percent of the gross loan value GBV. At the time of NPL purchase, an investor anticipating the borrower's default should expect (i) full loss on the unsecured portion of the loan, and (ii) partial loss on the secured portion, since the collateral will eventually be sold.

In turn, the partial loss on the secured portion can be proxied by the shortfall of the net present value of the collateral from its book value. The collateral is assumed to be sold at the end of the process (after t periods). The net present value of the collateral, measured at the initial period, reflects the discount rate (r , which is the return expected by the entity owning the NPL), the average remaining duration of the resolution process in years (t), and the rate of decay of the collateral asset (δ). The direct and indirect costs under the legal proceeding route include management/servicing fees and legal fees; they are denoted, respectively, m_{cost} and l_{cost} , expressed in percent of the GBV, and defined in bulk at the initial period (see broadly similar approach in Ciavoliello and others 2016).

As a result, the loss under default can be expressed in net present value, taking into consideration both the secured and unsecured portions of the loan. Specifically, the loss under default is the sum of all the elements that the bank is expected to lose if it keeps the NPL (instead of selling it): the costs associated with the procedure; the whole uncollateralized value; and the share of the collateral that has depreciated. Note that if the depreciation rate is zero, there is no loss on the collateralized part.⁸

$$\begin{aligned} \text{Loss under default per unit of gross NPL} &= \text{uncollat}/(1 + r)^t + [\text{collat}/(1 + r)^t - \text{collat} * \\ &\quad (1 - \delta)^t/(1 + r)^t] + m_{cost} + l_{cost} \\ &= 1/(1 + r)^t - [\text{collat} * (1 - \delta)^t/(1 + r)^t] \\ &\quad + m_{cost} + l_{cost} \end{aligned}$$

Model-Based Haircut Formula

As a result, the haircut can be computed through a formula that captures the various contingencies. The unprovisioned loss is calculated as follows (in percent of GBV) and computed at the initial period when the sale is assumed to occur:

⁸The model does not take into account the possibility that the collateral may not be sold at its “fair” value, due, for instance, to the illiquidity of the collateral market.

$$\text{Unprovisioned loan loss per unit of gross NPL} \\ = p * (1 - \alpha) + (1 - p) * [1/(1 + r)^t - \text{collat} * \\ (1 - \delta)^t / (1 + r)^t + m_{\text{cost}} + l_{\text{cost}}] - llr$$

Main Steps of the Simulations

The template computes the amount of capital that would be released by removing NPLs from bank balance sheets at their net book value. In practice, these calculations are done in three stages (Figure 2).

Step 1: Calculation of the Tied-up Capital

The first stage consists in computing the capital tied up by NPLs. The tied-up capital is proportionate to the excess NPL stock relative to its desired level—an excess level that the bank disposes of. The bank is required to put capital aside in line with the regulatory capital requirement (denoted as the ratio *reg. CAR%*) and the risk-weighted assets. NPLs are applied a risk weight denoted *WNPL*, which could differ from the one for performing loans (*WPL*). In line with the standardized method under the Basel II/III regulatory framework, the capital requirement ratio applies to *net* NPLs, that is gross NPLs minus loan loss reserves (LLR).⁹ Note that, in the template, “net NPLs” do not deduct collateral, since Basel rules have a very restrictive definition of the type of collateral that qualifies, from a prudential perspective, to be deducted from NPLs for the purpose of determining capital requirements.¹⁰ In practice, in sub-Saharan Africa, very little collateral is eligible to be deducted from exposures; so, it is disregarded in the template. Therefore, the formula for tied-up capital is as follows:

$$\text{Tied-up capital} = \text{Net NPL sold} * \\ (\text{WNPL} * \text{reg. CAR}\%) * (\text{dRWA}/\text{dCRWA})$$

where “net NPL sold” is the excess NPL net of LLR that the banks will dispose of (that is: Net NPL sold =

⁹The prudential treatment described in the note (that is, risk weights assigned to net exposures) is only applied by banks using the standardized approach. Under the IRB approach, risk weights are applied to gross exposures and the difference between expected losses (EL) and provisions is deducted from/added to prudential own funds.

¹⁰The eligible collateral in the standardized approach includes cash; gold; some categories of debt securities depending on their rating, issuer, or seniority; equities (including convertible bonds) included in a main index or listed on a recognized exchange; undertakings for collective investments in transferable securities; and mutual funds under certain conditions (Basel Committee on Banking Supervision 2019).

Actual net NPL – Target net NPL); *RWA* denotes the risk-weighted assets; and *CRWA* denotes the credit risk component of risk-weighted assets (the other components being market and operational risks).¹¹

To compute the amount of “Net NPL sold,” a country-specific estimation of the LLR attached to these NPLs is necessary. The template offers several possibilities (see calibration section):

- By default, the template uses, for each country, the average provisioning ratio for the whole NPL portfolio, computed as: $llr = \text{LLR}/\text{Gross NPL}$. Then, $\text{Net NPL sold} \approx (\text{Actual Gross NPL} - \text{Gross NPL Target}) * (1 - llr)$.
- The template also offers alternative country-specific measures of the provisioning ratio *llr* based on the weighted average of provision rates across different categories of loans (substandard, doubtful, loss) when available from the bank-level database.¹²

To compute the ratio $dRWA/dCRWA$, two options are considered. By default, it is assumed that other components of the RWA are fixed in $RWA = CRWA + \text{other components}$. Therefore, $dRWA/dCRWA = 1$. Alternatively, if the composition of RWA is assumed constant, meaning that RWA and CRWA grow at the same rate, then: $dRWA/dCRWA = RWA/CRWA$, which can be computed from bank-level data.¹³

Step 2: Calculation of the Capital Relief

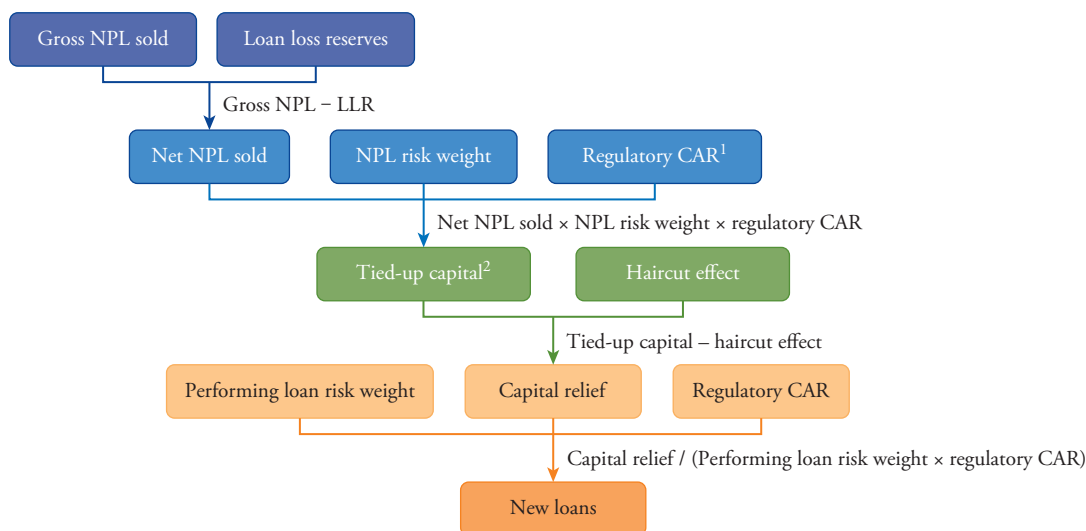
The capital relief associated with the NPL sale is equal to the tied-up capital minus the haircut (if any). The template proposes three alternative scenarios with (i) no haircut; (ii) an ad hoc haircut (expressed as a ratio); or (iii) a model-based haircut.

¹¹Since $K = \text{reg. CAR}\% * RWA \Rightarrow dK = \text{reg. CAR}\% * dRWA$. Given that $dRWA = dCRWA * dRWA/dCRWA$, and $dCRWA = \text{WNPL} * dNPL$, the change in capital is $dK = \text{reg. CAR}\% * \text{WNPL} * dNPL * dRWA/dCRWA$.

¹²In the Fitch Connect bank database, NPLs are classified in these three buckets (substandard, doubtful, loss) according to the numbers of days past due in the respective country’s regulations. Generally, provisioning rates are higher for the oldest/legacy NPLs.

¹³The intuition behind this alternative assumption is that bank risks can be correlated. For instance, when banks remove NPLs from their balance sheets, this can reduce both the credit risk and the operational risk.

Figure 2. Main Steps of the Calculations



Source: IMF staff.

Note: CAR = capital adequacy ratio; LLR = loan loss reserves.

¹Statutory capital requirement ratio (percent).

²Tied-up capital = capital that the bank needs to set aside (proportional to the risk-weighted assets).

- **Scenario 1:** If there is *no haircut* (that is, no capital loss), then all capital is released and can unlock new lending.

$$\text{Capital relief} = \text{Tied-up capital}$$

- **Scenario 2:** With an *ad hoc haircut ratio* of θ percent, the capital relief formula needs to deduct the haircut (in level), which is the product of the ratio θ (a given percentage of the net book value of NPLs sold) times the amount of net NPLs that are sold.

$$\text{Capital relief} = \text{Tied-up capital} - \theta * \text{Net NPL sold}$$

- **Scenario 3:** With a *model-based haircut*, the capital released is computed as:

$$\text{Capital relief} = \text{Tied-up capital} - \text{Unprovisioned loan loss per unit of Gross NPL sold} * \text{Gross NPL sold}$$

where the unprovisioned loss per unit of gross NPL is computed with the formula described above in the section titled “model-based haircut formula.”

Scenario 3 calculates the haircut in level (nominal terms). In this scenario, the implied model-based haircut *ratio* can easily be inferred. To recover the implicit haircut ratio expressed in percent of net NPL, the following formula can be used:

$$\text{Haircut ratio in scenario 3} = \frac{\text{Unprovisioned loan loss per unit of Gross NPL sold} * \text{Gross NPL sold}}{\text{Net NPL sold}}$$

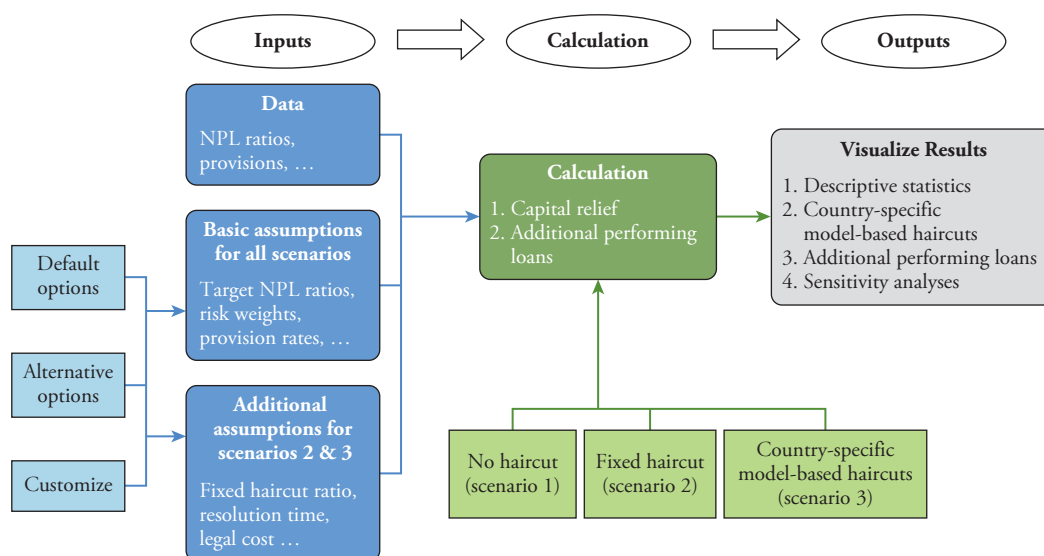
Step 3: Use of the Freed-up Capital to Grant New Loans

The capital relief directly affects the amount of new (performing) loans that banks could extend after NPL disposal. The amount of new loans is a function of the capital relief, the regulatory capital requirement on performing loans (*reg. CAR%*) and the risk weight of new loans. Note that if the capital relief is negative, the amount of new loans is negative (meaning that there is a credit contraction relative to the pre-sale situation because of the capital loss).

$$\text{Additional performing loans} = \text{Capital relief} * (1 / (WPL * \text{reg. CAR}\%)) * (dCRWA/dRWA)$$

where *WPL* is the risk weight of performing loans, *RWA* denotes the risk-weighted assets, and *CRWA* denotes the credit risk component of risk-weighted assets.¹⁴

¹⁴The formula can be derived from: $K = \text{reg. CAR}\% * RWA \Rightarrow dK = \text{reg. CAR}\% * dRWA$. In addition, $dCRWA = dRWA * dCRWA/dRWA$, and $dCRWA = WPL * dPL$. Therefore, the

Figure 3. Structure of the Excel Template

Source: IMF staff.

As in step 1, two options are considered to compute $dCRWA/dRWA$. By default, it is assumed that other components of the RWA are fixed in $RWA = CRWA + other\ components$. Therefore, $dCRWA/dRWA = 1$. Alternatively, if the composition of RWA is assumed constant, meaning that RWA and CRWA grow at the same rate: $dCRWA/dRWA = CRWA/RWA$, which can be computed from bank-level data. This alternative assumption can be used when credit risk and other risks, such as operational risk, are correlated.

Structure, Calibration, and Outputs of the Excel Template

Structure and Calibration of the Template

This section presents the key parameters of the Excel template and their default values. For almost all indicators, the template also allows users to overwrite default parameters and input ad hoc values. The parameters are imputed in the Input sheet of the template as illustrated in Figure 3.

The template simulates three scenarios for the haircut, relative to the pre-sale baseline. The following options are available to the user:

- **Scenario 1:** no haircut (no loss, NPLs sold at their net book value). This is the main scenario, and it can be used to easily compare results across countries.
- **Scenario 2:** fixed haircut that is applied uniformly to all countries (with a 10 percent positive haircut ratio as the default parameter). Note that the haircut could be assigned a negative value when banks sell their NPL portfolio at a premium. This scenario can be used in case information is available on the average level of haircut in a given country; it is less relevant for country comparisons (since haircuts are likely to differ across countries).
- **Scenario 3:** country-specific, model-based haircuts, based on the above formula for unprovisioned losses. This scenario is more helpful for policy experiments, since it can be used to assess the impact of changes in parameters on key results (see below). It is less relevant outside policy experiments, since the results are very sensitive to underlying assumptions.

For all three scenarios, a series of common assumptions are made. This facilitates the comparison of results across scenarios:

- We assume that banks bring down their NPL ratio to a desired level. By default, the template assumes that the NPL ratio is halved relative to its 2018 value, which is the latest year with available com-

change in performing loans is $dPL = dK * (1 / (WPL * reg.CAR\%)) * (dCRWA/dRWA)$, with dK denoting the capital relief.

prehensive data at the time this note was drafted.¹⁵ Other NPL disposal targets can be simulated.

- We assume a regulatory CAR of 12 percent for all countries (as a default parameter), which appears to be in force in many sub-Saharan African countries.
- The NPLs are weighted at 100 percent by default. This is consistent with prudential standards and practices in sub-Saharan Africa. Indeed, Basel I does not have a specific requirement for NPLs; therefore, for countries under Basel I, the NPL risk weight is identical to the one for performing loans (that is, 100 percent). For countries under Basel II/III (standardized approach), the NPL weight varies between 100 percent and 150 percent, depending on the provisioning level.¹⁶ Given that almost all countries in sub-Saharan Africa are moving to Basel II/III standards and have a high level of provisions (only two countries in our sample have a coverage ratio below 20 percent), the default calibration assumes $WNPL=100$ percent. Note that the template also offers an alternative 150 percent calibration as well as the possibility of manually inputting a different value.
- Performing loans are weighted at 100 percent by default ($WPL=100$ percent), although the template also offers the option of using 75 percent, as alternative calibration, when retail loans comply with the specific classification requirements under Basel II/III.¹⁷
- The ratio $dCRWA/dRWA$ is assumed to be equal to 1 by default. Alternatively, it can be computed as $CRWA/RWA$ using bank-level data for each country (and using the region's median for countries that do not report this information).

For all three scenarios, the template also offers various options to compute the stock of provisions on

¹⁵Future updates of the template may allow using data for subsequent years.

¹⁶The rule is to set a 150 percent risk weight when specific provisions are less than 20 percent of the outstanding amount of the loan, and a 100 percent risk weight when specific provisions are above 20 percent of the outstanding amount of the loan (see Basel Committee on Banking Supervision 2019).

¹⁷To be included in the regulatory retail portfolio and risk weighted at 75 percent, claims must meet the following criteria: (i) orientation: individual person or persons or to a small business; (ii) product: revolving credit and lines of credit, personal term loans and leases, and small business facilities and commitments (securities and mortgage loans are excluded); (iii) granularity; and (iv) low value of individual exposures (see Basel Committee on Banking Supervision 2019).

the amount of NPL sold. By default, the amount of provisions on the portfolio of NPL sold is assumed to reflect the average provisioning rate at the country level using IMF Financial Soundness Indicator (FSI) data (option 1).¹⁸ This assumption is relevant if the NPL portfolio is randomly selected and no information is available on the type of NPLs that are disposed of. However, if banks decide to predominantly sell certain types of NPLs (for instance, loss NPLs), which are known to have provisioning rates that differ from the average, these provisioning rates should be computed in a more granular way (options 2 and 3). Thus:

- Option 1: The *average provision ratio* at the country level is taken from the FSI database and computed as the ratio of aggregate specific provisions to aggregate gross NPLs for each country.¹⁹ This ratio represents the average provision rate on the whole NPL portfolio and does not take into account whether NPLs sold are substandard, doubtful, or loss (or a mix).
- Option 2: Under this option, the provision ratio is computed as the *weighted average of provision rates by category of NPL* (substandard, doubtful, loss). In this case, the country-specific provision rates for each category are taken from the World Bank's Bank Regulation and Supervision Survey database.²⁰ And the weights of each category of NPLs are provided by the Fitch Connect bank-level dataset. In addition, under Option 2, it is assumed that, for a given amount of NPLs sold, the resolution strategy starts first with loss NPLs; then, after (and if) exhausting the loss category, the bank sells the doubtful ones; and after (and if) exhausting both the loss and doubtful categories, the bank finally sells the most recent (substandard) NPLs. If the amount of NPLs sold is small, it is likely that only loss NPLs will be disposed of, but if the NPL reduction is large, all types of NPLs could be impacted.²¹

¹⁸At the time of drafting this note, the coverage of the Fitch Connect bank-level dataset was not sufficiently comprehensive to be able to compute from it accurate average provisioning rates for banking systems in sub-Saharan African countries.

¹⁹Specific provisions are calculated from the FSI database as the difference between gross NPLs and net NPLs.

²⁰The database is available at: <https://www.worldbank.org/en/research/brief/BRSS>

²¹While conceptually superior to option 1, the computation of the provision ratio by buckets of NPLs relies on many simplifying assumptions due to missing data in the Fitch Connect bank database: (i) when a particular bank does not report any data by NPL category, it is removed from the country calculation of the country provision rate; (ii) when a bank reports only partial data by NPL

- Option 3: Like in option 2, the provision ratio is computed as the *weighted average of provision rates by category of NPL* (substandard, doubtful, loss). However, the ordering is reversed, with the disposal strategy starting with substandard NPLs, followed by doubtful, and finally, loss NPLs.

The second scenario allows the user to input an ad hoc haircut ratio. By default, in the template, the haircut ratio is positive, uniform, and set at 10 percent of the amount of net NPLs sold, consistent with the assumption made in Jobst, Portier, and Sanfilippo (2015). This assumption would need to be adapted to country circumstances and reflect the fact that the haircut is eventually set by market forces. Experience in Central and Eastern European countries in the aftermath of the 2008–09 global financial crisis shows that haircuts can be very high in times of financial crisis, especially if legal frameworks, banks’ data reporting, and banks’ internal valuation systems are weak, and if the entity purchasing the NPLs is private rather than public.²² In these cases, haircuts can get close to 80 percent of gross loans. In general, haircuts are higher for retail and small corporate loans than for large corporate loans (which often have some collateral and for which the legal restructuring route is more standardized). In difficult times, standard haircuts can range from 50 percent of gross loans for mortgage loans or other forms of collateralized loans, to two-thirds for retail NPLs, and even higher for corporate debt. By contrast, haircuts can be nonexistent or even negative in special circumstances, including when the purchasing entity is public.²³

category (for example, data is available for sub-standard NPLs but missing for doubtful and loss NPLs), the missing data is inferred by distributing the residual in equal amounts across the remaining NPL categories; (iii) when a country does not report any data by NPL category (meaning that no bank in the country reports data in this format), it is assumed that the country’s ratios for each category (for example, share of substandard NPLs in total NPLs) is equal to the median for sub-Saharan Africa; and (iv) when a provision ratio for a given country and a given NPL category is not available in the World Bank’s Bank Regulation and Supervision Survey database, it is assumed that this specific ratio is equal to the sub-Saharan African median provision ratio for the same NPL category.

²²See European Banking Authority 2016; Gandrud and Hallerberg 2014; and Croatian National Bank 2020.

²³The liquidation of problem banks or their orderly resolution without recourse to public funds are, in general, preferable options. The use of public resources to recapitalize private banks should be a last-resort measure, used exclusively when financial stability is threatened. It should only occur after loss absorption by bank owners, and alongside time-bound restructuring plans that address the underlying

For the third scenario, the calculation of the model-based haircut is based on a default calibration. The model uses the following default values, although it is possible to input other values:

- The discount rate is set at 10 percent, which is the assumed expected return for the owner of the NPL.²⁴
- 80 percent of the NPL is assumed to be collateralized (collat=0.8); that is, 20 percent of the principal value is unsecured (uncollat=0.2). The collateral value decays over time at a rate of $\delta=0.05$ per year. Similar assumptions were used in Jobst, Portier, and Sanfilippo (2015).
- The costs (management fees and legal fees) include: $m_{cost}=0.05$,²⁵ while l_{cost} is proxied by the cost of enforcing a contract through courts taken from the latest World Bank *Doing Business* report.²⁶ More specifically, for legal costs l_{cost} , 75 percent of the value reported by the World Bank is used, since the legal process may have already started for a subset of NPLs sold by banks to investors (in which case, parts of the costs have already been paid).²⁷
- The average remaining time to resolution is sourced from the latest World Bank *Doing Business* report.²⁸

bank weaknesses and help restore its long-term viability (see Dobler and others 2020).

²⁴See example of Croatia for NPL investors’ income per unit of gross NPL value in recent years (Croatian National Bank 2020).

²⁵For Europe, indirect costs are assumed to be in the range of 2 percent to 6 percent according to Jobst, Portier, and Sanfilippo (2015) and Ciavoliello and others (2016).

²⁶The *Doing Business* indicator on “enforcing contracts” is used as a proxy to estimate the legal costs of resolution. It is important to note that the *Doing Business* indicator does not refer to the recovery of bank loans, but a hypothetical case where a commercial debt is recovered through the court system. Bank loans may have different procedures available, and most importantly, the indicator does not refer to the recovery of secured loans. In addition, in August 2020, The World Bank suspended the *Doing Business* report due to some data irregularities. The authors of this note are aware of the risk and quality concerns over these indicators. However, there are no better alternatives presently.

²⁷More precisely, the World Bank *Doing Business* database provides the individual components of the cost of enforcing a contract, but some costs are likely to be split between the bank and the borrower. As a result, the total enforcement cost for the bank is proxied as the sum of attorney fees, enforcement costs, and half of the court fees. Then, 75 percent of this value is taken.

²⁸To proxy the time to resolution, (i) the default option in the template is to use the *time to enforce contracts* for going concern businesses from the World Bank *Doing Business* database, since this series is available for the whole country sample. The series refers to the time required to enforce a contract through the courts (in calendar days), including the time to file and serve the case, the time for trial and to obtain the judgment, and the time to enforce the judgment. Note that the time, which is reported in calendar days in the World

- As a baseline, given that legal frameworks are often weak and inefficient in Africa, it is assumed that $p=0.67$, meaning that the NPL recovery takes consensual forms in two-thirds of the cases, and legal proceedings in one-third.
- $\alpha=0.35$ is the net present value recovered through the consensual route (for example, out-of-court restructuring or settlement process).²⁹

Outputs of the Template

For a given NPL reduction, the template produces two main statistics: (i) the capital released by NPL disposal, which results from the combination of the lower capital charge and the possible haircut; and (ii) the new loans that can be generated from this capital relief. These two statistics are computed for each of the three scenarios and for each country. In addition, the template also produces several descriptive statistics, such as NPL ratios (in net and gross terms) or a breakdown by loan type (substandard, doubtful, loss).

For scenario 3, the template also produces country-specific haircuts. These haircuts are model-based and therefore very sensitive to the choice of parameters. Results should be treated with caution and may be more useful to conduct policy experiments than in absolute terms (see below). The template ranks the haircuts by size, with some countries having positive haircuts and others having negative haircuts.

Bank database, is converted to years in the template and rounded to the nearest 0.5. (ii) A second option is to use the *time to resolve insolvency* (also from the World Bank *Doing Business* database), although this series is not available for some countries and insolvency procedures are not common in the sub-Saharan Africa region (compared to debt enforcement). The series is the time required to recover debt measured in calendar years, including appeals and requests for extension. (iii) A third option in the template is to use the *average of the time to enforce contracts and the time to resolve insolvency*. Note that, similarly to the assumption on legal costs, we take 75 percent of these series values (for the time to enforcement and the time to insolvency), since the resolution process may have already started for some of the NPLs sold by the banks.

²⁹The default calibration of 35 percent is justified as follows. For the consensual route, banks typically proceed to a preliminary segmentation of NPL borrowers to identify the (i) viable, (ii) marginally viable, and (iii) nonviable ones. It is assumed that the shares of these categories are given by the median shares of (i) substandard, (ii) doubtful, and (iii) loss categories of NPLs in sub-Saharan African countries from the Fitch Connect bank database for 2018. These shares are 0.27, 0.29, and 0.44, respectively. It is also assumed that the recovered amounts (in percent of the loan book value) are 75, 50, and 0. This gives an overall recovery ratio of about 35 percent.

In some cases, scenario 3 shows extreme values for haircut ratios calculated in percent of net NPLs. This is because net NPL figures reported by some countries in the IMF FSI statistics are very low. Haircuts computed in percent of gross NPLs do not display these extreme values. The low net NPL figures are due to high reported provisions in some sub-Saharan African countries, which could result from either stringent provisioning practices or possible statistical errors/inconsistencies across series:

- *Stringent provisioning practices.* Provisioning in some countries can be extremely high because legacy NPLs that are in the loss category and fully provisioned are sometimes kept on the banks' balance sheets because of tax, legal, and judicial impediments to write them off. In addition, in some jurisdictions, banks tend to maintain high provisions because they apply conservative prudential requirements, which add an extra layer of protection at the behest of regulators and supervisors, supplementing the accounting requirements (Bhatia and others 2020).
- *Statistical issues.* Specific provisions on NPLs may be overreported because provisions are constituted against both nonperforming and performing loans in some countries, without the possibility of separately identifying them. In other cases, banks are slow in reclassifying loans to NPLs even when specific provisions have already been made; thus, provisions can be temporarily larger than recorded NPLs because of this lag.

The template also produces several sensitivity analyses, based on scenario 3. It shows how the capital relief and new loans vary depending on the value of key parameters for scenario 3: collateral depreciation rate; collateralized portion of NPL; probability of consensual resolution; target capital adequacy ratio, and so on.

Finally, the template can be used to build policy experiments. To give a few examples:³⁰

- *Measures that boost the market value of NPLs* (such as developing a market for distressed assets, improving collateral valuation and registry, and establishing specialized NPL collection agencies that boost

³⁰See some applications of the template in the 2021 IMF Departmental Paper "Resolving Non-Performing Loans in Sub-Saharan Africa in the Aftermath of the COVID-19 Crisis."

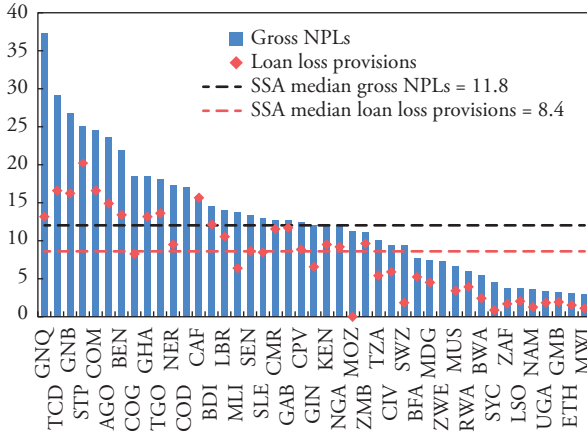
repayment prospects) can be simulated by inputting a negative haircut ratio. Public support provided to systemically important banks (in situations where their liquidation could threaten financial stability) could also lead to negative haircuts.

- *Targeted policies that remove legacy (loss) NPLs first*, can be simulated by selecting the corresponding option in the calculation of provision rates.³¹
- *Reforms of the legal system to reduce the time and costs associated with contract enforcement* can be factored in. For instance, the template can simulate the impact of lowering by one year the duration of legal proceedings.

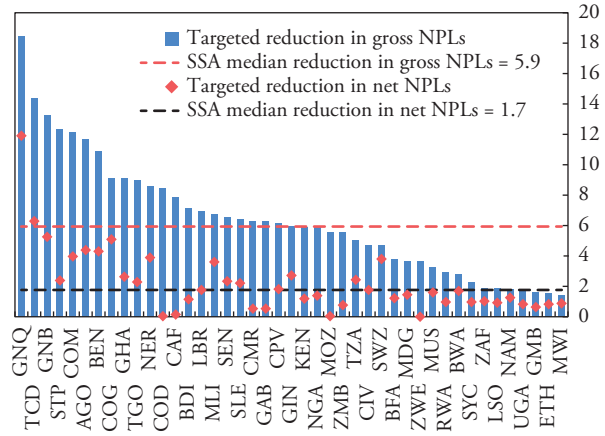
³¹For policy experiments with a targeted NPL disposal strategy, key parameters should be adjusted to account for the fact that the sale focuses mostly on loss NPLs (and not on “average” NPLs). For instance, management costs may need to be increased; the discount rate should decrease given lower expected returns on legacy NPLs; the probability of consensual recovery would be reduced; and the value recovered through the consensual approach should be significantly lowered, as well as the collateralized portion of the loan.

Figure 4. Selected Outputs of the Template

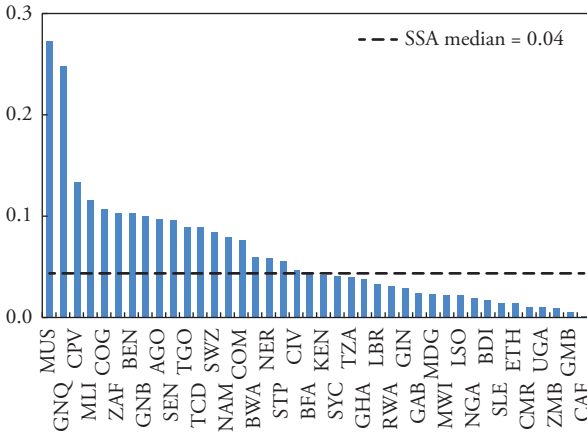
1. SSA: NPLs and Specific Provisions, 2018
(Percent of total gross loans)



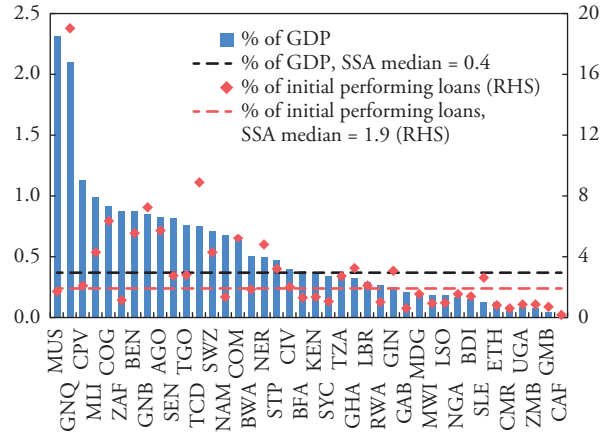
2. SSA: Reduction in NPLs in Percent of Initial Total Gross Loans
(Percentage points)



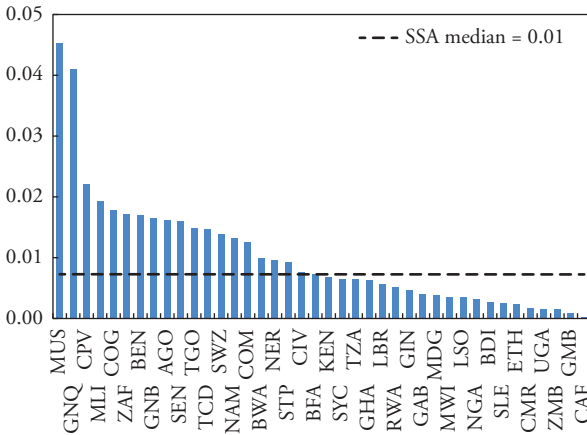
3. SSA: Capital Relief from NPLs Disposal, No Haircut
(Percent of GDP)



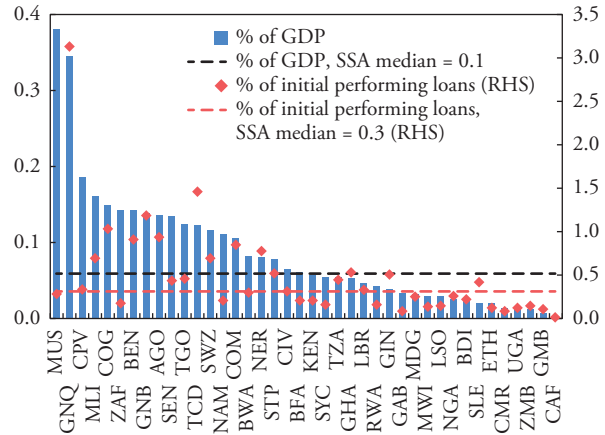
4. SSA: Additional Performing Loans from NPLs Disposal, No Haircut



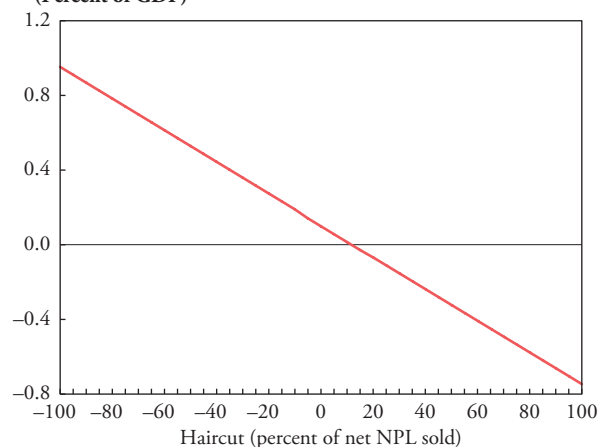
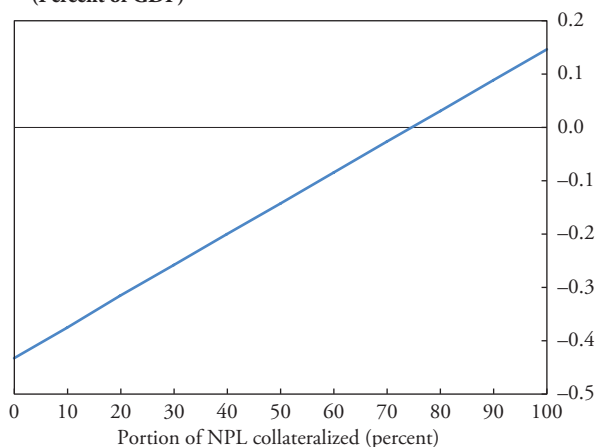
5. SSA: Capital Relief from NPLs Disposal, 10% Positive Haircut
(Percent of GDP)



6. SSA: Additional Performing Loans from NPLs Disposal, 10% Positive Haircut



Sources: IMF Financial Soundness Indicators; country authorities; and staff estimates.
Note: The shock presented in these panel charts is a 50 percent decline in the NPL ratios relative to 2018.

Figure 4. Selected Outputs of the Template (Continued)**7. Sensitivity Analysis for Benin: Capital Relief from NPLs Disposal (Percent of GDP)****8. Sensitivity Analysis for Benin: Capital Relief from NPLs Disposal (Percent of GDP)****Country-Specific Model-Based Haircuts**

(Percent of gross NPL sold)

Country	Country	Country	Country
Eswatini	Guinea	Côte d'Ivoire	São Tomé & Príncipe
Seychelles	Chad	Guinea-Bissau	Kenya
Namibia	Mauritius	Angola	Burundi
Malawi	Ethiopia	Gambia, The	Zambia
Equatorial Guinea	Uganda	Sierra Leone	Central African Rep.
Congo, Republic of	Benin	Senegal	Cameroon
Botswana	Burkina Faso	Togo	Gabon
Mali	Comoros	Ghana	
South Africa	Tanzania	Cabo Verde	
Niger	Madagascar	Liberia	
Lesotho	Rwanda	Nigeria	
			SSA Median
			0.3%

Notes:

Positive

Negative

Note: The shock presented in these panel charts is a 50 percent decline in the NPL ratios relative to 2018.

Sources: IMF Financial Soundness Indicators, country authorities, and staff estimates.

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