INTERNATIONAL MONETARY FUND

IMF Country Report No. 22/155

PHILIPPINES

FINANCIAL SECTOR ASSESSMENT PROGRAM

June 2022

TECHNICAL NOTE ON RISK ASSESSMENT OF BANKS, NON-FINANCIAL CORPORATES, AND MACRO-FINANCIAL LINKAGES

This technical note on Risk Assessment of Banks, Non-Financial Corporates, and Macro-Financial Linkages was prepared by a staff team of the International Monetary Fund in the context of a joint IMF-World Bank Financial Sector Assessment Program (FSAP). It is based on the information available at the time it was completed on February 2021.

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Price: $18.00 per printed copy

International Monetary Fund
Washington, D.C.

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TECHNICAL NOTE

RISK ASSESSMENT OF BANKS, NON-FINANCIAL CORPORATES, AND MACRO-FINANCIAL LINKAGES

Prepared By
Monetary and Capital Markets Department, IMF

This Technical Note was prepared in the context of a joint IMF-World Bank Financial Sector Assessment Program (FSAP) missions in the Philippines during June 2019-October 2020 led by Hiroko Oura, IMF and Ilias Skamnelos, World Bank, and overseen by the Monetary and Capital Markets Department. IMF, and the Finance, Competitiveness and Innovation Global Practice, World Bank, World Bank, and is based on data available at the time it was completed (February 2021). The note contains the technical analysis and detailed information underpinning the FSAP assessment's findings and recommendations. Further information on the FSAP program can be found at http://www.imf.org/external/np/fsap/fssa.aspx.

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Glossary

AFC	Asian Financial Crisis
ASEAN	Association of Southeast Asian Nations
AfS	Available for Sale
BI	Bank Indonesia
BHC	Bank Holding Company
BOE	Bank of England
BOJ	Bank of Japan
BOT	Bank of Thailand
BSP	Bangko Sentral ng Pilipinas—Central Bank of the Philippines
CAR	Capital Adequacy Ratio
CBC	Counterbalancing Capacity
CCAR	Comprehensive Capital Analysis and Review
CET1R	Common Equity Tier 1 Ratio
CFST	Cash-Flow Based Stress Test
D-SIB	Domestic Systemically Important Bank
DSGE	Dynamic Stochastic General Equilibrium
DSTI	Debt Service to Income
ECL	Expected Credit Loss
ECB	European Central Bank
EM	Emerging Markets
FCU	Foreign Currency Unit
FSAP	Financial Sector Assessment Program
FRB	Federal Reserve Board
FX	Foreign Exchange
GDP	Gross Domestic Product
G-SIB	Global Systemically Important Bank
HfT	Held for Trading
HQLA	High-Quality Liquid Asset
HtM	Held to Maturity
ICAAP	Internal Capital Adequacy Assessment Process
ICR	Interest Coverage Ratio
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
IRRBB	Interest Rate Risk on the Banking Book
JFSA	Japan Financial Services Agency
LCR	Liquidity Coverage Ratio
LGD	Loss Given Default
LLP	Loan Loss Provision
LTV	Loan to Value
MSMEs	Micro, Small and Medium Enterprises
NBFI	Non-Bank Financial Institution

NFC	Non-Financial Corporate
NPL	Non-performing Loan
NSFR	Net Stable Funding Ratio
OCI	Other Comprehensive Income
OJK	Otoritas Jasa Keuangan
PD	Probability of Default
PHP	Philippine Peso
RAM	Risk Assessment Matrix
RCB	Rural and Cooperative Bank
ROA	Return on Assets
RR	Reserve requirement
RWA	Risk-Weighted Asset
SEC	Securities and Exchange Commission
SME	Small and Medium Enterprise
SRB	Systemic Risk Buffer
STeM	Stress Testing Matrix
SVAR	Structural Vector Autoregressive
TB	Thrift Bank
UKB	Universal and Commercial Bank
USD	United States Dollar
WB	World Bank
WEO	World Economic Outlook

EXECUTIVE SUMMARY[1]

The Philippines is a dynamic economy with a relatively smaller financial system than other Asian emerging market economies, dominated by banks. The total assets of the system amount to 126 percent of GDP. However, bank credit is just over 50 percent of GDP and mostly goes to nonfinancial corporates (NFCs). Banks are also tightly interlinked with NFCs through conglomerate ownerships. Access to finance for individuals is significantly lower than comparator systems, with only a third of adults having formal accounts. Non-bank financial institutions and capital markets—especially bond markets—are substantially less developed than banks. The Fintech ecosystem is nascent.

The immediate risk to financial stability is from the impact of COVID-19. GDP contracted by 9½ percent in 2020—a much sharper decline than during the Asian Financial Crisis (AFC). The economy had solid macro-fundamentals before COVID-19 thanks to policy efforts, but the pandemic turned out to be an extreme tail shock. The authorities took various measures, including time-bound regulatory relief and forbearance measures, though the scale of loan moratoria and credit guarantees has been relatively limited. With policy support and easing of containment measures, the economy started to recover in the second half of 2020 and is expected to grow 6½ percent in 2021.

To gauge the effects of the COVID-19 crisis and policy effects, the FSAP conducted series of macro-financial analyses. Bank solvency and liquidity stress tests follow the standard FSAP method. This FSAP estimated models to gauge the second-round effects of bank solvency test results on GDP growth, focusing on the credit channel. Then the same model is used to evaluate the effects of counterfactual policy to write-off non-performing loans (NPLs) early. Given the importance of the bank-NFC linkage, the FSAP conducted a scenario-based NFC stress test focusing on listed firms and a joint bank-NFC cash-flow liquidity stress test to gauge the effects of loan moratoria.

Philippine NFCs are likely to experience distress as domestic and global GDP contract sharply in the already severe baseline. The adverse GDP shocks are expected to reduce corporate earnings across different sectors, especially in the energy, consumer discretionary, and industrial sectors. As a result, the debt-weighted-average interest coverage ratio would decline from 4.9 percent at end-2019 to 1.3, below one, and 0.2 percent in the baseline, adverse, and severe adverse scenarios, respectively. Debt-at-Risk would jump from five percent at end-2019 to about 45 percent even in the upside scenario and reach 80 percent in the severe adverse scenario. The NFC distress could increase NPLs significantly without private and public sector actions or economic recovery. Support from wealthy owner families of large conglomerates, fiscal aide, and credit guarantees for smaller firms could mitigate contagion to bank solvency. Loan moratoria, which do not automatically classify loans as NPLs immediately, could help firms to survive liquidity shocks if the COVID-19 crisis turns

[1] This Technical Note has been prepared by Minsuk Kim, Paola Morales, Hiroko Oura, Jiri Podpiera (all IMF), and Adhi Purwanto (IMF expert). All the exercises, assessment, and information in this note reflect data up to February 2021. Most of the exercises in this FSAP do not take into account any mitigating effects from already announced or prospective sector-specific policy support measures, which would give more conservative stress test results than otherwise.

out to be temporary. However, it might only delay eventual bankruptcy if the crisis lasts longer or challenges some firms' business model fundamentally.

While banks can withstand the exceptionally severe shocks in the baseline, they could experience a systemic solvency impact if additional downside risks materialize. Distress to the corporate sector could be widespread even in the baseline and sharply rise in adverse scenarios, elevating credit risks to banks. In the baseline, banks' total capital adequacy ratio (CAR) falls from 15.6 percent to 11.7 percent by 2022, still above the ten percent minimum requirement even without sectoral policy effects. However, CAR falls to 9.3 percent in the adverse scenario, and 4.9 percent in the severe adverse scenarios. The second-round effects from such distress might reduce the real GDP level by an additional 4 to 9 percentage points in adverse scenarios. However, CARs start to recover in 2022 as the economy recovers.

The solvency stress test results should be interpreted with caution. The test does not incorporate the mitigating policies' effects such as credit guarantees (albeit small), regulatory responses, and loan moratoria. The credit risk projection is based on the historical relationship between macroeconomic variables and probability of default (PD). Given the unusual nature of the COVID-19 crisis, the past relationship may not necessarily hold. Some of the behavioral assumptions in the standard FSAP stress test approach, which are set to assure cross-country comparability of exercises—may give relatively pessimistic estimates under extremely large shocks like COVID-19. Most NPLs remain in the bank's balance sheets during the entire stress test horizon, which further reduces the interest income on loans. A relatively small fraction of NPLs are assumed to cure, and NPL restructuring (including write-offs and sales to special purpose vehicles) are assumed out. Besides, assuming constant bank portfolios throughout the stress test horizon disregards that banks could optimally adjust their portfolios to mitigate macroeconomic shocks' effects.

Moreover, additional policy measures for banks, including precautionary limits to bank's dividend distribution, could mitigate the COVID-19 crisis' impact noticeably. For example, a simulation of a one-time counterfactual policy to write off NPLs early using available excess capital could improve the projected GDP for several years, yielding net benefits above the cost. The experience after the Asian Financial Crisis (AFC) also suggests such a measure could be effective to sustain healthy credit growth that can support economic recovery. Write-off could be financed by limiting banks' dividend distribution immediately as a precautionary measure and be ready to take additional measures to strengthen banks' capital even more if downside risks materialize.

On the other hand, banks have sufficient buffers to withstand severe liquidity shocks, in part supported by high levels of the reserve requirement. High-quality liquid assets (HQLA) for the calculation of liquidity coverage ratio (LCR) are mostly reserves and sovereign securities. Banks rely mainly on retail and wholesale deposits. The system appears to be more resilient against FX liquidity shocks than local currency liquidity shocks. However, buffers are concentrated in a couple of Global-SIB branches. Since total currency LCR replaced FX liquidity requirements for foreign currency unit, the BSP could consider introducing FX LCR. The net stable funding ratio and cash flow analysis show similar outcomes. Especially, a high reserve requirement is critical for cash flow stress test results. At the end-2019, most reserves originated from a 14 percent reserve requirement ratio (RR-ratio). If

banks are allowed to use all the reserves, all universal and commercial banks can survive severe cashflow stress for months. The BSP reduced the RR-ratio to 12 percent when the COVID-19 crisis hit, which increased system-wide and individual banks' usable buffer modestly.

As for the liquidity linkage between banks and NFCs, the system-wide liquidity analysis shows certain policies, such as loan moratoria may not achieve their intended results depending on the behavior of banks and NFCs. Liquidity stress to NFCs from lower earnings could spill over to banks, and loan moratoria could further complicate the linkages. The direct effect of loan moratoria is to improve NFC cash balance while reducing bank cash inflows and liquid assets. Without moratoria, NFC cash balance declines for debt service, which increases bank liquidity conditions. However, liquidity-strapped NFCs may withdraw bank deposits to fulfill payment obligations, weakening banks' cash position. Furthermore, if banks continue to roll over maturing NFC loans, NFC's liquidity balance recovers with or without moratoria. The results show that for NFCs, moratoria can substantially improve their liquidity balance when banks' rollover rate is low but less so otherwise. So, the policy effectively supports them with credit supply shocks but not much so without the shocks. For banks, overall moratoria effects on their liquidity balance critically depend on whether NFCs have alternative financing sources. If NFCs withdraw deposits, banks might experience broadly the same cashflow effects irrespective of moratoria policy. The Bangko Sentral ng Pilipinas (BSP) could monitor banks and NFCs' contingent financing plans to gauge the systemwide effects better.

The BSP should enhance its macro scenario stress testing exercises. Currently, the supervision sector implements all bank-related analysis, and the Office of Systemic Risk Management (OSRM) focuses on non-financial sectors and their link to banks. No units/sectors conduct macro-scenario stress testing—one of the essential tools for financial stability analysis—despite the staff's strong capacity. The BSP should start such exercises. There is no single best practice about how to organize stress testing work. Several units and sectors could work jointly, or different sections could conduct distinct exercises depending on their objective.

Financial supervisors in the Philippines should make further efforts to close data gaps. The BSP should leverage the International Financial Reporting Standards (IFRS) 9 introduced in 2018 for the calculation of regulatory capital and start collecting more granular credit risk parameters such as PD, loss-given-default (LGD), and loan-to-value (LTV) ratio. Such data help refine stress test models and help the BSP challenge banks' practice by comparing a bank's assessments to other banks' and the BSP's assessments. The Securities and Exchange Commission's (SEC) initiative to create an NFC database is welcome to extend the NFC analysis beyond listed firms. Over the medium term, the household survey and credit registry data should be enhanced to develop more granular borrower-based credit risk indicators.

Table 1. Philippines: Recommendations—Risk Analysis

Recommendation	Timing[/1]	Agency
Addressing Resilience, Integrity, and Effectiveness		
Financial stability policy		
Limit bank dividend distributions while downside risks remain high and be ready to take additional measures to strengthen banks' capital if the risks materialize to continue providing credit to the economy.	ST	BSP, FSCC members
Consider introducing FX LCR (94)	MT	BSP
Risk analysis		
Develop macro-scenario based microprudential stress test of banks (62)	MT	BSP
Develop macroprudential stress test of banks (64)	MT	BSP
Develop tools that jointly examines banks, NFCs, and the real economy to enhance systemic risk assessment (64, 106)	MT	BSP
Enhance collaboration		
Enhance collaboration within the BSP to conduct essential macroprudential risk analyses, including macro scenario stress tests of banks (62, 64)	MT	BSP
Improve data sharing arrangements within the BSP (65)	MT	BSP
Further strengthen NFC information sharing between the BSP and SEC. (36)	MT	BSP, SEC
Closing data gap		
Continue the effort to construct NFC database beyond listed firms. (36)	MT	SEC
Collect more granular data on banks' credit risk (PD, LGD, LTV), leveraging the introduction of IFRS 9 (67, 68, 69).	MT	BSP
Improve household survey data and credit registry to develop borrower-based credit risk indicators (69)	MT	Government, BSP
Consider monitoring contingent financing plans of large banks and NFCs (205)	MT	BSP

[/1] Short-term (ST) = within one year; medium-term (MT) = one to three years

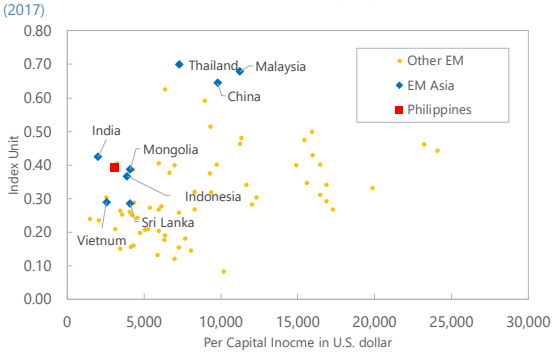
MACROFINANCIAL SETTING

A. Financial System Structure

1. The size of the financial system is broadly in line with the economy's level of development (Figure 1). The total assets of the system amount to 126 percent of GDP (Table 2). The banking system holds about 94 percent of the system's assets, but bank credit is just over 50 percent of GDP as banks hold substantial liquid assets. Access to finance for individuals is significantly lower than in other Asian emerging market economies (EMs), with only a third of adults having formal accounts.

Financial Development

The Philippines's financial development is above average among Ems but on the lower side among emerging Asian economies.



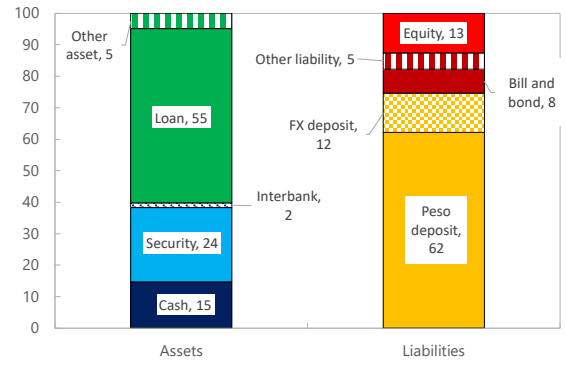
Sources: IMF Financial Development Index

The index is based on a composite of financial institution and market development (depth, access, and efficiency).

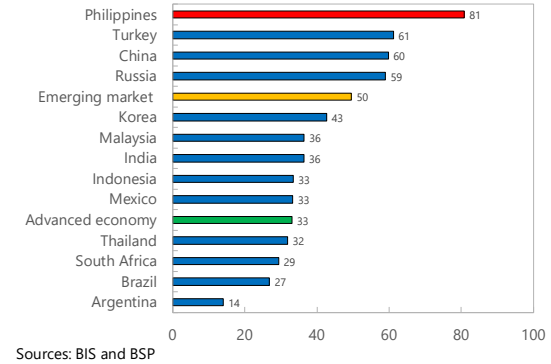
2. The banking sector is dominated by several large domestic banks. Forty-six universal and commercial banks (UKBs) hold over 94 percent of bank assets, of which 60 percent are held by the top five banks (all domestic). D-SIBs, including branches of some Global-SIBs. hold about 80 percent of the banking sector. Foreign bank subsidiaries and branches, which are supervised in the same manner in the country, hold seven percent of bank assets. Also, there are about 500 small thrift banks (TBs) and rural and cooperative banks (RCBs).

Philippines: Bank Business Model

Banks follow a traditional commercial banking business model with a large share of liquid assets



80 percent of the loans go to NFCs, an unusually high level compared to other countries.



Sources: BIS and BSP

Source: BIS, BSP, and IMF staff calculations.

3. Overall, banks follow a traditional commercial banking business model, relying on deposits and lending mostly to large NFCs (Figure 2). While loans represent about 55 percent of assets for UKBs and RCBs, they represent close to 72 percent for TBs. Eighty percent of the loans go

to NFCs, which is unusually high, partly because of underdeveloped corporate bond markets. The exposure to real estate loans is relatively low because of a regulatory limit of 20 percent of total loans applicable (only) to UKBs (raised to 25 percent upon COVID-19 permanently). Real estate loans are largely commercial. The exception is TBs, providing one-third of their loans to residential properties. TBs and RCBs are more exposed to household consumption and agriculture loans, accounting for 32 percent for TBs and close to 50 percent for RCBs. Overall, banks are liquid with nearly 40 percent of their assets in securities and central bank reserves, the highest level among Asian EM peers. The liability side is more homogenous across different bank types, albeit a larger importance of domestic deposits for TBs and RCBs and a larger share of equity for RCBs.

4. NFCs are deeply interconnected with the financial system through "mixed" conglomerate structures that include NFCs and financial institutions (Figure 3). Seven out of the ten largest banks are related to local-family-owned mixed conglomerates, and these banks hold about 60 percent of the banking sector's assets. The figure and a network analysis by the BSP suggest that the primary source of contagion among banks is common exposures to large conglomerates.

5. The other segments of the financial system are underdeveloped. Nonbank financial institutions (NBFIs)—insurers, mutual funds, and pension funds—are much smaller than several Asian peers. Insurance penetration is low by international standards (1.3 percent from 2013-2017). Total industry premiums were only 1.65 percent of GDP, and total assets amounted to US$31.5 billion. There are also varieties of informal nonbank micro-financial institutions (mostly pawnshops). Informal financing among family members is more significant to households than bank loans. Regarding capital markets, the domestic stock market capitalization and bond outstanding are roughly 90 percent and 30 percent of GDP, respectively, standing at the lower side in the region. The debt market is dominated by government securities.

6. The Fintech ecosystem is nascent. Digital payments are used much less than in Asian EM peers. The 2017 Global Findex results indicate that only a quarter of the adult population made or received at least one digital payment in the preceding year. Some of the constraints include expensive bank charges and barriers to establishing IT and communication infrastructure for the archipelago of over 7,000 islands.

7. The financial system is indirectly exposed to international spillovers (Figure 4). Banks' direct cross-border exposure is low at about 10 percent of bank assets and liabilities, mostly to service overseas Philippine workers. Dollarization is also moderate (15 percent of deposits and 11 percent of loans are in FX). Exposures to FX risks are tightly regulated with separate licensing requirements to conduct FX transactions and strict limits to open an FX position. Banks have maintained positive open FX position. Most international spillovers are likely to stem indirectly from NFC's international borrowing, trade, and declines in financial asset prices. International remittance

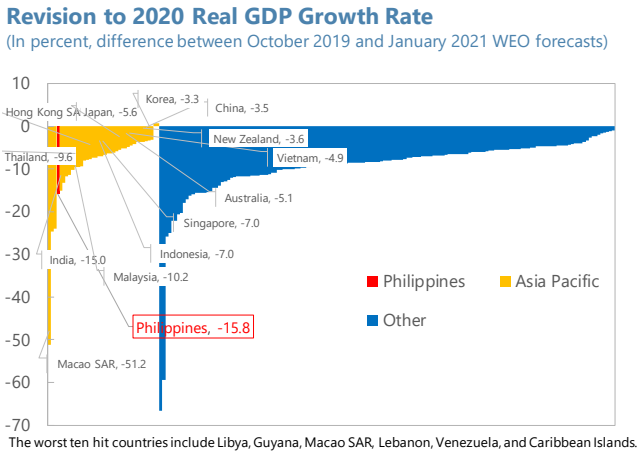
inflows are significant (about eight percent of GDP annually) but may have little impact on banks' FX deposits because they can be credited to banks only in pesos in most cases.[2]

B. Macro-financial Development

8. The Philippines was severely hit by COVID-19 (Figure 5 and Table 3) but is now recovering. Real 2020 GDP contracted by 9.5 percent. The government imposed stringent quarantine measures, resulting in 12 percent (half a year on half a year, seasonally adjusted.) real GDP contraction in the first half of 2020. The recovery started in the third quarter, mainly driven by easing containment measures and economic policy support with real GDP increasing by 8.0 percent in the third quarter and 5.6 percent in the fourth quarter (quarter-on-quarter, seasonally adjusted.). The Fund projects 2021 real GDP growth to be 6.6. percent (January 2021 World Economic Outlook, WEO).

Philippines: Magnitude of the COVID-19 Shock to WEO Forecasts

The Philippines is one of the worst-hit economies by the COVID-19, which reduced the 2020 real GDP growth rate forecast by 15⅔ percent (bottom eight percentile of the global distribution) compared to the pre-COVID forecast. .



The worst ten hit countries include Libya, Guyana, Macao SAR, Lebanon, Venezuela, and Caribbean Islands.

9. However, the economy went into the pandemic with better macro-financial fundamentals than before the AFC as a result of bold structural reforms and prudent macroeconomic policies (Figures 5–6). Economic growth has been over 6 percent during 2013–19, with moderate inflation. Public debt steadily declined in the past 20 years, reducing the country risk premiums. External debt and international reserves. Pre-COVID financial indicators of NFCs were healthier than the pre-AFC time. While property prices doubled in the past ten years, they are broadly in line with income growth, and residential mortgages are only four percent of GDP.

10. Before the pandemic, banks' health appeared comparable to other EMs despite some deteriorations since the mid-2010s (Table 4 and Figure 7). By historical standards and among key EM comparators, the NPL ratio was low at end-2019. Total regulatory capital adequacy ratio

[2] Major money transfer operators offer USD payments in cash.

(CAR) has been stable at about 15 percent in the past ten years, and the quality of capital is high. Nonetheless, the CAR is lower than in many EMs as they strengthened their capital during the same period. Return on assets (ROA) has been about 1½ percent—at the median among EMs—supported by high interest margins. TBs and RCBs tend to have higher NPL ratios (around 6 and 11 percent, respectively) than UKBs (about 1½ percent). But they also have higher capital ratios than UKBs.

11. There are notable differences in financial soundness indicators across bank types and individual banks (Figure 8). Dispersion of CARs is particularly large across UKBs. While the median UKB has a CAR of 21.5 percent, the interquartile range goes from 15.5 percent to 70.6 percent. Among UKBs, D-SIBs tend to be in the lower quantile of the distribution with a median CAR of 15 percent (compared to 34 percent for non-D-SIBs), making them less resilient to shocks. On the other hand, TBs and RCBs tend to have larger dispersion in ROAs and NPLs, pointing to pockets of vulnerability, particularly to credit related shocks. While in principle the failure of TBs or RCBs would not pose systemic risk, weaknesses in these banks could be problematic if their resolution is not handled effectively.

12. So far, the financial system has broadly withstood the COVID-19 shock, in part supported by domestic and global policy measures (Figure 5, Table 5).

- **Financial markets**: Markets recovered well after a brief period of increased volatility in March 2020. The exchange rate appreciated slightly against the USD for 2020 as a whole, and gross international reserves recovered by nearly US$20 billion to US$110 billion between end-April and end-year (11 months of import coverage). The BSP cut policy rates and reserve requirements in contrast to the AFC.

- ***NFCs***: Market analysts forecast significant earnings shocks, especially in retail, tourism, transportation, and construction industries. The authorities launched a small (0.6 percent of GDP) credit guarantee program for loans to small- and medium-sized enterprises (SMEs) and the agricultural sector. Moratoria (total of five months) expired at the end of 2020.

- ***Banks***: Lending standards have tightened, and credit is contracting though the credit gap remains positive as GDP contracts. The NPL ratio rose from 2.1 at the end-2019 to 3.4 percent in September 2020, so has the share of past-due loans and restructured loans. However, the CAR rose over one percentage point since end-2019 (Table 4). However, these figures may have optimistic bias under moratoria and forbearance measures. At the same time, banks continued to receive new deposits, reducing the loan-to-deposit ratio noticeably.

13. The BSP also issued time-bound regulatory relief and forbearance measures (Table 5). Measures included unusually strong forms of forbearance to delay NPL recognition and allow banks to provision over a maximum period of five years subject to the BSP's approval. The uptake appears to be limited so far, given the BSP's tight approval criteria. BSP's effort to keep track of credit quality information without policy measures to maintain transparency should help assessing the impact of some policy measures going forward.

ASSESSMENT OF VULNERABILITIES

A. Key Risks

14. The key risks to financial stability are stemming from the COVID-19 crisis and bank-corporate linkages. As discussed in the Risk Assessment Matrix (Table 6), the economic impact of COVID-19 is expected to be much worse than the AFC for the Philippines. Uncertainty about the impact remains significant, especially on the length and depth of the pandemic and its scarring effects. Lockdowns and social distancing will depress NFC earnings, and they could spill over to bank health through funding and credit exposures and ownership linkages of mixed conglomerates. Standard macroeconomic policies and the measures to support borrowers, especially SMEs, with credit guarantees and loan moratoria could complicate the transmission channels. Regulatory responses, including forbearance, might have intended and unintended effects.

B. Assessment Method

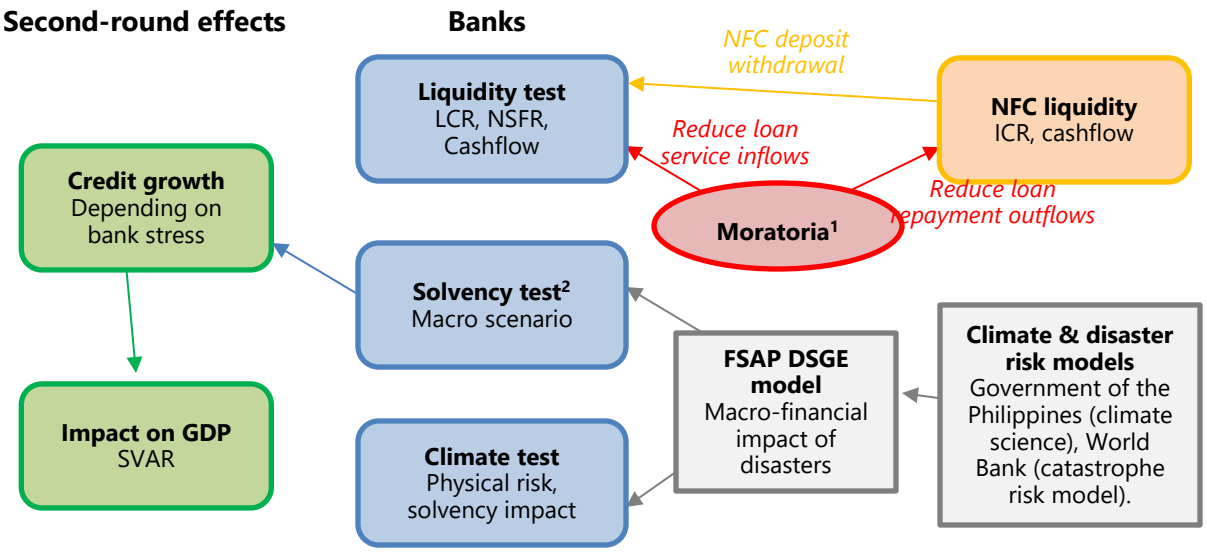
15. FSAP stress tests aim to be macroprudential focusing on systemic risk.[3] These tests usually start with macroeconomic scenarios (i.e., system-wide common shocks). They also tend to include some forms of feedback effects such as contagion in interbank and financial markets and solvency-liquidity linkages. Presentation of FSAP stress tests also emphasizes system aggregate outcomes such as system-wide capital ratios, total capital shortfalls (expressed in percent of GDP) to bring all banks' capital ratios back to hurdle rates, and the share of failing banks in percent of banking sector's assets. On the other hand, microprudential stress tests focus on assessing institution-specific risks and vulnerabilities. Scenarios and shocks could differ across banks, depending on their risk profiles. Even when the exercises use macro scenarios, as in supervisory bank stress tests conducted by authorities in the United States., the euro area, and the United Kingdom, the output emphasizes bank-by-bank results and resulting supervisory actions (such as restriction on dividend distributions and exposures and recapitalization plan).

16. The FSAP mission conducted bank stress tests and applied new tools to better understand bank-NFC and bank-economic linkages (Appendix I and text figure). As for NFC stress tests, we first assess the effects of earning shocks (as forecasted by market analysts) by industry to their capacity to repay bank loans using standard interest coverage ratio (ICR) as well as cash ratio (cash and cash equivalent holdings relative to current liabilities). In addition, we constructed a macro-scenario stress testing models to gauge the impact on ICR and cash ratios under the same macroeconomic scenarios used for bank stress tests. The bank solvency test covers all banks, and liquidity tests examine UKBs. Both use end-2019 data, as reported 2020 data are likely to be biased upward due to temporary policy effects. Solvency test results are then used to estimate the second-round effects on GDP through credit growth channels. The model is applied to analyze counterfactual policy to restructure NPLs promptly. Cashflow stress tests of banks and NFCs are

[3] See IMF working paper (IMF, 2018) and MCM departmental paper by T. Adrian, J. Morsink, and L. Schumacher (IMF 2020) for IMF views on macroprudential stress tests.

linked to assess their liquidity contagion. The mission also developed a new approach to assessing physical risk from climate change, discussed in a separate technical note.

Philippines: Quantitative Risk Analyses and Their Linkages



DSGE = Dynamic Stochastic General Equilibrium, ICR = interest coverage ratio, SVAR = Structural Vector Autoregressive
1/ Loan moratoria could reduce NFC liquidity stress and therefore drawdown of NFC's liquid assets including bank deposits. While it reduces cash inflows to bank from loan repayments, banks may experience lower deposit withdrawal from NFCs. It will reduce bank capital if banks eventually need to write off moratorium-related restructured loans.
2/Bank solvency test does not examine additional effects from interbank exposures as such links are negligible (Figure 3).

17. These exercises in this FSAP do not take into account any mitigating effects from already announced or prospective sector-specific policy support measures, except for the system-wide liquidity analysis. The effects of monetary and fiscal policies are incorporated into the scenarios. However, the effects of, for example, credit guarantees, and regulatory responses are not incorporated. So far, the size of the credit guarantee appears small and does not seem to influence the thrust of our assessment much.[4] Moratoria expired at the end of 2020. We consider it is important NOT to include forbearance measures that are inconsistent with Basel III minimum requirements. They could artificially improve bank capital but not the "true" economic capital. The exception is the system-wide liquidity analysis of banks and NFCs that incorporates announced and possibly enhanced loan moratoria (which are not forbearance).

18. It should be noted that standard FSAP stress tests assumptions may produce relatively pessimistic results than outturns. To begin with, the FSAP stress test is not a forecasting exercise even for the baseline. It does not aim at minimizing forecast errors. Rather, it targets to assess the

[4] So far, the government announced a small 0.6 percent of GDP worth credit guarantees for small businesses and the agricultural sector. While it could reduce credit costs to banks, the size of the support is small compared to the projected bank capital shortfalls in adverse scenarios. Therefore, incorporating the guarantee effects will not change the thrust of our stress test results.

resilience of the system in tail events and with "neutral behaviors" in order to ensure cross-country comparability of exercises and minimize arbitrary assumptions. For instance, stress test results depend on the behavior of banks—e.g., balance sheet deleveraging. If banks aggressively shrink their loan portfolio, shift to safer creditors/assets, or write-off NPLs, the resulting bank soundness indicators could improve. However, it is hard to pin down such bank behaviors adequately. Therefore, stress tests typically assume certain behaviors to neutralize any mitigating effects from bank management's actions.

19. In addition to standard bank stress tests, this FSAP attempts to evaluate the bank solvency stress test results in a more "macroprudential" manner by estimating the second-round effects of bank distress to real GDP growth. The IMF defines systemic financial stability risk as "the risk of widespread disruption to the provision of financial services that is caused by an impairment of all or parts of the financial systemic, which can cause serious negative consequences for the real economy." A narrow interpretation of the definition means that the judgment over whether a certain shock is systemic or not depends on the feedback effects of the financial sector's distress to the real economy—especially economic growth.

20. We estimate the second-round effects focusing on credit channels (see Appendix I and diagram above). Following the spirit of the framework developed by Catalan and Hoffmaister (2020), we first estimate bank-by-bank panel models to project credit growth in response to the changes of bank soundness indicators (the output of stress tests, such as capital). Then, the impact of (aggregated up) credit growth—a credit shock—is put into a structural VAR (SVAR) macro-financial model to gauge the resulting changes to GDP growth rate in addition to what was originally assumed in the macro scenarios for bank solvency tests.

21. A key difference of this FSAP's approach from the Catalan-Hoffmaister approach is that our estimate is the "first-round estimate of the second-round effects." The Catalan-Hoffmaister approach uses the same SVAR to generate macro scenarios for bank solvency stress test and estimate the feedback effects from bank distress to the real economy. The approach yields an initial macro scenario, bank solvency stress tests, credit growth, and feedback effects back to the real economy that are fully consistent with each other. In our method, macro scenarios are generated by the DSGE model, and second-round effects are estimated by the SVAR model, leaving some levels of incompleteness. Still, it goes beyond the standard FSAP stress tests and provides some ideas about the potential size of the second-round effects.

22. The second-round effects model can also be used to evaluate the effects of some actual and counterfactual policies. The second-round effect model can provide an economy-wide cost-benefit analysis of counterfactual policy measures from a "planner's" perspective irrespective of who benefits or bears the costs. In particular, we consider the effects of NPL write-off—the funding could come from anywhere, from existing shareholders (including from limiting dividend distributions), owner families of conglomerates, new shareholders, and the government as the last

resort—to support banks to write off NPLs or accumulate loan-loss provisions (LLPs).[5] The additional provisions needed to write-off NPLs are the total cost of the counterfactual policy, while benefits are measured by the improvement of real GDP over the stress test horizon in response to the policy. While we broadly follow the Catalan-Hoffmaister approach developed in the context of IMF technical assistance, the application in FSAPs is new. Therefore, there could be large model uncertainty (partly because the exercise is conducted in the middle of the COVID-19 crisis when model behavior is not stable). Therefore, the figures should be interpreted carefully. However, they could help to disentangle complex transmission channels and nuance the effectiveness of certain policies.

23. Furthermore, we examine the liquidity linkage between banks and NFCs, focusing on loan moratorium effects using the recently developed IMF tool. The tool starts with cashflow liquidity stress tests of NFCs and banks. Then the assumptions for some items (such as deposit runoff rate) in bank stress tests are linked to the results of NFC liquidity stress tests and vice versa. As shown in the diagram above, loan moratoria would reduce debt service cash inflows to banks and outflows from NFCs. The overall impact on bank liquidity depends on the runoff rates of NFC deposits, which are important components of NFC liquid assets buffer that may be liquidated in response to NFC liquidity stress.

C. Scenarios

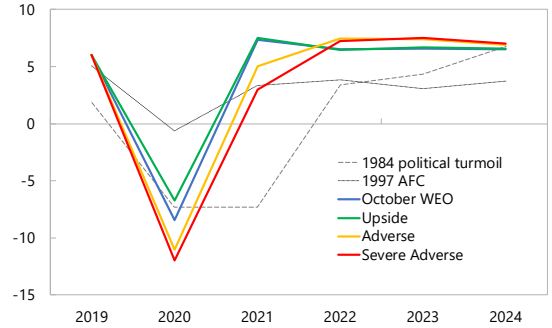
24. Four common macroeconomic scenarios were considered across exercises, assuming different degrees of risks from COVID-19. The real GDP paths of all the scenarios are more severe than the AFC but less than the political turmoil episode in the mid-1980s. Key drivers include the extent of lockdown and medium-term scarring effects from corporate bankruptcies and persistent unemployment. However, unlike the AFC, policy rates are assumed to remain countercyclical in all scenarios based on the development up to 3Q 2020 and the expected accommodative policy stance of major central banks. Still, financial conditions tighten slightly as equity prices drop, corporate credit spreads rise, and banks' interest margins shrink. See technical note on climate change stress test for the details of the DSGE model used to produce scenarios.

[5] The exercise focuses on NPL write-off and LLP instead of capital since the first two show statistically significant explanatory power in the credit model while bank capital ratios (and their deviation from minimum requirements) do not. See the section on the macro-financial linkage for more details.

Philippines: Macro Scenarios

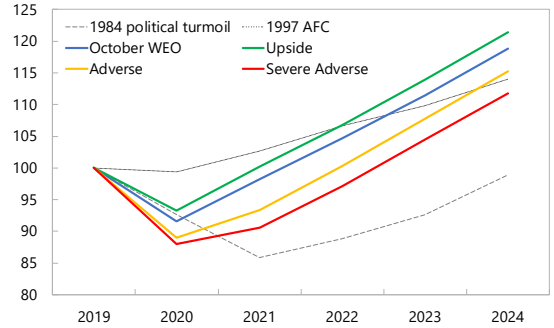
The baseline with COVID-19 is exceptionally weak—equivalent to nearly three standard deviation shock to the pre-COVID WEO forecast. The severe adverse scenario additionally includes a 3.8 standard deviation shock to GDP growth the baseline and a total of over six standard deviation shock compared to the pre-COVID forecast.

Macroeconomic Scenearios
(Annual real GDP growth in percent)



Sources: Philippine authorities; and IMF staff estimates.

Macroeconomic Scenarios
(Real GDP in level terms, 2019=100)



Sources: Philippine authorities; and IMF staff estimates.

Note: See Appendix I for more details, including paths of other macrofinancial variables.
Ex post, January 2022 WEO forecast (real GDP growth rate is -9.6 percent for 2020, 4.6 percent for 2021, and 6.3 percent for 2022) is revised down from October 2020 WEO (-8.3 percent for 2020, 7.4 percent for 2021, and 6.5 percent for 2022) but still above the adverse scenario.

- ***The baseline scenario*** follows the October 2020 WEO forecast, which factors in tight lockdown effects in the first half of 2020 (-8½ GDP growth rate for the year), followed by a visible recovery in 2021. The scenario shows a much sharper 2-year cumulative GDP contraction than AFC for the first two years, equivalent to a three-standard deviation shock to the pre-COVID WEO forecast (as of January 2020) showing growth rates near potential (6½ percent per year for 2020–24). The actual 2020 growth rate (-9.5 percent) turned out to be weaker than the October WEO, but roughly the same as January WEO, forecasting -9.6 percent for 2020 and 6.6 percent for 2021 (Table 3).

- ***The upside scenario*** incorporates national authorities' forecast as of September 2020, which has a slightly more optimistic GDP growth rate in 2020 than the baseline.

- ***The adverse scenario*** assumes prolonged lockdown measures throughout 2020 and with some scarring effects in 2021. Real GDP growth would contract by 11 percent in 2020, followed by a weaker recovery in 2021 than the baseline. The first 2-year cumulative growth amounts to a ⅔ standard deviation shock to the baseline (nearly a four standard deviation shock to the January 2020 WEO forecast). Even though January 2021 WEO forecast was revised down from the baseline, it is still above this adverse scenario.

- ***The severe adverse scenario*** assumes prolonged and even more stringent lockdown in 2020 with more severe scarring effects in 2021. The first 2-year cumulative growth would reach -6½ percent, equivalent to a 1⅓ standard deviation shock to the baseline.

CORPORATE SECTOR STRESS TEST[6]

25. This FSAP conducts a stress test exercise of Philippine firms' financial health, expanding the 2020 Article IV work. The exercise estimates their debt service capacity, proxied by the interest rate coverage ratio (ICR), and their cash positions at end-2020. The macroeconomic scenarios considered are consistent with those used for the banking system stress tests. The sample comes from Capital IQ, S&P Market Intelligence, and consists of 151 non-financial firms as of end-2019, of which 147 firms are publicly listed firms. The sample is nationally representative for the purpose of this study, accounting for about 44.4 percent of the Philippines' outstanding NFC debt and 46.1 percent of banks' total loan portfolio (net of the reverse repo agreements with the BSP).

Philippines: Sample Representativeness as of 2018

Revenue / GDP (%)	Value Added / GDP (%)	NFC Debt Share (%) 1/	Market Cap. Share (%)	Bank Loan Share (%) 2/	Employment Share (%)
38.9	17.4	44.4	70.3	46.1	1.2

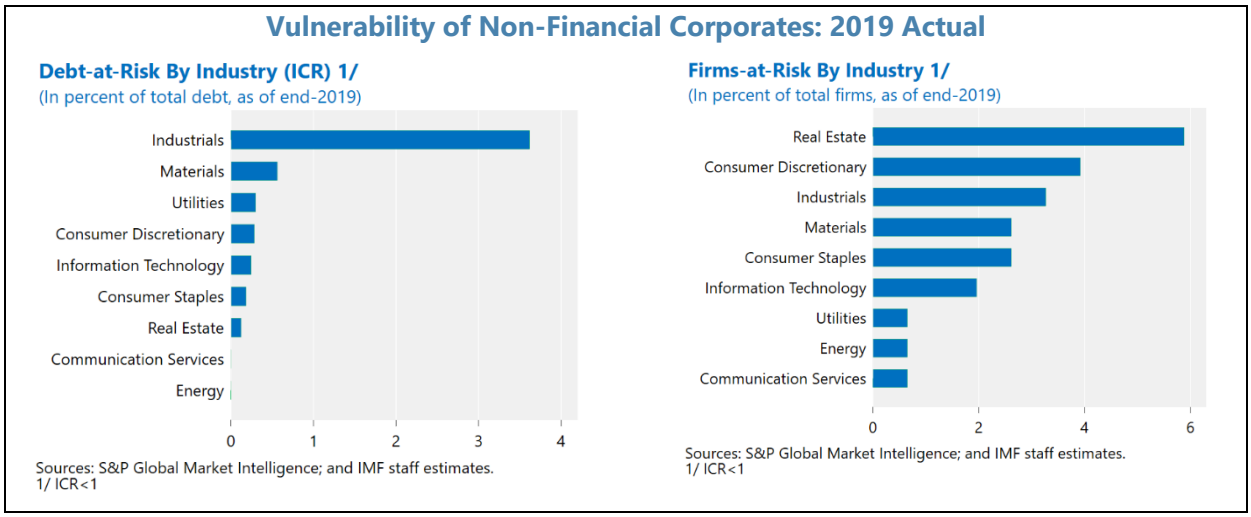
1/ Percent of NFC debt as of 2019:Q1.
2/ Percent of total outstanding loans to residents, net of BSP RRP agreements.

26. The data show that Philippine firms entered the pandemic with strong earnings over interest expenses (Figure 6). The median and debt-weighted ICR at end-2019 stood at about 3.6 and 4.9, respectively, implying adequate debt service capacity. Nonetheless, the ICR had declined somewhat since 2014, mainly reflecting the rise in the cost of financing and corporate leverage, although strong profitability (about 6 percent return on assets for the median firm) provided some offset. In terms of the sample distribution in 2019, the ICRs were significantly lower for smaller firms and those in energy, materials, and information technology.

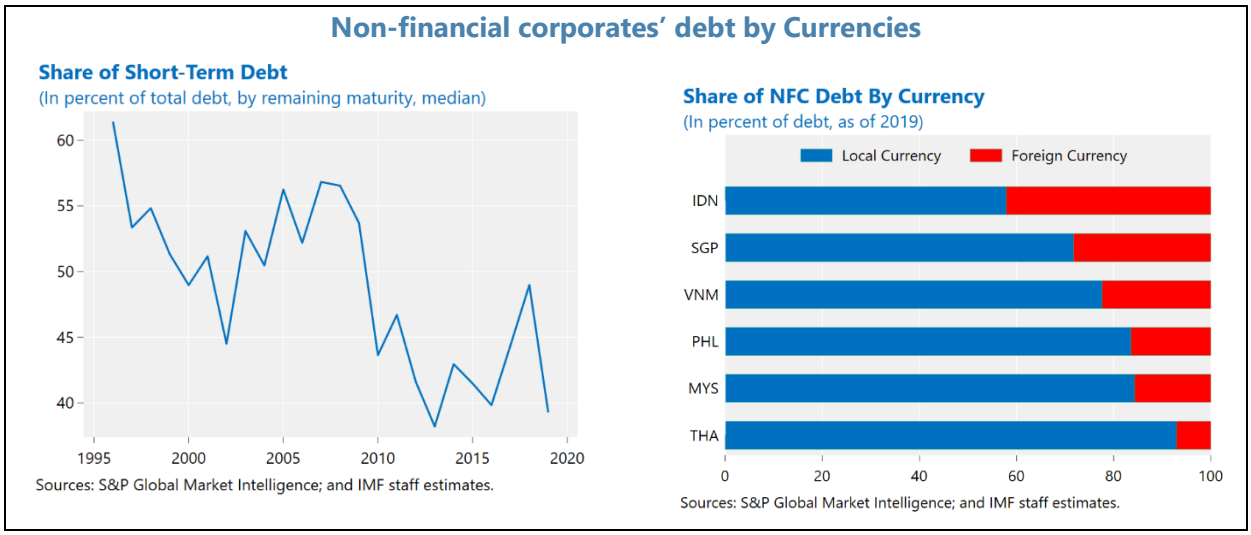
27. The debt-at-risk share increased during 2014—2019, but still comparable to historical levels. The share of NFC debt held by firms with ICR below one rose from a record low level of about 1.7 percent in 2016 to about 5.3 percent in 2019, which is still well below the double-digit levels observed before the global financial crisis. Meanwhile, the share of sample firms with ICR below one in 2019 was at a moderate level of about 22 percent. Compared to other economies in the region, the overall debt service capacity of Philippine firms was among the strongest, both in terms of the debt- and firm-at-risk shares based on the ICR-below-one threshold (Figure 6).

28. Firms in the industrial sector tend to have lower ICR and, therefore, are the sources of debt-at-risk. Of about 5.3 percent of the NFC debt held by firms with ICR below one in 2019, about 68 percent (or 3.6 percent as the share of total sample NFC debt) was held by firms in the industrial sector, which includes industries such as transportation, construction, and heavy machinery and equipment. In terms of the share of firms, however, real estate, consumer discretionary, and industrials accounted for the highest shares of risky firms in the sample.

[6] This section is drafted by Minsuk Kim (IMF, Asia and Pacific Department).



29. The structure of Philippine NFCs' debt was also relatively less vulnerable before the crisis. In terms of the maturity structure, the share of short-term debt (on a remaining maturity basis) prior to the COVID-19 crisis was significantly lower than in the AFC and the global financial crisis episodes. Moreover, the share of FX debt was also moderate compared to other major ASEAN economies, indicating a limited exposure to currency risk.



30. The cash buffers were at comfortable levels before the crisis, despite some decline in recent years. Cash used to be considered as negative debt in the past, but corporate finance has become more complex over the past several decades. Across the globe, NFCs these days have notable cash and cash equivalent liquid assets while they have gross borrowing. Even if firms' ICR falls below one, they can continue servicing their debt if they have sufficient cash buffer. The median cash ratio in 2019, for example, stood at about 24 percent, implying that Philippine firms' median cash holding was enough to cover almost one-quarter of total liabilities coming due within a year. Although this ratio had declined from a recent peak of 37 percent in 2014, it remained above the

ASEAN median of 23 percent in 2019. Significant differences existed across industries; however, with firms in materials, communication services, and real estate had cash ratios below 20 percent.

A. Methodology

31. The exercise estimates ICRs using two complementary approaches (see Appendix II for more details). In one approach, we directly apply relevant shocks to the subcomponents of the ICR (i.e., operating income and interest payment) at the end-2019 to estimate the ICR value at end-2020. The operating income shock is set based on the information from consensus earnings forecasts of market analysts, whereas shocks applied to interest payments—namely, the exchange rate and the interest payment shock—are set in line with the baseline scenario. In an alternative approach, we use a regression-based approach to predict the ICRs at end-2020, where the explanatory variables consist of a set of macroeconomic and global variables. This approach allows for estimating ICRs under upside, adverse, and severe adverse macroeconomic scenarios discussed in the previous section in addition to the baseline.

32. Cash positions at end-2020 under the baseline scenario is estimated by adding expected cash flow during 2020 to cash balance at end-2019. Specifically, the cash flow from operations is assumed to decline in line with the operating income shock assumed for the ICR analysis. Capital expenditure and debt refinancing are set at levels broadly consistent with the magnitude of the macroeconomic shocks, based on the historical trends.

B. Results

33. Philippine firms are likely to experience substantial distress even in the baseline (Figure 9). Under the baseline scenario, the median and the debt-weighted mean ICRs are expected to decline to about 0.9 and 1.3 in 2020, respectively, down from 3.6 and 4.9 in 2019. The deterioration in the debt service capacity is expected to be driven by the fall in ROA, which in turn reflects the lower projected real GDP growth in the Philippines and the rest of the world.

34. The decline of ICR implies that the share of NFC debt-at-risk would jump to 55 percent in 2020, up from 5.3 percent in 2019. The sharp increase in the debt-at-risk share is expected to be driven by large firms, as indicated by the relatively larger decline in the debt-weighted ICR than the median ICR. Meanwhile, the share of firms with ICR below one is expected to rise to about 48 percent of total sample firms in 2020, up from 18.3 percent in 2019, pointing to a risk of mass corporate failures if these firms cannot find additional financing (e.g., support from conglomerate groups and founders' families as well as additional equity or bond issuances) or without large-scale policy interventions.

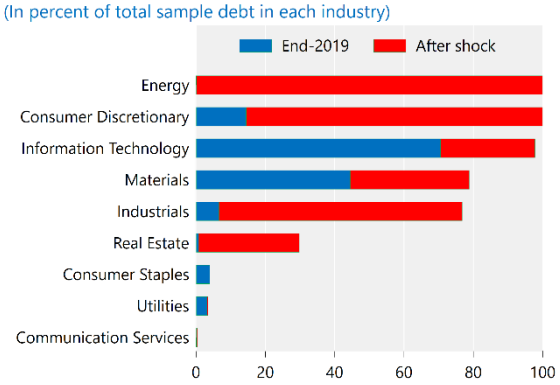
35. The results show large variations in the COVID-19 impact across industries. In terms of the size of the impact on the debt-at-risk and firm-at-risk shares, energy, consumer discretionary,[7] industrials are expected to see the largest increases, broadly in line with market expectations.

[7] Based on the Capital IQ industry classification system, tourism-related industries, such as hotels, restaurants, and leisure, would all fall under consumer discretionary.

Information technology is also expected to be among the most vulnerable industries, but largely due to the already low profitability before the pandemic.

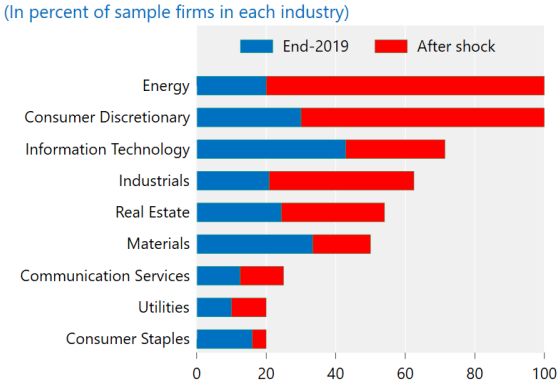
Vulnerability of non-financial corporates: Stress Scenario

Debt-at-Risk (ICR<1)
(In percent of total sample debt in each industry)



Sources: S&P Global Market Intelligence; and IMF staff estimates.

Firm-at-Risk (ICR<1)
(In percent of sample firms in each industry)



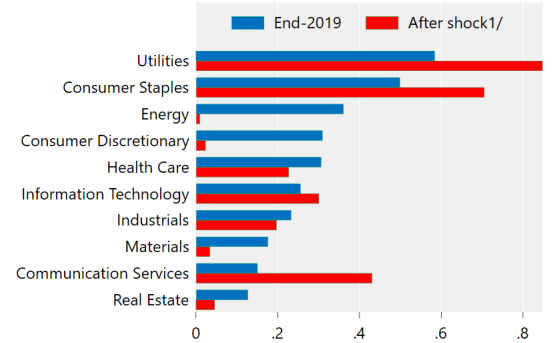
Sources: S&P Global Market Intelligence; and IMF staff estimates.

36. Under adverse macroeconomic scenarios, the debt-at-risk share would rise to above 70 percent. In the adverse and severe adverse macroeconomic scenarios described above, the debt-at-risk shares in 2020 are expected to increase to about 76 percent and 81 percent, compared with the 55 percent level in the baseline scenario. Even under the upside scenario, the share is expected to reach 45 percent, substantially higher than the 5 percent level in 2019.

37. However, the impact on the cash position is expected to be relatively moderate, indicating that some firms with low ICR might be able to survive short-lived liquidity stress. At the system-wide level, the cash-to-assets ratio would drop to 8.7 percent (without mitigating effects from policies such as a moratorium on loan repayments, including principal and interest), down from 9.7 percent in 2019, while the median cash ratio would drop to about 23 percent from 24 percent in 2019. Across industries, firms in consumer discretionary, energy, and real estate are expected to experience the most severe cash shortages in 2019, either due to the initial thin cash buffers in 2019 (real estate) or the relatively large expected decline in the cash flow from operations (consumer discretionary and energy).

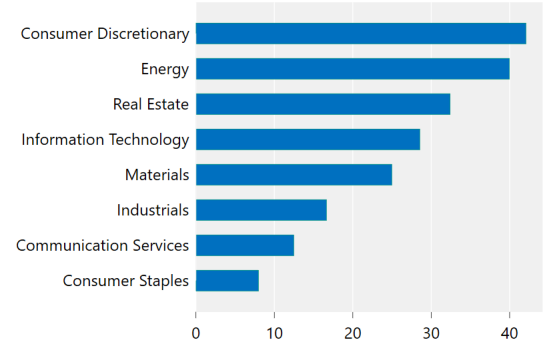
Liquidity of non-financial corporates: stress scenario

Philippines: Cash Ratio
(Cash and equivalents-to-current liab. in 2019, median)



Sources: S&P Global Market Intelligence; and IMF staff estimates.
1/ Assuming 90 percent debt rollover ratio.

Philippines: Share of Firms with Expected Cash Shortages
(In percent of sample firms in each industry, end-2020)



Sources: S&P Global Market Intelligence; and IMF staff estimates.
1/ Cash balance expected at or below 0 in 2020.

C. Recommendations

38. Monitoring of NFC vulnerabilities should be strengthened by addressing the data gap. The data used in this analysis relies on a relatively small set of Philippine NFCs that account for about 44.4 percent of the total outstanding NFC debt in the economy. While more comprehensive data exist, compiled by SEC, they become available with significant lags, hampering timely monitoring of NFC vulnerabilities. In this regard, SEC's initiatives to digitalize more comprehensive NFC data are welcome. Efforts to improve information sharing between the BSP and the SEC should also continue.

BANK SOLVENCY STRESS TEST[8]

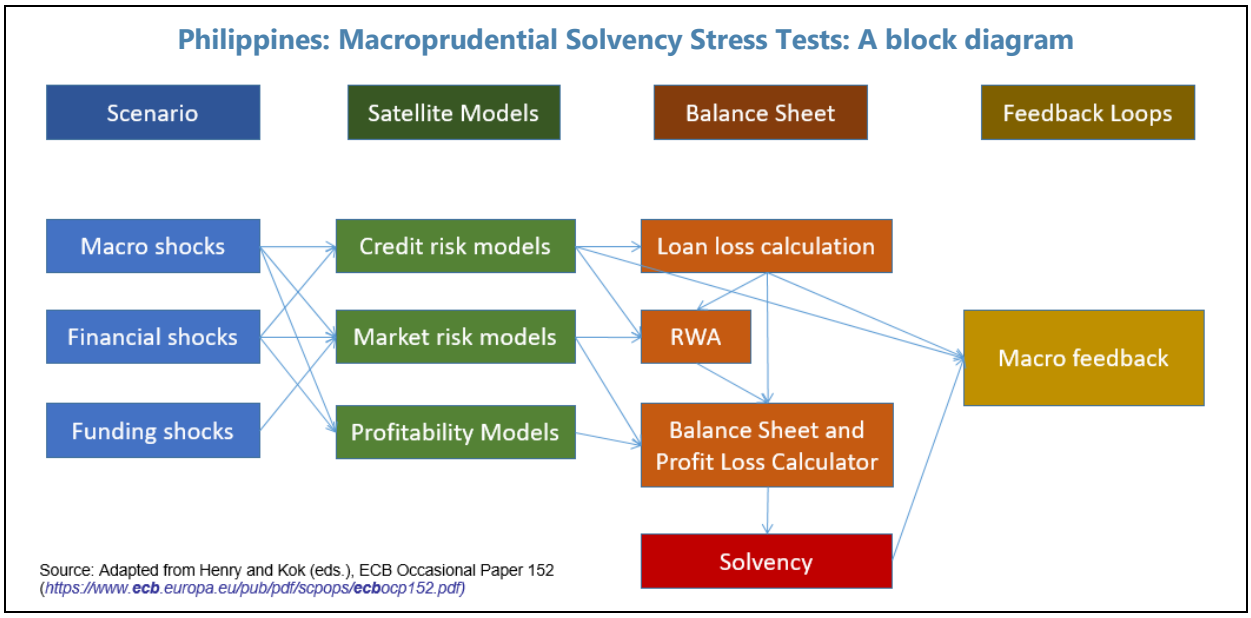
A. Methodology

39. The solvency stress test comprises a scenario-based assessment (STeM in Appendix I). The analysis covers 46 UKBs (21 universal and 25 commercial banks) including D-SIBs, 49 TBs, and 447 RCBs. These 542 banks represent 100 percent of the Philippines banking system's assets.

40. The scenario-based assessment follows the standard FSAP stress test approach using balance sheet information. The solvency stress test assesses whether banks have adequate capital buffers to withstand a set of macro-financial shocks envisioned under the four three-year horizon scenarios. While the macro scenario incorporates fiscal-monetary policy responses and some borrower support measures, the tests do not account for regulatory relief/forbearance and borrower-support measures that are not reflected in the scenarios. The diagram below illustrates selected elements of the solvency stress testing framework. Scenarios influence the credit risk, market risk, and profitability of individual institutions. This, in turn, has an impact on banks' balance sheets and profit and losses via changes in the loan loss provisions, RWAs, market gain/losses, interest income, and non-interest income. Post stress capital is calculated by adjusting the initial capital (C_0) of each institution with the stressed income ($Income^*$) and the stressed RWA (RWA^*), as follows:

$$CR^* = \frac{C_0 + Income^*}{RWA^*}$$

[8] This section is drafted by Paola Morales (IMF, MCM).



41. The tests assume a quasi-static balance sheet. The allocation of assets and the composition of funding sources remain the same as of the latest actual observation. Gross exposures in bank balance sheets, such as loans and holdings of debt securities, are assumed to grow in line with nominal GDP growth. Besides, banks are able to build capital buffers only through retained earnings (i.e., no new equity issuance).

42. Credit risk satellite models are estimated for each bank type (UKBs, TBs, and RCBs). The credit risk models link the macro-financial scenario to a proxy probability of default (PD), using quarterly information for the period 2005-2019. Proxy PDs are calculated based on historical information on the new flows of NPLs. Details on the methodology to calculate the Proxy PDs are presented in Appendix III-A. For the estimation of the credit risk models, all the possible combinations of key macroeconomic variables (e.g., real GDP growth, unemployment rate, short term interest rates, term spread, stock prices, exchange rate), as well as different lag structures, are considered. Final models are selected based on in-sample fit and significance of long-run multipliers among a pool of models that comply with sign constraints in line with economic theory. The selected models are presented in Appendix III-B.

43. UKBs' PDs are very responsive to real GDP growth, partly because their loan portfolio is concentrated in Metro Manila, where most national economic activities concentrate.[9] Their loans are mostly to large NFCs whose performance is closely linked to nation-wide GDP. On the other hand, local factors appear to matter more for TBs and RCBs, given that their loan portfolio is concentrated in the specific regions where they operate and the household sector and SMEs (Figure 8). Historically, their PDs show much higher volatility than those of UKBs. Their portfolios appear to be small and less diversified, and one or two idiosyncratic default—not necessarily related to macroeconomic development—could cause large jumps in NPL ratios. The credit risk models are

[9] Metro Manila accounts for close to 60 percent of the national GDP.

used to derive PD projection under the baseline, upside, and adverse scenarios. PDs paths are shown in Figure 10. Under the baseline scenario, PDs peak at 13 percent for UKBs, 10 percent for TBs, and 16 percent for RCBs. As expected, the highest projected PD is lower under the upside scenario and higher under the adverse scenarios.

44. Aggregate PD paths by bank type are mapped to individual bank PDs proportional to their initial PDs. The mapping is done by using the standard score (z-score in a standard normal distribution) of aggregate PDs and of individual banks' starting PDs.[10] This approach guarantees that the projected PDs of individual banks remain within the [0, 1] range. The aggregate PDs at the starting point (December 2019) are 1.04 percent for UKBs, 6.6 percent for TBs, and 9.7 percent for RCBs. However, there is a large variation across banks, as shown by the bottom right chart of Figure 10. This large variation is reflected in the distribution of projected PD paths under different scenarios. The annual flow of New NPLs is given by $PD_t * Performing\ Loans_{t-1}$ and the flow of new provisions required to cover potential losses related to new NPLs is calculated as $Loss\ given\ default\ (LGD) * New\ NPLs$.

45. LGDs are assumed to be consistent with historical coverage ratios for each bank type. LGD is assumed to be 68 percent for UKBs, 35 percent for TBs, and 66 percent for RCBs. Sensitivity analysis, using 35 percent and 85 percent LGDs for all bank types, is presented in Appendix III-C. Large difference of cure rates of NPLs across bank types (10 percent for UKB, 22 percent for TBs, and 24 percent for RCBs per quarter) contributes to the difference. LGDs are kept constant throughout the test horizon and across scenarios. It implies that the test does not incorporate the effects of COVID-related forbearance measures that allow banks to stagger provisions over (up to) five years, and credit guarantees would reduce LGD. As a result, the stress test results are likely to show weaker results than upcoming reported data even for the baseline. In other words, our stress tests exclude artificial positive effects from forbearance measures as well as true economic mitigation effects from guarantees, though the size of public credit guarantee is small and limited to SMEs and the agricultural sector (Table 5).

46. Unlike typical FSAP stress tests, the tests for the Philippines explicitly incorporate the possibility that some NPLs will "cure" back to performing. The standard FSAP stress testing framework assumes that once a loan becomes non-performing, it will remain as an NPL for the rest of the stress testing horizon. NPLs will not cure back to performing nor be taken out from the balance sheet as banks write them off. In this FSAP, we introduce cure rates—partly because historical data shows double-digit cure rates in the Philippines, affecting NPL ratio dynamics substantially. Also, to the extent that the COVID impact is short-lived, many NPLs are likely to be cured as economic activities recover. However, we continue to exclude write-offs.

47. Cure rates are assumed to be equal to a fraction of the average historical cure rate per bank type. In particular, the cure rate with respect to NPLs is assumed to be 10 percent for UKB, 22

[10] For instance, the PD paths for each UKB are given by the formula $PD_{i,t} = \Phi\left(\Phi^{-1}\left(PD_{i,0}\right) + \left(\Phi^{-1}\left(PD_{UKB,t}\right) - \Phi^{-1}\left(PD_{UKB,0}\right)\right)\right)$, where $\Phi(.)$ is the cumulated distribution function (CDF) of a the Normal Distribution and $\Phi^{-1}(.)$ is the inverse CDF.

percent for TBs, and 24 percent for RCBs. These rates represent less than 25 percent of the historical annualized cure rates. Sensitivity analyses using average historical annualized cure rates per bank type as well as a zero-cure rate are presented in Appendix III.C. To account for the possibility that many new NPLs that have emerged in the early stage of the crisis reflect NFC liquidity stress, not solvency stress, an extra cure rate of 18 percent (total of 28 percent) with respect to New NPL (2020) is assumed for UKBs in 2021.

48. The market risk module assesses the risk associated with valuation adjustments from changes in asset prices, interest rates, and exchange rates. The adjustment is applied to banks' securities portfolios and existing open positions in foreign currency in their balance sheets. For available-for-sales (AfS) and held-for-trading (HfT) securities, market losses/gains are estimated following a mark-to-market approach. A modified duration formula is employed to reevaluate exposures as a function of their reported residual duration and the relevant bond yield assumption under the scenarios. Trading losses from HfT securities are considered realized losses, affect net income, and are subject to taxation and dividend payout. Unrealized gains/losses from AfS securities affect other comprehensive income (OCI). However, they are not subject to taxation. Therefore, valuation changes in AfS securities affect capital one to one. For HtM securities, the framework uses a credit risk approach. Provisions are made to cover expected loss as asset quality deteriorates. Finally, valuation changes in open foreign positions are estimated based on fluctuations of the exchange rate under the scenarios (i.e., Net Open Position in FX × change in the exchange rates).

49. Interest rate risk on the banking book (IRRBB) is assessed using time-to-repricing buckets. Banks are exposed to maturity transformation risk as they lock in rates on assets for more extended periods than rates on liabilities. The impact of interest rate risk on net interest income is estimated by measuring the gaps between assets and liabilities that reprice in each period, up to the end of the three-year stress test horizon. Banks' maturity profile is assumed to remain the same over the stress testing period.

50. In addition, the exercise applies interest margin shocks. Consistent with a decrease in the interest margin observed during the AFC, the test assumes a shock on the interest margin. The shock is taken as a fraction of the shock experienced during the AFC, which had a V shape with a peak of 80 percent in the second year.[11] The severe adverse scenario assumes a quarter of the AFC shocks, while other scenarios assume milder shocks. The COVID macro scenarios consider more moderate margin shocks than the AFC because of the more benign financial condition observed so far. In particular, the BSP managed to cut interest rates, unlike the AFC period, which reduces the pressures on margins from increases in funding costs. Thus, the reduction in interest margin is assumed to be driven by a decrease in lending rates and shocks are applied to the fraction of loans

[11] More specifically, the interest margin at the cutoff date is defined as $Interest\ Margin_i^0 = Lending\ Rate_i^0$ - $Deposit\ Rate_i^0$. The deposit rate in time t for scenario S is adjusted by the interest rate shock, i.e., $Deposit\ Rate_{it}^S = Deposit\ Rate_i^0 + Interest\ Rate\ Shock_t^S$ and the lending rate is adjusted as $Lending\ Rate_{it}^S = (Deposit\ Rate_i^0 + Interest\ Rate\ Shock_t^S) + \varphi_t^S * Interest\ Margin_i^0$, where φ_t^S is a time varying parameter that follows a V shape, representing a fraction of the shock experienced during the AFC.

that mature and are repriced in each period. Since interest margin shocks play quantitatively substantial roles, a sensitivity analysis using different shocks is presented in Appendix III.

51. Net income (profit and loss) is projected, incorporating all the risk factors in the stress test. The net interest income accounts for changes in balance sheet size, reduction in income due to increases in non-performing loans, changes due to IRRBB, and effects of interest margin shocks. Loan loss provisions are determined by the evolution of credit risk on loans and HtM securities. Trading income accounts for gains and losses associated with HfT securities and FX-open positions. Other on the income statement, including non-interest income and non-interest expense, are assumed to remain constant as a proportion of interest-earning assets over the stress testing period. The income tax rate is set at 30 percent.

52. Dividend payout, crucial for banks' ability to recover from shocks, depends on bank profits and bank types. Dividends are assumed to be paid only if net income after taxes is positive.[12] The dividend payout ratio for UKBs is anchored to the payout in 2019. Out of 46 UKBs, 11 paid dividends with an average payout ratio of 13 percent.[13] For TBs and RCBs dividend payout ratios are taken as individual bank averages over the last 5 years. Two out of 51 TBs and 32 out of 447 RCBs paid dividends during that period, with an average payout ratio of 0.8 percent and 0.9 percent, respectively.[14] It is also assumed that banks do not issue new shares or make repurchases during the stress test horizon.

53. The risk-weighted assets (RWAs) changes in response to the changes in credit risks, following the Basel III standardized approach. There are three main components driving shifts in RWAs for credit risk. The first component reflects a decrease in risk weights (to zero) generated by the flow of provisions related to new NPLs. The second component shows the increase in risk weights resulting from the non-provisioned part of new NPLs, which, according to the Basel III standardized approach, are subject to a 150 percent risk weight. The third component reflects changes in risk weights as NPLs cure. In addition, RWAs grow in line with balance sheet growth, which is set at the nominal GDP growth rate (static balance sheet assumption).

54. Hurdle rates are based on minimum capital requirements. The stress testing results are benchmarked against the Philippines' minimum capital requirements, namely Common Equity Tier 1 Ratio (CET1R) of 6 percent (applied only to UKBs), Tier 1 ratio (T1R) of 7.5 percent, and Total Capital Ratio (CAR) of 10 percent. Moreover, UKBs are required to hold a 2.5 percent capital conservation buffer and, if applicable, a D-SIB buffer (of 1.5 or 2 percent), which are not included in our hurdle

[12] This behavioral assumption is for stress testing purposes. In practice, regulation allows banks to distribute dividends without restrictions only if they comply with the minimum CET1 ratio. When income after tax is negative, the assumption may be more conservative than regulatory requirements since regulation allows banks to distribute dividends using capital buffer above the minimum CET1 ratio. On the other hand, when income after tax is positive, the assumption may be less conservative than regulatory requirements since banks distribute dividends even when their capital is below the minimum CET1 ratio.

[13] Information on UKBs' dividend payout ratios is sourced by BSP, Capital IQ, and individual banks' financial statements.

[14] Information on TBs and RCBs dividend payout ratios of TBs and RCBs was provided by BSP.

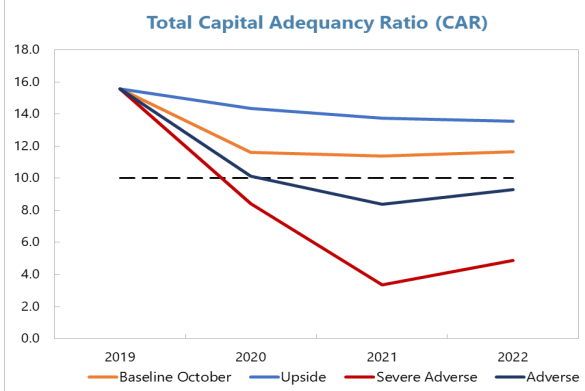
rates. In the presentation below, we focus on 10 percent CAR. This is common across all banks. Also, it tends to be the most binding requirement since most of the capital is CET1.

B. Results

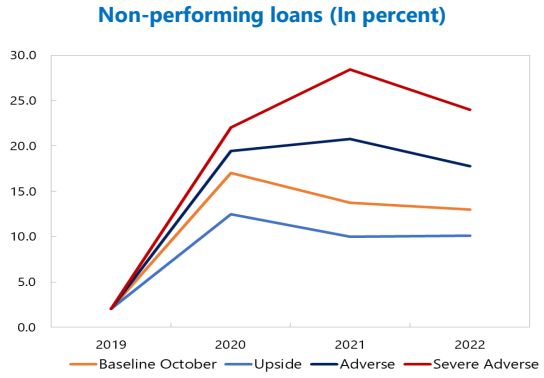
55. While banks can withstand the severe baseline scenario, they could experience systemic solvency stress in a much more severe adverse scenario (Figure 11). By 2022, the CAR falls from 15.6 percent to 11.7 percent in the baseline, 9.3 percent in the adverse scenario, and 4.9 percent in severe adverse scenarios compared to the 10 percent minimum CAR requirement. UKBs are more likely to meet the Common Equity Tier 1 Ratio (CET1) requirement (6 percent minimum requirement) as the quality of capital is high. Nonetheless, capital ratios start to recover in 2022 in adverse scenarios in line with the assumed economic turnaround.

Philippines: Bank Solvency Stress Test Results

Banks can withstand the unusually weak baseline shock, but the system's CAR could fall below the hurdle rate in the adverse scenarios…



…mainly owing to credit risks.



Note: See Appendix I for the details of stress testing methods and assumptions and Figure 8 for additional information about the results. All banks have to comply with the minimum CAR of 10 percent set by the BSP (Basel III 8 percent). The results with actual 2020 GDP sit somewhere between the October baseline and adverse scenairos.

56. The impact is particularly noticeable for UKBs and RCBs, but capital shortfalls vis-à-vis minimum requirements are moderate. Even in the baseline, 185 banks (mostly RCBs), which account for about a third of the system by assets, might not meet the 10 percent requirement. In the adverse scenario, 201 banks could have capital shortfalls. In the unlikely severe adverse scenario, 214 banks with three-quarters of the system's assets miss the minimum CAR requirement. Nonetheless, capital shortfalls appear moderate—below four percent of GDP even in the severe adverse scenario.

57. UKBs are more likely to meet CET1 requirements (6 percent) than CAR requirements as the quality of capital is high. UKBs' CET1 ratio remains above the hurdle rate under the baseline, upside and adverse scenarios. However, it falls below the national requirement and the Basel III CET1 requirement (4.5 percent) under the severe adverse scenario. The CET1 ratios of 20 out of 46 UKBs fall below regulatory minimum under the severe adverse scenario, including D-SIBs.

58. The system-wide capital depletion from the starting point amounts to 3.9 percent and 10.7 percent under the baseline and severe adverse scenarios, respectively. Mostly driven by the capital depletion of UKBs, that amounts to 4.3 percent and 11.6 percent (3.9 percent and 10.6 percent, using CET1), respectively. For TBs, the capital ratio under the baseline scenario remains close to the starting CAR, while under the severe adverse, the capital depletion amounts to 1.8 percent. Finally, RCBs experience a capital depletion of 5.2 percent and 6.6 percent, under these two scenarios, respectively.

Bank Solvency Stress Tests: Key Results (2022)										
Scenarios	**Capital ratios[1]** (In percent)					**Capital shortfalls[1, 2]** (in percent of GDP)				
	Total	**UKB**		**TB**	**RCB**	**Total**	**UKB**		**TB**	**RCB**
	CAR	CAR	CET1R	CAR	CAR	CAR	CAR	CET1R	CAR	CAR
Latest actual	15.6	15.3	12.7	17.5	19.4	0.0	0.0	0.0	0.0	0.0
Baseline October	11.7	11.0	8.9	18.2	14.2	1.0	0.9	0.5	0.0	0.0
Upside	13.5	13.1	10.8	18.5	14.3	0.5	0.5	0.1	0.0	0.0
Adverse	9.3	8.5	6.5	17.3	13.6	1.9	1.8	1.1	0.0	0.0
Severe Adverse	4.9	3.7	2.1	15.7	12.8	3.9	3.7	2.8	0.0	0.1
	Number of banks not meeting the minimum requirements[1] (number)					**Share of failed banks' assets in total[1]** (in percent of system's assets)				
	Total	**UKB**		**TB**	**RCB**	**Total**	**UKB**		**TB**	**RCB**
	CAR	CAR	CET1	CAR	CAR	CAR	CAR	CET1R	CAR	CAR
Baseline October	185	12	8	6	167	31.8	30.8	24.1	0.5	0.5
Upside	178	9	6	6	163	25.2	24.2	17.1	0.5	0.5
Adverse	201	18	12	9	174	59.9	58.7	32.1	0.6	0.6
Severe Adverse	214	21	20	12	181	76.4	75.0	64.3	0.8	0.6

1/ Figures at the end of the stress test horizon (2022).
2/ Amount of money needed to bring CAR and CET1 to respective regulatory minimums.
UKBs and TBs and RCBs that are subsidiaries of UKBs have to comply with the following minima (hurdle rate for the stress tests): CAR 10 percent (Basel III 8 percent), CET1 ratio 6 percent (Basel III 4.5 percent) and Tier 1 ratio 7.5 percent (Basel III 6 percent). Moreover, these banks are required to hold a 2.5 percent capital conservation buffer and, if applicable, a D-SIB buffer (of 1.5 or 2 percent). The minima for independent TBs and RCBs are: CAR 10 percent and Tier 1 ratio 6 percent. They are not subject to buffer and leverage ratio requirements either.

Bank Solvency Stress Tests: UKBs Various Classifications (2022)								
Scenarios	**Capital ratios[1]** (In percent)							
	UBs vs KBs		**DSIBs vs Non DSIBs**		**Top 10 vs Other**		**Conglomerate[2] vs Other**	
	UBs	KBs	DSIBs	Non DSIBs	Top 10	Other	Conglo-merate	Other
Latest actual	14.6	23.9	14.4	20.8	14.3	15.3	14.5	18.6
Baseline October	10.5	17.6	10.5	14.5	10.2	11.0	11.0	11.0
Upside	12.6	19.7	12.5	16.7	12.3	13.1	13.0	13.6
Adverse	8.0	14.8	8.0	11.4	7.8	8.5	8.7	7.4
Severe Adverse	3.2	9.9	3.3	6.2	3.2	3.7	6.2	1.5
Scenarios	**Recapitalization needs[1]** (in percent of GDP)							
	UBs vs KBs		**DSIBs vs Non DSIBs**		**Top 10 vs Other**		**Conglomerate[2] vs Other**	
	UBs	KBs	DSIBs	Non DSIBs	Top 10	Other	Conglo-merate	Other
Latest actual	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Baseline October	0.8	0.1	0.7	0.2	0.7	0.9	0.5	0.4
Upside	0.4	0.0	0.4	0.1	0.4	0.5	0.3	0.2
Adverse	1.7	0.1	1.4	0.4	1.4	1.8	1.1	0.7
Severe Adverse	3.5	0.3	3.1	0.7	3.0	3.7	0.7	1.2

1/ Figures at the end of the stress test horizon (2022).
UKBs have to comply with the following minima (hurdle rate for the stress tests): CAR 10 percent (Basel III 8 percent), CET1 ratio 6 percent (Basel III 4.5 percent) and Tier 1 ratio 7.5 percent (Basel III 6 percent). Moreover, UKBs are required to hold a 2.5 percent capital conservation buffer and, if applicable, a D-SIB buffer (of 1.5 or 2 percent).
2/In this table conglomerate refers to domestic conglomerates.

59. Banks' stressed capital ratios exhibit a considerable variation across banks. It is mainly driven by significant variations in starting capital ratios and initial PDs. At the end of the stress test horizon, the median CAR is 15.08 percent under the adverse scenario, while the interquartile range goes from 4.4 percent to 26.3 percent. Similar variations are found across different scenarios. Variations are more pronounced across UKBs, given larger variations in their starting CARs (Figure 10).

60. State-owned banks tend to be more vulnerable than private banks. All three state-owned banks, which represent 15 percent of the total banking system's assets, fail the test even in the upside scenario. Their CAR drops from 13.7 percent to 1.8 percent under the baseline and -0.9 percent under the adverse scenario. Their vulnerability is mainly explained by relatively low starting capital ratios and high initial PDs.

61. Foreign bank branches, representing 6 percent of system assets, appear resilient under all the scenarios. Even though they experience similar capital depletions across scenarios compared to other UKBs, their CARs remain above regulatory minimums mainly due to higher starting CARs (28.8 percent) and lower starting PDs. In contrast, foreign subsidiaries tend to be more vulnerable as a result of higher starting PDs. Their CAR falls from 18 percent to 7.7 percent under the baseline and 3.2 under the adverse scenario. However, these subsidiaries represent less than one percent of the banking system's assets.

62. Results should be interpreted with a high degree of caution given large economic and model uncertainty. The credit risk projection is based on the historical relationship between macroeconomic variables and PD. Given the unusual nature of the COVID-19 crisis, the past relationship may not necessarily hold. The sensitivity could be overestimated if income support measures to NFCs and households and loan moratoria mitigate distress of these borrowers. If the shock turns out to be relatively temporary, borrowers may draw down their savings and look for additional borrowings (including non-bank financing) to continue debt service. Results are also susceptible to certain micro-assumptions, particularly the LGD, the cure rate, and the interest margin shock. Appendix III presents the results using variations to these parameters.

63. Importantly, some of the behavioral assumptions in the standard FSAP stress test approach tend to give conservative estimates when the baseline reflects large shocks from COVID-19. Most NPLs remain in banks' balance sheets during the entire stress test horizon, which further reduces the interest income on loans. Only a relatively small fraction of NPLs are assumed to cure (mostly back to performing), and other efforts to reduce NPLs are assumed to be muted. For instance, write-offs, restructuring, and sales to special purpose vehicle are assumed to be zero during the stress test horizon. Besides, the assumption that the composition and risk profile of banks' balance sheets remain constant throughout the stress test horizon, disregarding the fact that banks can adjust their portfolio structures to mitigate the effect of the macroeconomic shocks. These behavioral assumptions are set to ensure cross-country comparability of FSAP stress test exercises.

C. Recommendations

64. BSP's supervision sector regularly conducts a series of micro-prudential single factor solvency stress tests. They include a set of uniform sensitivity analyses that cover, separately, credit and market risks. The exercises are performed semi-annually, for a specific year, using hypothetical credit and market shocks. Banks are tested to withstand assumed shocks based on regulatory minimum capital ratios. The credit risk exercises assume 20 percent and 50 percent write-off rates over total net loans, as well as loans to certain economic segments. The segments cover various economic industries, various types of consumer loans, and large exposures (conglomerates). The credit risk exercises cover all UKBs and TBs. On the other hand, the market risk exercise assumes

increases in domestic and foreign interest rates,[15] as well as shocks to the foreign exchange rate.[16] The market risk exercises cover all UKBs and their TBs subsidiaries, as well as stand-alone TBs with total assets of at least 5 PHP billion or total capital of at least 1 PHP billion. The BSP also conducts quarterly stress test exercises on real estate exposures. The shock is assumed to be equivalent to a 25 percent write-off on all real estate exposures and covers all UKBs and TBs. The BSP also conduct ad hoc exercises as needed. For example, it conducted a stress test to assess the impact of loan moratoria on bank solvency in the summer of 2020.

65. The supervision sector could start macro scenario-based micro-prudential stress tests to sharpen their supervisory scrutiny. While the BSP staff have the capacity to run such tests, they are currently not conducting macro scenario tests. This is partly because the allocation of tasks between the supervision sector and macroprudential unit is not defined clearly enough and hiring constraints with the newly created macroprudential unit. The supervision sector could start macro-scenario micro-prudential stress tests to more effectively conduct, for example, the Internal Capital Adequacy and Assessment Process (ICAAP), where banks report their own stress test results using the macro scenario that matters for their respective portfolio. With BSP's own stress test results, where macro assumptions may be tailored across banks, the BSP can challenge banks' exercises more effectively by comparing the two outputs.[17] These exercises could be implemented within the supervision sector or in collaboration with the economic research department (for scenarios) and the macroprudential unit (for risk identification, especially from the real economic sectors).

66. BSP's macroprudential unit is tasked to conduct systemic risk analysis focusing on the non-financial sector. In the BSP, "systemic risk analysis" is operationally defined as the analysis of the linkages between the financial system and the real economic sectors, including vulnerability exercises of the real economic sectors that could lead to bank distress. As a result, the unit's work so far focused on the network analysis of NFCs and banks, and the vulnerability analysis of NFCs similar to this FSAP's NFC stress tests, as well as in-depth analysis of real estate developers. However, the unit does not conduct stability analysis of financial institutions, including macroprudential stress testing of banks—one of the main workforces of macroprudential analysis in many other central banks. Indeed, among the central banks with high-capacity staff, it is hard to find one that does not regularly conduct macro scenario tests these days.

67. The macroprudential unit could develop macroprudential stress tests of banks that are distinct from microprudential stress tests. Such exercises could focus on the systemic part of the financial system, such as UKBs. They could examine the effects of a common macro scenario relevant at a particular point in time. These exercises could include some form of macro-financial

[15] Increases in domestic interest rates range from 300bps to 500bps, and increases in U.S. interest rates range from 100bps to 300bps.

[16] Exchange rate shocks range from 10 percent to 30 percent.

[17] For example, stress tests for UKBs could focus on credit risks from large NFCs, while stress tests for TBs could examine scenarios with distress in the property markets and household income. Stress tests for RCBs could examine local/regional factors, including risks from severe typhoons or earthquakes that affect the agricultural and tourism sectors and a major drop in remittance inflows that reduce household income.

feedback effects—such as the second-round effect analysis of this FSAP. In addition, it could consider linking corporate sector stress test results to banks' credit risks from NFC loans.[18] Connecting the network analysis to bank stress tests is another approach to make a stress test more macroprudential. Bank stress test results could be used to estimate potential contingent liabilities to the government from various credit guarantee programs it offers, informing the Department of Finance. Once the methodology is established well, the BSP could consider publishing the high-level results in its semi-annual Financial Stability Review as many other central banks do. Similar to microprudential macro scenario tests, macroprudential stress tests could be implemented within the macroprudential unit or in collaboration with the economic research department (for scenarios) and the supervision sector (for implementing bank stress testing part).

68. There are multiple options for the data-sharing arrangement between the supervision sector and macroprudential unit. Suppose the macroprudential stress tests are conducted within the macroprudential unit. In that case, one straightforward option is to set up a data-sharing system so that the unit can access the supervisory data easily and directly. However, some central banks are subject to internal legal firewalls between the supervision and other departments due to the confidentiality of detailed bank-level data. Then, the macroprudential department could work with alternative, less confidential data collected by the bank. Such an arrangement is often observed when the central bank is not the supervisor, and their legal arrangements do not allow exchanging highly confidential data. In other cases, a central bank conducts macroprudential stress tests to be published in the Financial Stability Review using only publicly available data.[19]

69. The results of these exercises are effectively used to inform and influence policy decisions, which should continue. The BSP has been using the results of existing stress tests to inform senior members of financial regulatory agencies and the interagency financial stability committee. For example, when the government discussed the extension of the moratorium policy in summer 2020 upon COVID, the BSP examined the impact on bank solvency depending on the policy's length to discourage extensive moratoria. Given that the Philippine government tends to "tax" the banking sector to pursue the government's social and developmental objectives, such use of stress tests that show financial stability cost of those policies appear desirable.[20]

70. The authorities should collect more granular data on the performance of banks' credit portfolios, especially for large banks. The existing data only indicate whether loans are performing or non-performing. Since Philippine banks are regulated under the standardized

[18] For instance, one could use ICR-based NFC stress test results to calculate stressed PDs for banks' loan portfolios instead of PDs estimated using banks' NPL transition data. When long-term credit registry data becomes available, one could use the detailed registry data to further improve the accuracy of the credit risk model.

[19] One should note that the details of publicly available data differ substantially across jurisdictions. Some jurisdictions (e.g., the United States) disclose substantial details of bank-level data that many other regulators would consider confidential.

[20] The directed lending requirements for SMEs were introduced in 1991 through RA 6977 and amended by RA 9501 in 2008. Meanwhile, the Agri-Agra requirements were introduced through Presidential Decree 717 in 1975 and amended by RA 1000 in 2009. Many banks—especially larger banks based in capital Manila with limited agricultural lending opportunities—pay fines when they cannot comply with the requirements.

approach of the Basel II and III, the BSP does not collect PD nor LGD data, even though some large banks keep track of such data (or credit rating transition matrix) internally for their own risk management purposes. The additional data that track the gross flows into and out of NPLs (available since 2014) is useful for obtaining proxy PDs—the probability of performing loans to turn into NPL—as we did in this FSAP. However, such an approach has limitations. In particular, it does not help assess the adequacy of provisions, which is a crucial credit risk factor in many emerging market economies.[21] The BSP should start collecting some indicators of PD and LGD from banks and credit registries since the estimated LGD implied by actual levels of provisions varies substantially across banks, and stress test results change drastically depending on LGD assumptions. By merely comparing reported data across banks for similar loan types, the BSP could obtain a better sense of appropriate PD and LGD levels.[22]

71. The recently introduced International Financial Reporting Standard (IFRS) 9 provides new opportunities and challenges for the BSP to monitor credit risks. The Philippines adopted IFRS 9 in 2018, where banks are now required to set aside provisions following the expected credit loss (ECL) framework. The BSP also adopted IFRS 9-based accounting provisions to calculate regulatory capital starting at the beginning of 2018. The ECL framework forces banks to manage credit risks in a more forward-looking manner, often implemented by working with PD and LGD concepts.[23] By collecting the upgraded data from banks, the BSP could also enhance its top-down credit risk stress test compatible with IFRS 9.[24] Indeed, such an enhancement may become necessary for the BSP to assess each bank's ECL framework's robustness. At the same time, it will be important to keep collecting the data under the existing format before the introduction of IFRS 9 to prevent a significant reduction of provisions.[25] From modeling perspectives, one should be able to connect the historical and future data so that credit risk models could use long-term data with some conversion assumptions.

72. The BSP should also collect additional data that can improve stress testing and some supervisory and macroprudential policy tools' effectiveness. Collateral information, regularly updated collateral values and loan-to-value (LTV) ratios are critical for assessing and managing risks from property and other secured loans. If the collateral's market value declines significantly, it would increase LGD and therefore expected credit loss. An increase of LGD, in addition to PD, is an

[21] For instance, in the FSAP exercise, we estimated implied LGD by setting proxy PD*Exposure at default*LGD = actual (specific) provisions set aside by banks. Without a separate estimate of LGD based on actual experience, supervisors would not be able to assess whether provisions are adequate or not.

[22] Such exercises could also help to sharpen BSP's supervisory scrutiny on provisions.

[23] See, for example, a report by Moody's and the BIS (2018). At least, banks need to enhance their credit data well beyond the levels required under the standardized Basel approach. Even banks that are managing credit risks with advanced Internal Rating Based models will need to adjust their data structure significantly.

[24] See the IMF Working Paper (2020) by Gross, Laliotis, Leika, and Lukyantsau that presents a suite of top-down (by supervisors and central banks) credit risk modeling tools that are compatible with IFRS 9 and ECL.

[25] Based on quantitative impact studies (such as those conducted by the European Banking Authority) provision requirements may or may not decline compared to the existing framework depending on the stringency of the existing framework.

essential component of standard stress testing for property loans, especially when property prices are overvalued. Currently, the BSP does not monitor these indicators. The BSP's primary prudential tool to limit risks from the property market is to place a hard limit to the share of property loans to total loans (25 percent for UKBs). However, such hard limits are not sufficiently risk-sensitive compared to more modern tools such as microprudential LTV limits (for the lifetime of the loans), macroprudential LTV limits that change over property market cycles, debt-service-to-income ratio (DSTI), risk-weight adjustments, and long-term, non-cyclical systemic risk buffer (SRB). To use these modern prudential tools effectively, more granular data on LTV and corporate and household survey data that help to identify the appropriate level of DSTI would be needed.[26] Improving credit registry data would also be essential to strengthen credit risk analysis.

MACRO-FINANCIAL LINKAGE[27]

A. Second-Round Effects

73. The banking sector's response to the initial macroeconomic shocks, especially their adjustment in supplying credit to the economy, can amplify the transmission of the shocks. This section asses the second-round effects focusing on the macro-financial linkage through the banking sector's credit growth. We estimate a credit growth model (panel) that includes bank-by-bank solvency test results in response to the initial macroeconomic shocks as explanatory variables. Bank-level credit growth projections are then aggregated by taking the weighted-average across banks. The aggregate credit growth projection is then fed into a structural-VAR model to get the projected path of macroeconomic variables, including the second-round effects from bank distress.

74. The estimated credit growth model shows that both macroeconomic and bank-specific factors significantly affect credit growth (Appendix IV Table 1). After controlling for the partial effects of other explanatory variables, an increase in the changes of NPL and loan loss reserve ratio reduce credit growth. While the literature of credit growth often use CAR as a supply-side factor, CAR or deviation of CAR from regulatory requirements did not show statistically significant impact in case of the Philippines, and therefore excluded from the final model.[28] Other macroeconomic control variables also show expected signs—higher real GDP growth is associated with higher overall real credit growth, and an increase in the policy interest rate weakens overall real credit growth. The long-run elasticity of credit growth to changes in GDP growth is similar to the estimation results of peer countries. The model is estimated using only the data for UKBs (2008Q1-2019Q3), which have about 90 percent of the banking sector's assets, as an approximation of the Philippines' banking sector.

[26] See, for example, Romania FSAP for calibrating the appropriate level of DSTI to using household survey data.

[27] This section is drafted by Adhi Purwanto (IMF expert, Bank Indonesia).

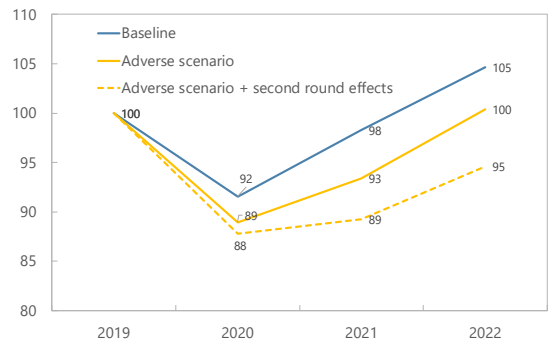
[28] This could be partly due to regulatory relief measures, including forbearance to delay NPL recognition and accumulating LLPs during distress episodes used in the past. As shown in credit growth figure (Figure 5 bottom right), CAR, and NPLs (Figure 7), CAR has been less responsive to macroeconomic shocks than NPLs.

75. Then, the second-round effects on the real economy are estimated as their response to credit shock in an SVAR. The SVAR model includes credit, GDP, inflation, policy rate, and exchange rates (Appendix IV Table 2). Structural shocks are identified by taking credit shock as exogenous, meaning that credit shock influences the other variables but not vice versa (Appendix IV Table 3). The elasticities of macroeconomic variables to changes in the bank's credit are shown in Appendix IV Table 4. The one-year and two-year' elasticities are used to calculate the second-round effect to GDP so that the impact of changes in credit in a particular year would affect the dynamics of GDP in the same year and the following year. The elasticities of GDP to credit growth changes imply that a sustained one percentage point increase in the rate of credit growth leads to a 0.07 percentage point increase in the first year's GDP and a 0.16 percentage point increase in the two years' cumulative GDP.

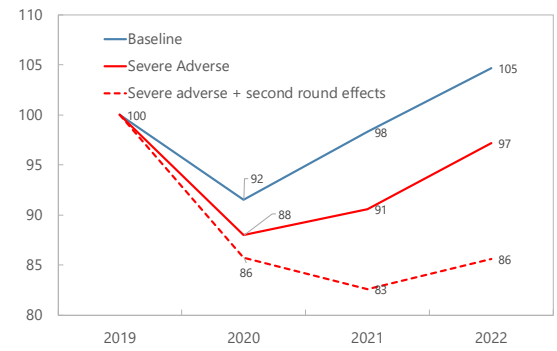
76. Second-round effects through weaker credit growth may double the initial shock to GDP in adverse scenarios (Figure 12). In the adverse (severe adverse) scenario, the banking sector CAR declines by nearly 8 (12) percentage points, which could reduce real GDP level by additional 4 (9) percentage points by 2021. The effect might persist over the remaining test horizon.[29]

Philippines: Second-round Effects—Feedback from Bank Distress to the Real Economy

Second-round effects could be sizeable, reducing real GDP by additional 4 percentage points from 2021 on in adverse scenario…



…and by 9 percentage points in severe adverse scenario



B. Counterfactual Policy Simulation

77. The second-round effect models can be used to investigate the effects of counterfactual policy measures. Since the empirical credit growth model indicates NPL ratios and LLP ratios as significant predictors, we consider the effects of a one-time write-off of NPL worth (an arbitrary) 30 percent of LLP stock in 2021—which we assume will be financed by available excess

[29] The results could potentially overestimate the size of second-round effects. First, growth of alternative sources of financing (e.g., foreign financing and capital market financing, which may not be fully captured in the model) could fill in the bank credit gap. Second, the fact that we use DSGE model to generate initial macro scenario while a separate SVAR model is used to gauge the feedback effects from banks' health to real GDP could result in some double counting of the effects. The DSGE model includes the banking sector and credit growth. So, the GDP shock includes some of the feedback effects among bank capital, credit, and real GDP. On the other hand, the linear and symmetric structure of the SVAR may contribute to underestimating the impact as second-round effects tend to be highly non-linear and asymmetric.

capital. Excess capital could come from any sources, including by increasing retained earnings by limiting dividend distribution, raising new capital from existing shareholders, owner families of conglomerates, new shareholders, and the government as the last resort. It turns out that the policy's costs range from 1½ percent to nearly 3 percent of GDP—in a similar order to the capital shortfalls of the stress test results in adverse scenarios.

78. The estimates appear to suggest possible net positive effects of timely loss recognition and NPL restructuring (Figure 12). While the single year benefits are about the same as the costs, the policy yields benefit for multiple years. The total benefits from 2021-22 are significantly above the costs and even larger once the positive effects in outer years (e.g., 2023–24) are included.

Philippines: Cost-Benefit Analysis of Counterfactual Policy
(2019 real GDP = 100)

	Baseline	Adverse	Severe adverse
Benefit 1	1.62	2.23	2.86
Benefit 2	2.31	3.20	4.13
Cost	-1.56	-2.16	-2.88

Benefit 1: Maximum difference in the level of real GDP during 2020-22
Benefit 2: Sum of differences in the level of GDP from 2020 to 2022.
Cost: 30 percent of loan-loss provision stock as of 2021 (one time).

79. These results are consistent with the Philippines' experience after the AFC. The BSP took similar forbearance measures to those introduced upon COVID when the AFC occurred, including the measure to delay NPL recognition and accumulate LLP slowly over time. Over several years since 1997, the bank capital reclined just a little—about 2-3 percentage points. NPL ratio rose only slowly from about 2 percent to 18 percent in end-2001 and declined gradually over the following ten years back to the pre-crisis level. The most striking consequence is that the credit-to-GDP ratio continued to decline from over 50 percent in 1997 to about 25 percent in 2007 and recovered back to 50 percent levels only in 2018 (Figure 5). This appears to be a typical symptom of "credit-less recovery," implying potentially significant lost opportunities.

C. Recommendation

80. Given the significant downside risks, the authorities should limit bank dividend distributions and be ready to take additional measures to strengthen bank capital if downside risks materialize.[30] Given the potential for large loan losses, the authorities should limit dividend distributions as a precautionary measure. If downside risks materialize, the BSP should consider broader policy options (e.g., support measures facilitating the sale and recovery of bad assets, raising additional capital starting with conglomerate owner families and private sector funding, and public funding only as a last resort). This is supported by the counterfactual policy analysis, which suggests that timely NPL restructuring and loss recognition, financed by adequate capital, can

[30] The recommendation is in line with the Fund's position on dividend distribution during COVID-19 (see IMF Special Series on Covid-19: "Restriction of Banks' Capital Distribution during the COVID-19 Pandemic" and "Main Operational Aspects for Macroprudential Policy Relaxation.")

improve GDP with sustained credit provision, while the benefits of such a policy are higher than its cost.

81. The BSP should allow the forbearance measures to lapse as scheduled and avoid introducing new measures. Forbearance does not address the underlying issues in weak banks and hampers banks' ability to continue to support the economy and ultimately may even undermine financial stability. Instead, the authorities should continue to use the flexibility in the accounting and Basel capital frameworks, and, looking at the future, further develop and use macroprudential tools and buffers. While the BSP used some of these micro and macro-prudential tools during the current crisis, the preceding forbearance measures could undermine their effectiveness by reducing bank capital's sensitivity to risks, as forbearance keeps bank capital at artificially high levels.

BANK LIQUIDITY STRESS TEST[31]

82. The FSAP has conducted a top-down liquidity stress test using the end-2019 regulatory data. The analysis covered all 46 UKBs, out of which 11 are branches of foreign banks. The UKBs represent 92 percent of the total banking sector assets.

A. Liquidity Risk Profile of Banks

83. The UKBs are funded mainly through customer deposits, and their liquid assets are of high quality. Both corporate and retail (i.e., household) deposits, each accounting for about half of total deposits, are the major sources of banks' funding. Other forms of funding account only for 18 percent of non-equity liabilities. Overall, most of the "wholesale funding" in the context of the Philippines is institutional deposits (from NFCs, NBFIs, governments, etc.) The liquidity buffers are of high quality, cash and reserves (the reserve requirements rate stands at 12 percent as of September 2020 and was 14 percent at end-2019), and the government securities (Level 1 assets) account for half and 46 percent of HQLA, respectively.

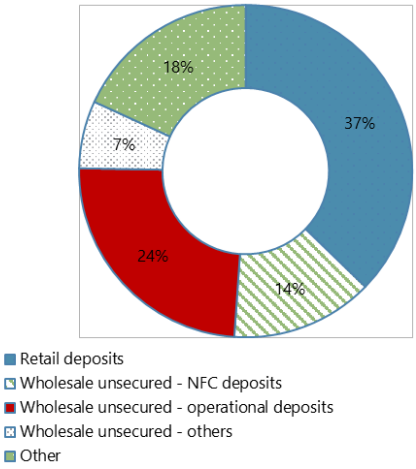
[31] This section is drafted by Jiri Podpiera (IMF, MCM)

Philippines: Funding and HQLA of Universal and Commercial Banks (UKBs)

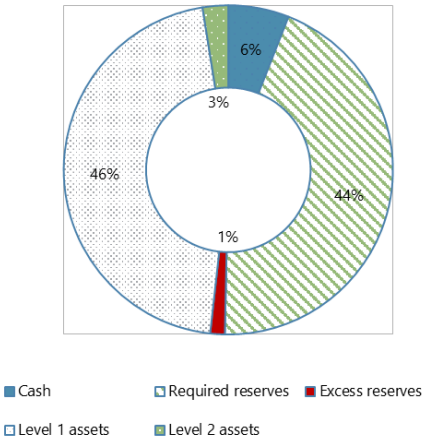
Deposits are the dominant source of funding for the UKBs; split roughly equally between retail and wholesale.

The stock of high liquid assets is of high quality, with cash, reserves, and level 1 liquid assets accounting for the bulk of HQLA.

Funding structure
(Percent)



High Quality Liquid Assets
(Percent)



Source: BSP; and IMF staff calculations.
The excess reserves are as of end-2019 when reserve requirement was at 14 percent, which was subsequency reduced to 12 percent upon the emergence of COVID-19.

84. Banks' direct cross-border exposure is low at about 10 percent of bank assets and liabilities, mostly to service overseas Philippine workers. Dollarization is also moderate (15 percent of deposits and 11 percent of loans are in FX). Exposures to FX risks are tightly regulated, with separate licensing requirements to establish a Foreign Currency Unit (FCU) to conduct FX transactions and strict limits to open an FX position. Moreover, banks have maintained a positive open FX position. Banks have some international borrowing (Figure 4) but broadly offset them by foreign assets. Also, banks borrow much less from international markets than the corporate sector and the government. Overall, banks' exposures to currency mismatch risks appear to be limited with positive (FX long) net open FX position (Table 4). Still, banks may experience FX liquidity stress from NFCs that may try to get FX loans or liquidate their deposits to fill their FX liquidity gap in case of capital outflow events.

85. FX liquidity risk from remittance inflows to banks could be largely mitigated because many of these FX assets appear to remain cash outside of the banking system. The Philippines receives about eight percent of GDP remittance inflows per year. However, if one receives inflows in bank accounts, it can be credited to banks only in pesos in most cases, which turns FX liquidity risks to peso liquidity risk.[32]

[32] Major money transfer operators offer USD payments in cash.

B. Methodology

86. The tests used several metrics to assess the adequacy of banks' liquidity buffers under adverse funding and asset valuation shocks. These metrics included the liquidity coverage ratio (LCR) for all currencies and FX only, cash flow-based stress test (CFST), and the net stable funding ratio (NSFR).

87. As for LCR-based tests, we examined three stress scenarios. First, a calibration using the Basel 2013 LCR factors (actual latest observed LCR). Second, through withdrawals of NFC and operational deposits, a wholesale funding shock was calibrated large enough to simulate a potential COVID-19-like shock, where many sectors of the economy suffer from liquidity stress from earning shocks. And finally, a combined shock that adds retail funding shock, haircuts on the valuation of liquid assets on top of the wholesale funding shock, and imposes larger haircuts on inflows of liquid assets. The combined shock represents a severe scenario that goes somewhat beyond the historically observed tail funding risk (historical banks run with plausible negative spillovers across banks). The hurdle rate was set at 100 percent.

88. The assumptions for LCR-based wholesale and combined liquidity shocks were calibrated based on simulations and historical experience. The wholesale shocks of 60 percent withdrawals of NFC deposits and 35 percent for operational deposits are based on a scenario simulation of the COVID-19-like shock to corporate profitability, without loan repayment moratorium. The withdrawals shock of 20 percent and 10 percent for less stable and stable deposits was based on the largest monthly single bank past withdrawals of close to 11 percent. Imposed haircuts of 50 percent on corporate bonds reflect the international evidence of high valuation changes in debt instruments during stress periods.

89. The CFST used the maturity ladder to evaluate funding gaps for one, three, and six months. It simulated a funding shock and an asset valuation shock akin to the severe adverse scenario used in the bank solvency test. It considers run-off of retail and wholesale deposits and limited rollover of maturing borrowings (time deposits, securities issued, and loans), which increases liquidity outflows from banks, and low rollover rates by banks for maturing loans and security assets, which reduces liquidity inflows. The funding gap is calculated as the stock of banks' counterbalancing capacity (CBC), which is the stock of liquid assets subject to haircuts consistent with the severe adverse scenario, minus net cash inflows (total gross inflows minus gross outflows). We considered two types of CBCs, the one including all the central bank reserves and the other excluding required reserves. This is to consider the "liquidity release" effects from reducing required reserves as the BSP undertook upon COVID-19.[33] Liquidity shortfalls are expressed in percent of GDP.

90. The actual calibration of the CFST liquidity shocks reflects historical evidence, simulations, and additional assumptions. One-month deposit withdrawals of 50 percent

[33] The LCR regulation in the Philippines includes required reserves as part of HQLA. However, the BSP conduct liquidity stress tests, excluding required reserves.

(institutional deposits) and 20 percent (household deposits) were set based on the NFC simulations and largest single bank historical withdrawals, which is about 20 percent (similarly to the LCR shocks). Also, we assumed that only half of the maturing cash inflow would be rolled over during the initial month of stress. This is because, in times of stress, banks are likely to be cautious in renewing credit and prudent in preserving buffers. The liquidity stress is assumed to continue through 6 months with declining severity to about half of the initial-month shock. The haircuts on counterbalancing capacity reflected interest rates simulated in the macroeconomic scenario for risk-free assets and adding risk premia for unencumbered eligible collateral and equities.

91. The longer-term funding resilience was assessed using the standard Basel III NSFR as reported by banks. The NSFR aims to enhance longer-term funding resilience by requiring, on an ongoing basis, that banks have enough stable sources of funding to match their liquidity profile of assets and off-balance sheet exposures.

C. Results

92. Banks seem to maintain adequate liquidity buffers (Figure 13). According to the LCR calibration based on Basel 2013, the system's LCR for all-currencies stands at 157 percent, and the FX LCR at 239 percent for the whole UKBs. At the individual bank level, the median total currency LCR is 207 percent, and FX LCR stood at 88 percent. Most banks exceed the 100 percent benchmark, while only a few banks (mainly branches of foreign banks) fall somewhat below the requirement as they rely more on wholesale deposits (Figure 14). The dispersion in FX LCR is more pronounced with much lower median FX LCR than all currency LCR because FX liquidity is concentrated in a few G-SIB branches. However, a stand-alone FX LCR is currently not a regulatory requirement.[34]

93. The banking system appears resilient to a wholesale funding shock. Large withdrawals of NFC and operational deposits would reduce the system's all-currencies LCR to 101 percent and FX currency LCR to 128 percent, suggesting a good liquidity resilience. The median LCR is 105 percent, and most banks would experience only a marginal liquidity shortfall. However, a number of branches of foreign banks show higher sensitivity to wholesale funding shocks. FX LCR median is 71 percent, and several banks have insufficient FX liquidity.

94. Several banks show liquidity shortfall under a severe liquidity shock. Under the combined shock, the system's all-currencies LCR would fall to 69 percent, the FX LCR to 80 percent. Once again, liquidity shortfalls are most significant in several branches of foreign banks.

95. As for cash-flow stress test results, only a few banks show net funding gaps under the imposed stress, and they also can close them using required reserves (Figure 15). Under the CFST assumptions, most banks have enough counterbalancing capacity to eliminate funding gaps. Only a few banks exhibit a net funding gap. These funding gaps are largest at a 1-month horizon

[34] Banks are required to satisfy only total currency LCR, but the BSP collects data to monitor LCR by currency. There used to be FX liquidity requirements for the Foreign Currency Unit (FCU). However, they were discontinued when the BSP adopted LCR.

and diminish over longer horizons. Most shortfalls are marginal, and only one bank shows a shortfall of 1.8 percent of GDP. However, all banks have enough required reserves to cover their shortfalls fully. Therefore, lowering reserve requirements by the central bank would allow meeting liquidity needs.

96. Most banks maintain sufficient stable funding. The NSFR exceeds the 100 percent in most banks. Some banks place slightly below 100 percent mark, while very few—mainly branches of foreign banks—fall further below it.

D. Recommendations

97. The BSP has a standard toolbox for assessing liquidity. It regularly evaluates the LCR and NSFR for all 46 UKBs. In addition, for a selected subgroup of 24 banks, it carries out a cash flow-like stress test, combining roll-off rates to the *maturity structure* of inflows and run-off rates to the *stock of liabilities* for outflows. The calibration of run-off and roll-off rates is similar to the one used in the FSAP's cash flow stress test. The BSP stress test shows banks can survive for several months.

98. The BSP could consider introducing LCR for foreign currencies. The FX liquidity is largely concentrated in a few branches of foreign banks (including the one that plays the role of settlement agency for FX transactions), and some domestic banks have insufficient liquidity buffers in foreign currencies. Also, FX liquidity requirements were relaxed recently as the BSP adopted Basel III liquidity requirements. Banks need to apply for a separate banking license to handle FX (Foreign Currency Unit, FCU). Before the LCR, banks needed to satisfy (FX) liquidity requirements within the FCU. The requirement was not reinstated as FX LCR. Still, the BSP continues to monitor FX LCR. If the BSP finds signs of risk build-up, it could consider introducing FX LCR as a micro- (including Pillar 2) or macro-prudential requirement.

99. The BSP should continue to enhance the liquidity stress test tool kit by advancing the cashflow stress test and considering a system-wide test. In order to conduct a fully-fledged cashflow stress test, the authorities should increase the granularity of collected information on maturity structure, especially adding the split between retail and wholesale deposits and the split of loans into households and NFC. This would also allow devising a framework for the system-wide LST that factors into the banks' LST the endogenous liquidity presses in the non-financial sector.

LOAN MORATORIUM AND BANK-NFC LIQUIDITY LINKAGE[35]

A. Methodology

100. COVID-19, as well as capital outflows, could weaken NFC's liquidity balance substantially. As we saw earlier, earnings shock from COVID-19 could lead to major liquidity stress in the corporate sector. In addition, in a scenario with significant capital outflow shock (not part of this FSAP's macro scenario, but it is a critical structural risk for an emerging market like the

[35] This section is drafted by Minsuk Kim, Hiroko Oura, and Jiri Podpiera (all IMF).

Philippines), NFCs could be impacted more than any other sectors, given that they are the largest taker of funding from abroad (Figure 4).

101. There could be strong liquidity contagion effects between banks and NFCs through the bank loan and corporate deposit linkages, depending on the behavior of banks and NFCs. Liquidity distress of NFCs could transmit to banks through multiple channels. As detailed in Figure 16, liquidity-constrained firms may try to liquidate their liquid assets. First, to the extent they withdraw domestic bank deposits, NFC's stress could affect bank liquidity condition by increasing corporate deposit runoff rates. The severity depends on the behavior of NFCs—if they first liquidate liquid assets other than domestic bank deposits, the contagion effects could be limited. Second, NFCs may try to get more funding to fill their liquidity gap. This channel's strength also depends on the availability of alternative funding sources—especially domestic capital market development—and lending decisions by banks. If they cannot find alternative funding to bank loans, such as borrowing from abroad or domestic corporate bond markets, cash outflow pressures to banks (as demand for new loans or rollover of maturing loans) could be strong.

102. Loan moratoria could further complicate the linkages. The Philippines introduced the loan repayment moratorium (Bayanihan to Heal as One Act) upon COVID-19. The first moratorium was introduced in the regions with enhanced quarantine measures—which mainly affected the Metro Manila area for 90 days. Then additional 60 days of moratoria were introduced in September 2020. The direct effect of loan moratoria is to improve NFC cash balance while reducing bank cash inflows from loan repayments. However, the overall effects are also subject to banks' decisions over how much of the repaid loans they refinance (i.e., rollover rate), which banks usually offer in both normal and stress periods.[36] Even without moratoria, if banks rollover 100 percent of repaid loans (including interest payment component), the resulting NFC and bank cash balances would be the same as the full moratorium case. With moratoria, if banks reduce the rollover rate of repaid loans, it would weaken NFC's cash position and increase banks' liquid asset balance. The overall effects critically depend on the share of borrowers that utilize moratoria and banks' rollover decisions.

103. In this exercise, we evaluate the effects of liquidity stress on NFCs and loan moratoria to the bank and NFC liquidity balance under alternative behavioral assumptions. We consider a total of 8 scenarios. They differ by the length of the moratorium period, five months that already took place, and 12 months incorporating the program's potential extension. We also assumed alternative utilization rates of moratoria, starting with 70 percent of loans observed in April-May and higher (90 percent) and lower (50 percent) alternatives to gauge the results' sensitivity. The benchmark without moratoria corresponds to assuming a zero percent utilization rate. Lastly, we considered alternative rollover rates by banks for repaid loans. The central assumption is 90 percent, which is what NFC data indicate during past distress episodes.[37] We considered more pessimistic assumptions of 50 percent as well, which is the assumption used for the calculation of Basel III LCR (for one month). Lastly, some firms' cash balance decline to negative. We considered the impact on

[36] During normal times, the observed rollover rate is above 100 percent, reflecting credit growth.

[37] In normal time, the rollover rate is over 100 percent.

bank's liquidity balance depending on whether banks provide additional financing to these firms so that they can restore their cash balance to 0.

B. Results

104. The results show that the rollover rates of bank loans play a critical role to determine the effects of moratoria on NFCs (Figure 17). For NFCs, moratoria can substantially improve their liquidity conditions when banks' rollover is low but less so otherwise, indicating the importance of moratoria to alleviate NFC liquidity stress when there is a credit crunch. Assuming 70 percent of loans use moratoria, no new financing from banks other than rollover of existing loans, and 90 percent rollover ratio, NFC's cash-to-asset ratio falls slightly from 9.7 percent at end-2019 to 8.8 percent end-2020 without moratoria. However, when the rollover ratio is 50 percent, the cash-to-asset ratio declines to 5.3 percent end-2020. Now, with 12-month moratoria and 90 percent rollover ratio, the cash balance improves even beyond the 2019 level to 10.6 percent. The same measure helps NFC's cash balance back to 9.6 percent—similar to the end-2019 levels—when the rollover rate is 50 percent.

105. In other words, as long as banks continue to rollover most of the existing loans, a relatively small share of NFCs would need to use moratoria. Moratorium and banks' rollover behavior are substitutes for each other. When banks maintain a 90 percent rollover rate, even with a lower moratorium utilization rate of 50 percent can bring NFC cash balance above the 2019 level. This implies that NFCs would need to use much less than 50 percent of the moratorium opportunities—or a shorter moratorium period than 12 months—to remain liquid. At the same time, banks' health, liquidity conditions, and risk tolerance that influence their rollover rate decision would be critical to assess the need for moratorium policies.

106. For banks, overall moratorium effects hinge on whether NFCs have alternative sources of financing to close their liquidity gaps. Alternative sources include their cash assets—including bank deposits—and new financing from foreign banks and domestic and international bond markets. The availability of new financing would depend on global liquidity and country risks to the Philippines as perceived by international investors. Domestic financing opportunities would be more when the corporate bond market is developed. Without new financing, NFCs may liquidate their cash instead of defaulting on loan repayments. NFCs have various types of liquid assets, such as local bank deposits, deposits abroad, and domestic and foreign securities.

107. The impact on bank deposits is subject to the overall cash flow gap of NFCs and the pecking order of liquidating cash assets. If NFCs liquidate bank deposits first, then banks' corporate deposits' runoff rate would be higher than when NFCs liquidate other assets first. In this exercise, we assume that NFCs liquidate all of their liquid assets proportionally.[38] As shown in the chart below, the potential NFC deposit withdrawals could be very high without moratoria, especially

[38] Indeed, this is the only feasible assumption given that the NFC financial statements data do not show the composition of the liquid assets—"cash and cash equivalents." The BSA data in Figure 4 indicate that, on aggregate, NFCs' main liquid assets appear to be domestic bank deposits and foreign assets.

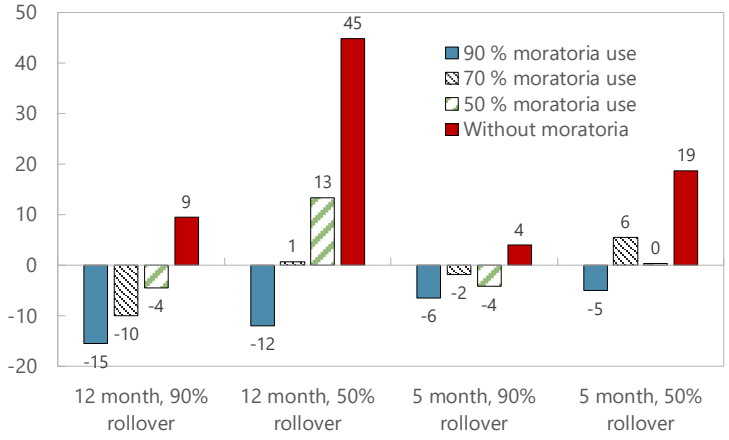
when banks cut down their lending. If banks rollover only 50 percent of their existing loans to corporates, the NFC deposit withdrawal rate could be as high as 45 percent over 12 months without moratoria. It will drop visibly to 13 percent with moratorium use of 50 percent. As expected, when banks continue to rollover 90 percent of their loans, the corporate deposit withdrawal rate goes down to 9 percent without moratoria—even lower than the case with some moratorium use under tight credit conditions.

Philippines: Bank-NFC Liquidity Linkage and Moratoria

Without moratoria, banks receive more loan repayment cash inflows but could lose substantial NFC deposits. Higher moratorium usage or rollover rates[1] mitigate NFC liquidity gaps and therefore reduce their deposit withdrawal. With some parameter combinations, NFC deposits could grow over the 2019 levels (shown as negative withdrawal rates).

NFC Deposit Withdrawal Rate

(In percent)



Source: IMF staff estimates.
1/ During normal times, banks' rollover rates for existing loans exceed 100 percent, reflecting normal time credit growth. Data shows they went down to about 90 percent during the past distress episodes across ASEAN.
Negative figures indicate deposit inflows.

108. Once the indirect effects of moratoria from NFC deposit withdrawal is incorporated, the total effects on banks' CBC differ little across policy and parameter choices. In all four cases shown in Figure 17, banks' remaining CBC after stress with NFC deposit outflow is about 110 percent of the end-2019 level.[39] It highlights offsetting roles of NFC and bank behaviors in response to liquidity distress and moratoria. Because moratorium affects the allocation of liquidity between banks and NFCs, rather than the overall liquidity available for the system of the two sectors, the policy effects could be almost nullified when the system-wide impact is considered. However, there will be differences when NFCs rely more on nonbank and international financing or liquid assets as such actions change the net liquidity available for the system of banks and NFCs.

[39] The CBC balance remain above the 2019 level because the refinancing rate of banks' own term borrowing is set at high (90 percent), and household deposit withdrawal is not considered in the exercise (even though loan moratorium and rollover of existing bank loans to the household are accounted for. For banks, this exercise is a partial stress test exercise focusing on bank-NFC linkages, covering only a subset of possible shocks.

C. Recommendation

109. The BSP could monitor contingent financing plans of banks and NFCs to better gauge the likely policy effects for the whole system. Even though moratoria shift NFC's liquidity stress to banks at first glance, the overall effects on banks' liquidity balance may turn out to be negligible when NFCs have substantial bank deposits that they can withdraw. The actual results critically hinge on how banks and NFCs behave under stress periods.

- ***For banks***, the ICAAP under Pillar 2 of the Basel III would include banks' own liquidity stress test results and contingent financing plans for each bank. When resolution planning is developed, banks need to state-contingent financing plans, including Emergency Liquidity Assistance and other available support during resolution for much greater stress than those considered in the ICAAP. The BSP could collect the information from each bank and assess the likely banking sector-wide behavior.

- ***As for NFCs***, Philippine firms are subject to substantial disclosure requirements on their financing details (e.g., currency composition). However, these are usually shown as footnotes in financial statements. Standardizing disclosure format and turning them into a database for quotative analysis would be critical for utilizing the rich disclosure requirements. In this context, the initiative of the Securities Exchange Commission (which sets disclosure requirements) to create an NFC database is welcome. Moreover, the BSP could start utilizing its recently obtained power under the new BSP Act to be able to ask any information that matters for the analysis of financial stability from any economic sector would be extremely helpful. It could consider starting to discuss contingent financing plans of systemically important NFCs to refine the behavioral assumptions in the system-wide liquidity stress tests.

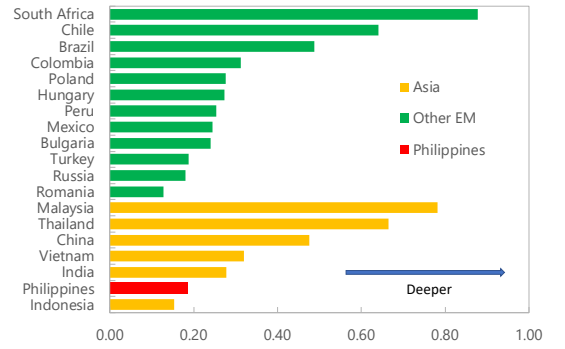
110. This type of exercise is another area where collaboration between the macroprudential unit and the supervision sector is essential. The analysis combines NFC and bank cash-flow stress tests, where the macroprudential unit and supervision sector have the responsibility, respectively. The BSP could consider similar arrangements as the macroprudential stress tests discussed in the section on bank solvency stress tests.

Figure 1. Financial Sector Development: Philippines and Selected Economies

Financial institutions' depth is on the lower side among Asian and other emerging markets.

Depth of Financial Institutions

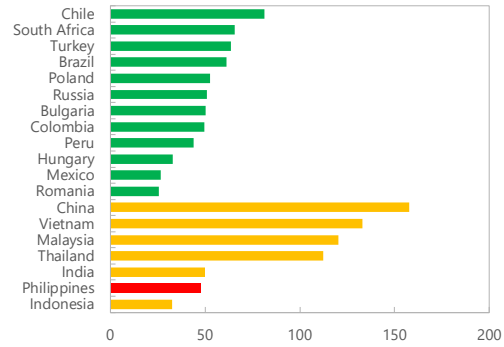
(Index based on bank credit, assets of pension and mutual funds, insurers' premiums in percent of GDP, IMF Financial Development Index)



Bank credits are on the smaller side among emerging markets.

Bank Credit to the Private Sector

(In percent of GDP, 2018)

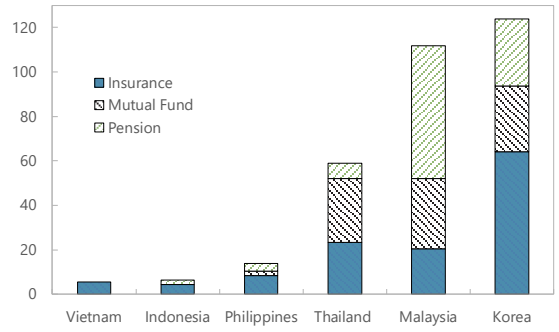


Sources: World Bank, World Development Indicators and IMF staff calculation.

NBFI sector is smaller than peers

Non-bank Financial Institutions

(Assets in percent of GDP, latest available)

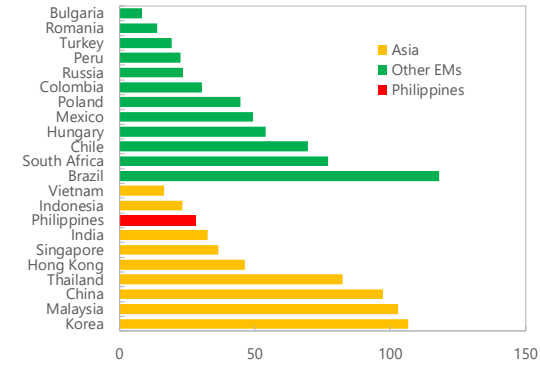


Sources: FinsStats, Financial Stability Board, and Fund staff estimates.

Bond markets are underdeveloped both in Asian and other EM peers

Domestic bond market development

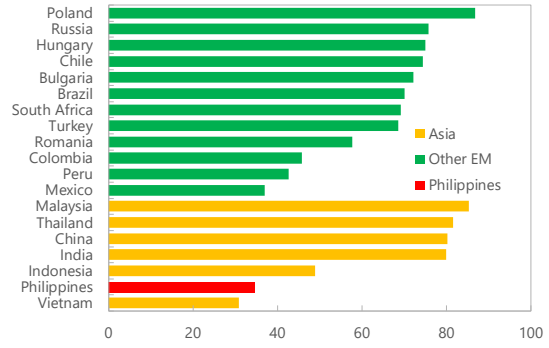
(Domestic bonds outstanding in percent of GDP)



Access to finance is much lower than EM peers with only 34 percent of adults have formal accounts.

Adults with Financial Accounts

(In percent of survey respondents)

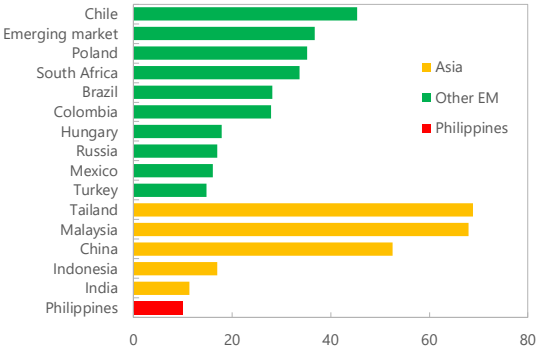


Sources: World Bank, Global Findex Data

Household debt from banks are smallest among EM peers, and households borrow primarily from friends and families.

Household Credit

(In percent of GDP, 2018, consumer, mortgage, and household as employers)

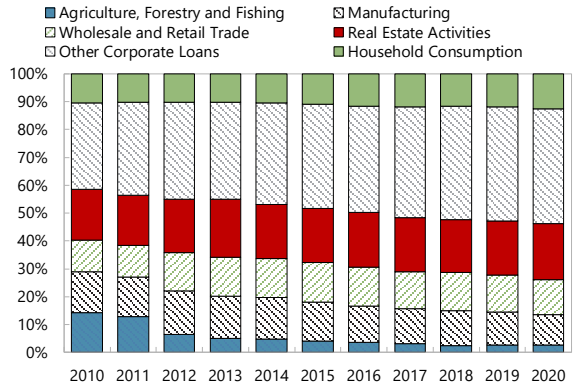


Sources: BIS, BSP, and IMF staff calculation

Figure 2. Philippines: Business Model of the Banking System

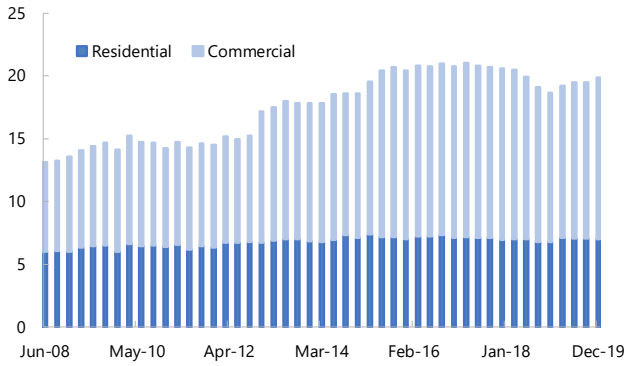
Loans are largely given to the corporate sector.

Loans by Sector



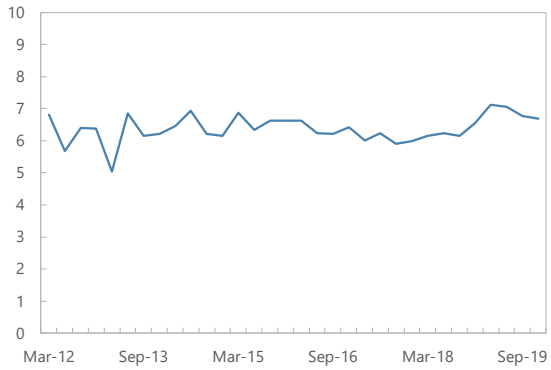
Real estate loans are largely commercial and their share in total assets are capped at relatively low 20 percent by the BSP.

Share of Real State Loans in Total Loans
(In percent)



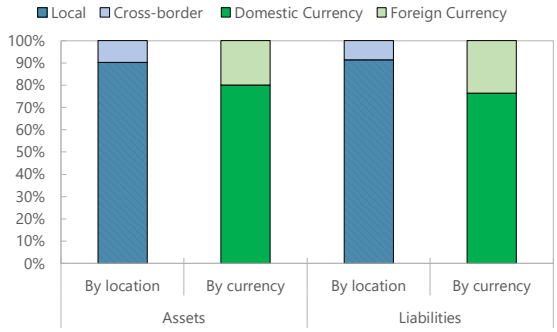
The share of directed loans to the agricultural sector under "Agri-Agra" law is about 7 percent of the total loans, even though banks are not fully compliant.[1]

Directed Lending under the Agri-Agra Law
(In percent of total loans)



Banks have moderate levels of cross-border exposures and dollarization.

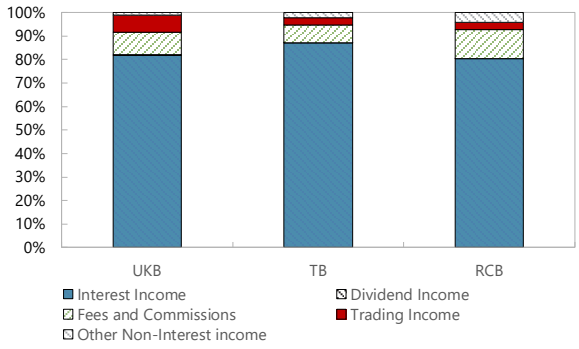
Bank asset and liability, by location and currency
(In percent of total)



Sources: BIS Locational Cross-border data

The main revenue source is interest income across all the three types of banks.

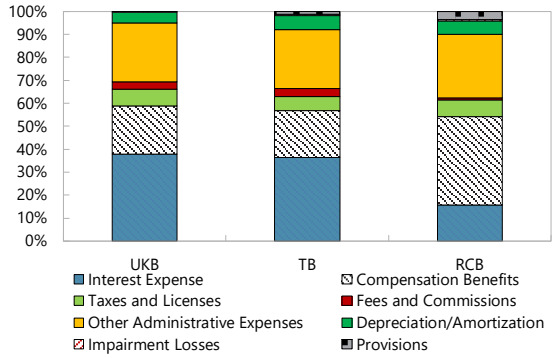
Revenue Sources
(In percent of gross income, 2019)



Sources: The BSP and IMF staff calculation.

Expenditures are mostly interes and administrative expenses, and salaries (especially for RCBs).

Expenditure Sources
(In percent of total 2019)

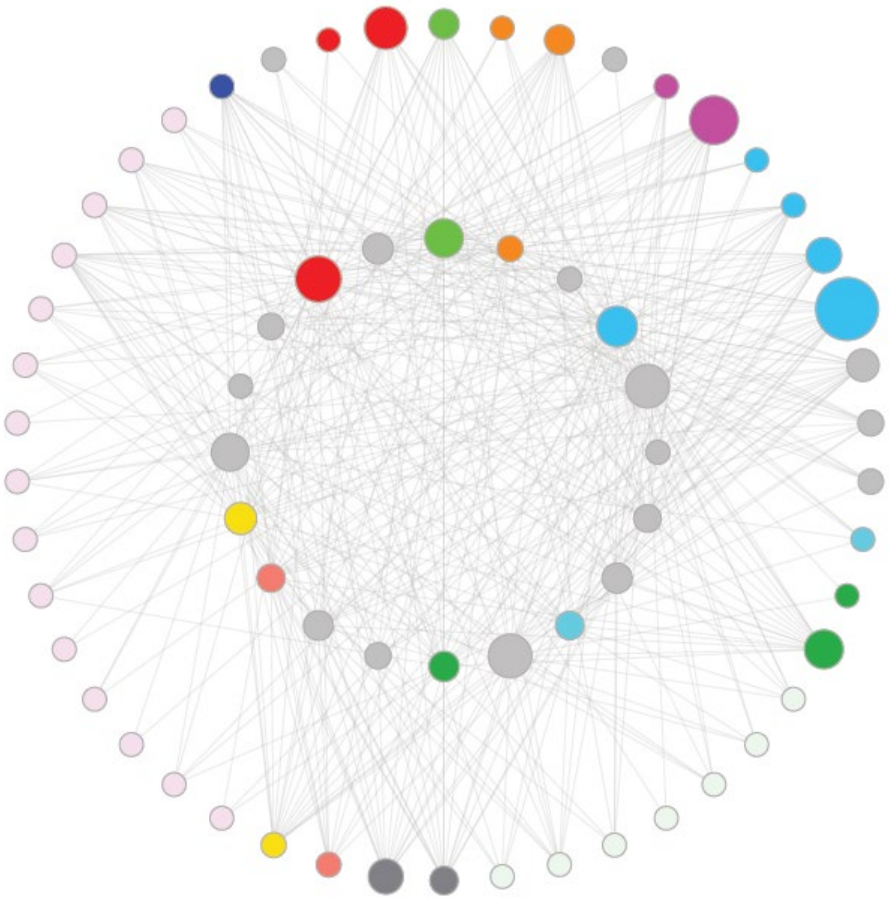


Sources: The BSP and IMF staff calculation.

1/ Note: The directed lending requirements for SMEs were introduced in 1991 and amended in 2008. The Agri-Agra requirements were introduced in 1975 and amended in 2009.The laws require banks to invest 25 percent of the increase of funding since 2009 (about 10 percent of UKB borrowing) to the broad agricultural sector (wider than the standard industry classification). At end-2019, UKBs provide about half of the required amounts and pay fines for shortfalls. Discussion to amend the law to expand the scope of qualifying investments is underway.

Figure 3. Philippines: Financial Linkage Among Banks and Conglomerates
(Inner circle = conglomerate groups, outer circle = banks)

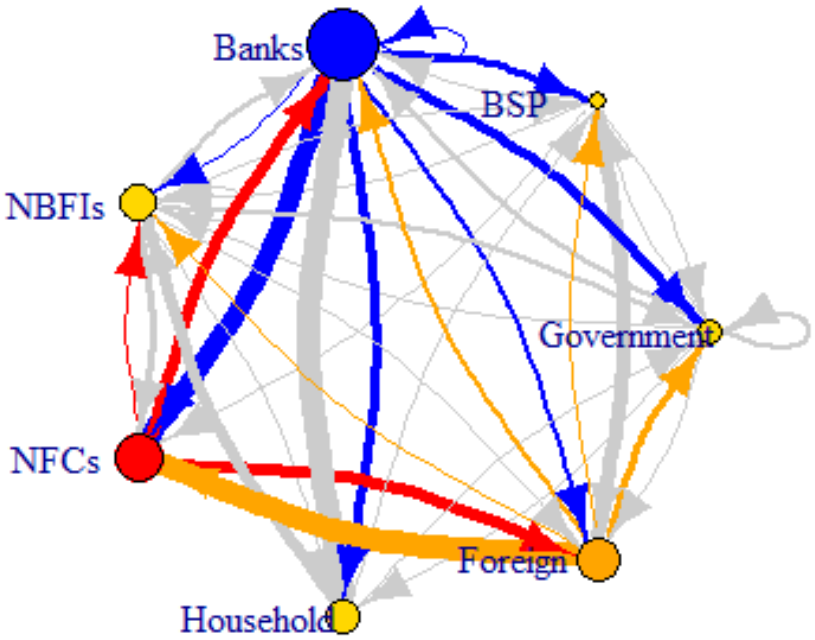
The main source of interconnectedness is though bank lending to conglomerates (lines between outer and inner circles), rather than interbank exposures (among nodes on outer circle). Large banks have significant exposures to a number of conglomerates, including their own. Each conglomerate also takes loans from various banks from within and outside of their own group. Contagion from common borrowers could be strong if any of the major conglomerates become distressed. The BSP study on network analysis shows the that failure of major conglomerates would have larger contagion effects to banks compared to failures of banks.



Sources: BSP and IMF staff visualization.
The sample includes 20 large conglomerates. Out of all UKBs and thrift banks, those with more than one connection (lending counterparts among the 20 conglomerates) are included in the figure Based on banks' large exposure data. Bank deposit data are not available due to the secrecy law.
Node size represents degree of the network. Nodes color codes: light pink = thrift banks that are not part of any conglomerate; light green = foreign banks; dark grey = government-owned banks; light grey = conglomerates and banks in a conglomerate with relatively smaller group total exposures; and other colors = other conglomerates—for instance, the three red nodes indicate a conglomerate groups and two banks that belong to the conglomerate.

Figure 4. Philippines—Financial Linkage Map
(Network of Financial Claims, all instruments and currencies, March 2019)

Banks are at the center of financial linkage, followed by NFCs and foreigners. Banks fund themselves with mostly household deposits, followed by corporate deposits, while lend primarily to NFCs. They hold large liquidity buffer consisting of BSP reserve deposits and government securities. Foreign investment mostly goes to NFCs (including FDI, portfolio equity, and borrowing), followed by sovereign and banks. Banks' international liability is much smaller than their domestic liabilities and largely balanced with international assets amounting to over 80 percent of liabilities. However, the coverage is much lower for NFCs (about 20 percent) in part because NFC receives FDIs. NBFI assets are mostly of institutions other than insurance and mutual funds.

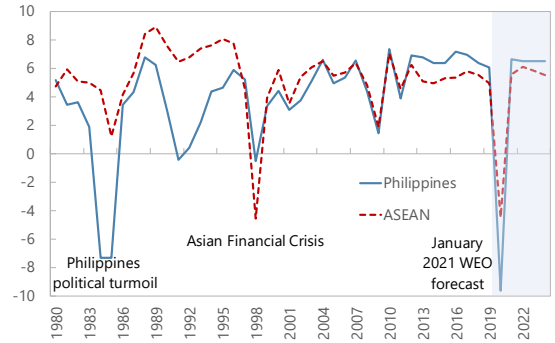


Sources: BSP and IMF staff visualization.
NBFI = non-bank financial instituitons, NFC = non-financial corporation.
Yellow lines=liabilities to foreign investors, blue lines = bank assets, and red lines = NFC assets.
Bubble size represents relative financial footprint of the sector (sum of financial assets and liabilities). Financial exposure data among NFCs and between households and NFCs are missing.

Figure 5. Philippines: Macro-Financial Indicators

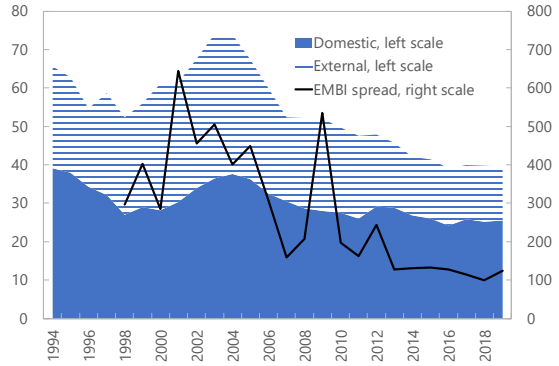
The Philippines is more severely hit by COVID-19 than its Asian peers, with weak growth forecast similar to the Asian Financial Crisis shock.

Real GDP Growth: The Philippines and ASEAN 5
(In percent)



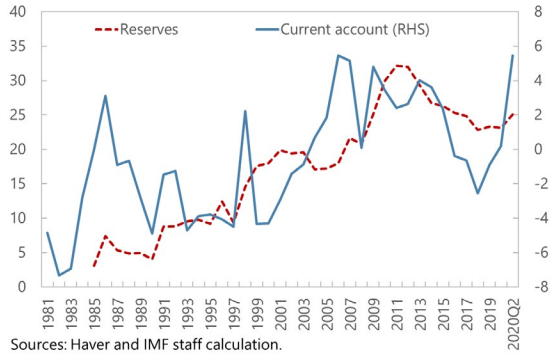
But the economy went into COVID-19 crisis with generally stronger economic fundamentals with much lower sovereign debt and country risk premium

Sovereign debt and risk premium
(Debt in percent of GDP, left scale; EMBI spreads in basis points, right scale



...and higher international reserve buffers.

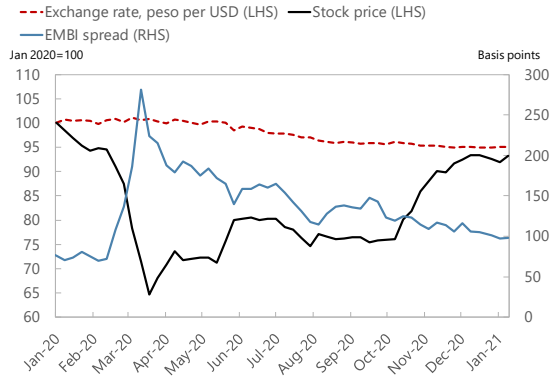
International Reserves and Current Account
(In percent of GDP)



Sources: Haver and IMF staff calculation.

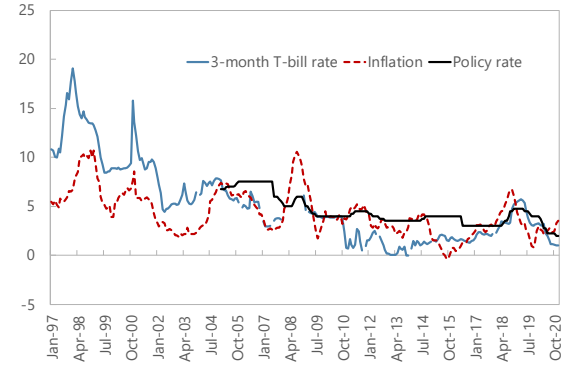
As a result, exchange rate has been stable and the deterioration of EMBI spreads and equity prices in March moderated notably.

The Impact of COVID-19 on Filipino Asset Prices



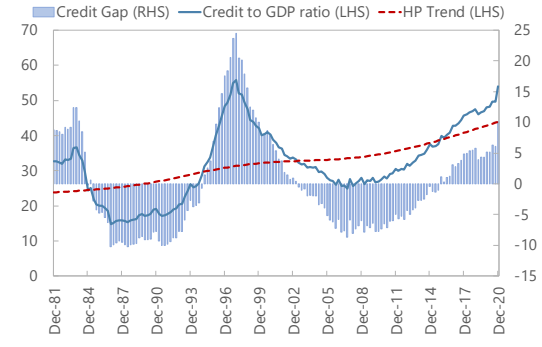
...and the BSP managed to cut policy rate under stable broad inflation, and T-bill rates declined unlike AFC experience.

Interest Rates and Inflation
(In percent)



The credit gap remains positive so far despite declining credit outstanding because of the contraction of GDP.

Credit gap
(In percent of GDP)

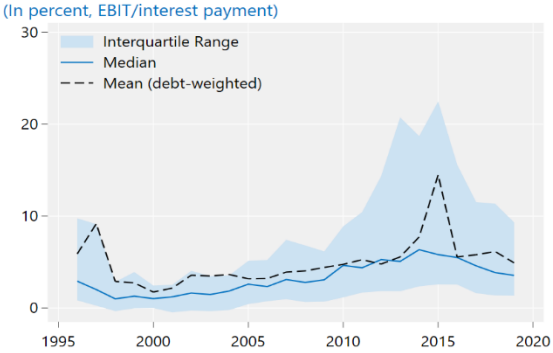


Sources: Haver Analytics, Moody's Analytics, Bloomberg, Datastream, national authorities, and IMF staff estimates.

Figure 6. Philippines: Risks from Non-Financial Sectors

The debt service capacity of NFCs is strong…

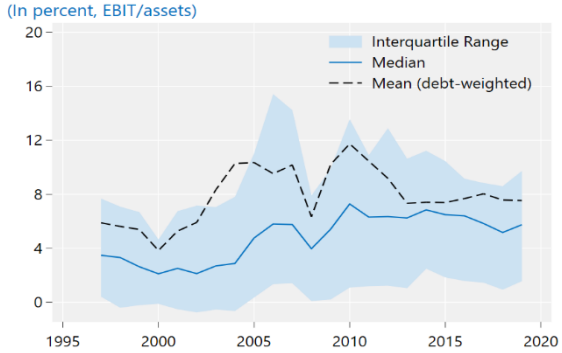
Interest Coverage Ratio
(In percent, EBIT/interest payment)



Sources: S&P Global Market Intelligence; and IMF staff estimates.

…supported by strong profitability,

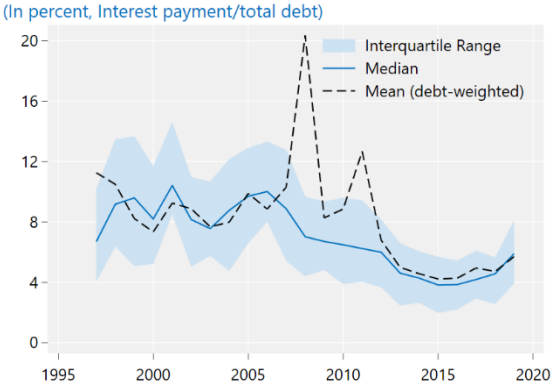
Profitability: Return On Assets
(In percent, EBIT/assets)



Sources: S&P Global Market Intelligence; and IMF staff estimates.

Slight declines of ICR in the past few years are mostly due to higher funding costs, as policy rates were tightened…

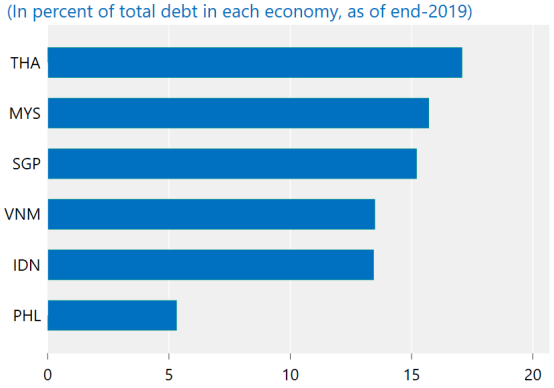
Effective Interest Rate
(In percent, Interest payment/total debt)



Sources: S&P Global Market Intelligence; and IMF staff estimates.

…still, the share of debt-at-risk is relatively low in the region.

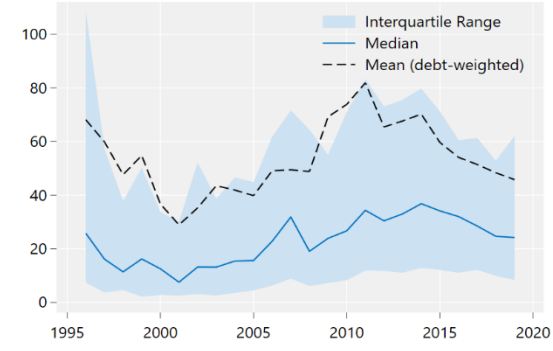
Debt-at-Risk (ICR<1)
(In percent of total debt in each economy, as of end-2019)



Sources: S&P Global Market Intelligence; and IMF staff estimates.

The cash buffer is also strong and provides additional resources to continue servicing debt upon earning shocks.

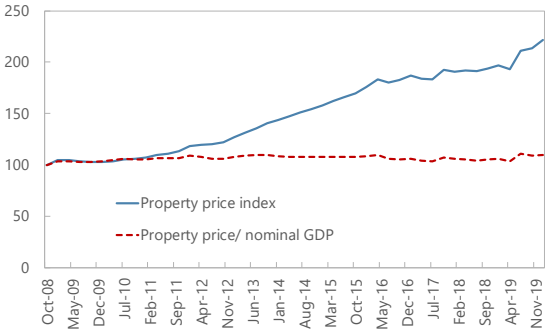
Cash Ratio
(In percent, cash and equivalents/total current liabilities)



Sources: S&P Global Market Intelligence; and IMF staff estimates.

Real estate price has sharply increased since 2010, though reasonably in line with income growth…

Property Price
(Index, 2008Q4 = 100)

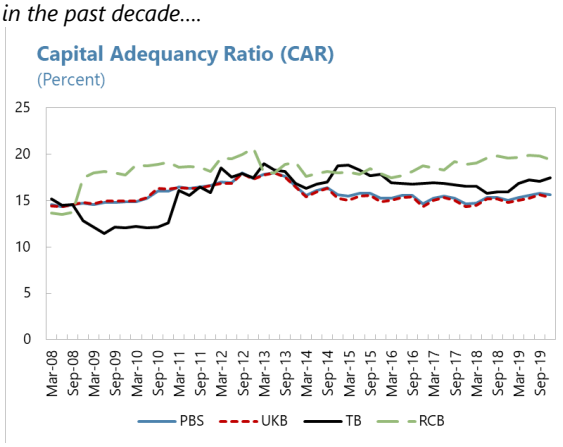


Sources: BIS and IFS, IMF staff calculation.

IDN = Indonesia, MYS = Malaysia, PHL = Philippines, SGP = Singapore, THA = Thailand, and VNM = Vietnum.

Figure 7. Philippines: Financial Soundness Indicators

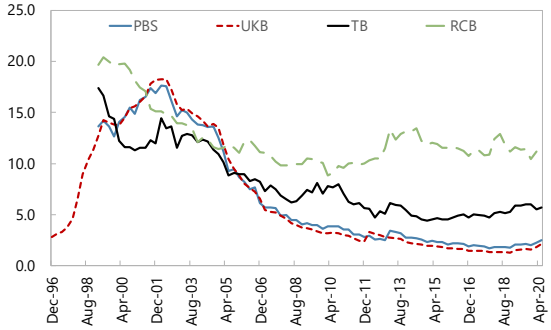
Bank capital ratios have been stable at about 15 percent in the past decade….



…at the lower side among EMs as others improved the capital ratio for the same period.

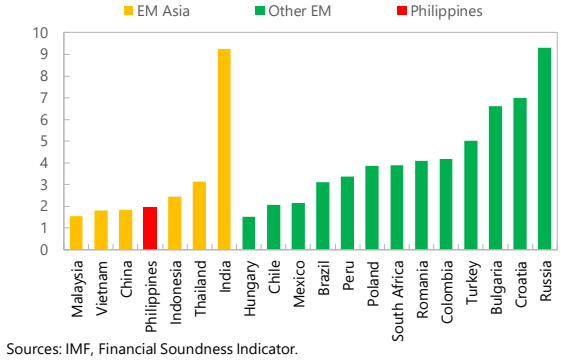
Sources: IMF, Financial Soundness Indicator.

NPL ratio has declined substantially since the Asian Crisis. Smaller banks tend to have higher NPL ratios.



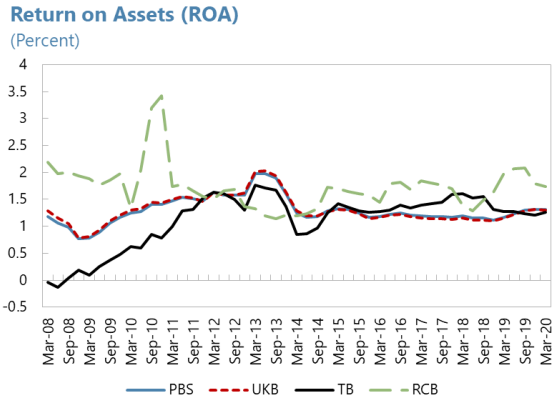
Sources: BSP, IMF staff calculation.

The level of NPL ratio is lower than many EM peers.

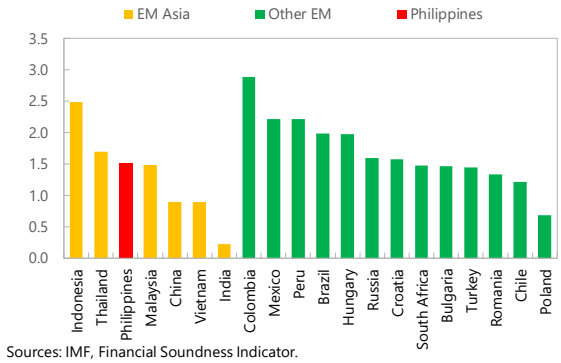


Sources: IMF, Financial Soundness Indicator.

ROA has been stable in the past several years, and RCBs tend to show higher profitability.



The system-wide level of ROA is at about the median among EM peers.

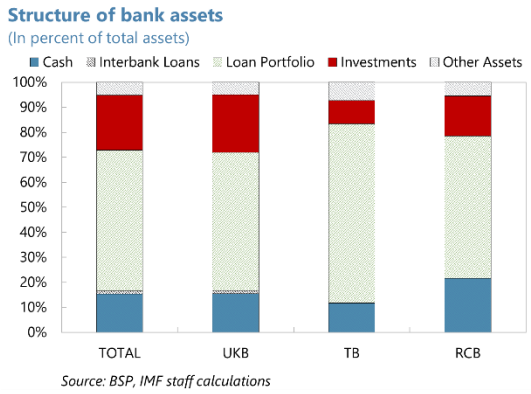


Sources: IMF, Financial Soundness Indicator.

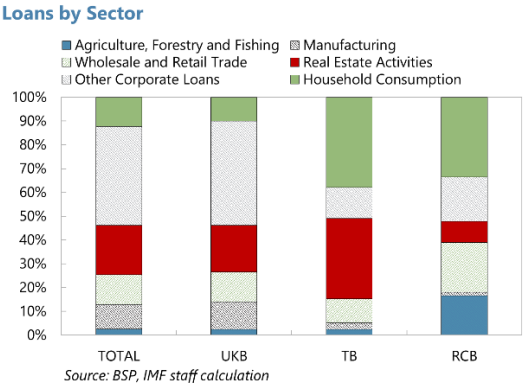
PBS = Philippines banking system.

Figure 8. Philippines: Financial Soundness Indicators by Bank Type

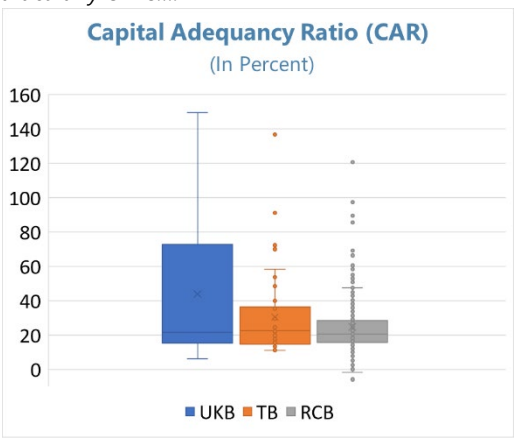
The loan portfolio of TBs and RCBs' represents a large share in total assets….



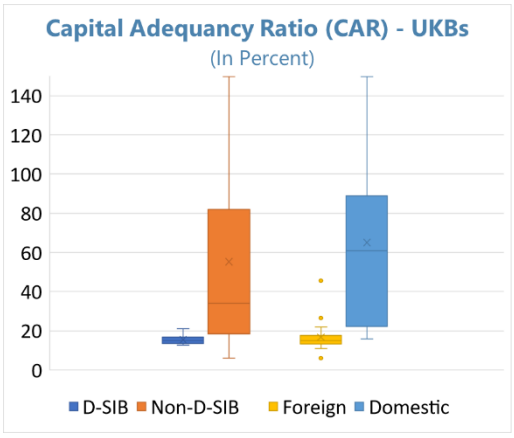
and is mostly concentrated on household (consumption and mortgage) and SME loans.



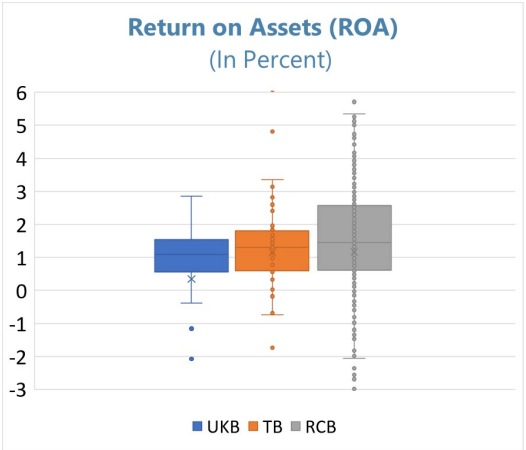
There is a large dispersion of CAR within bank groups, particularly UKBs….



D-SIBs and foreign banks tend to be in the lower quantile.



Although the median ROA across different groups is similar, there is a large variation across RCBs.



TBs and RCBs tend to have higher NPLs and a larger dispersion across banks.

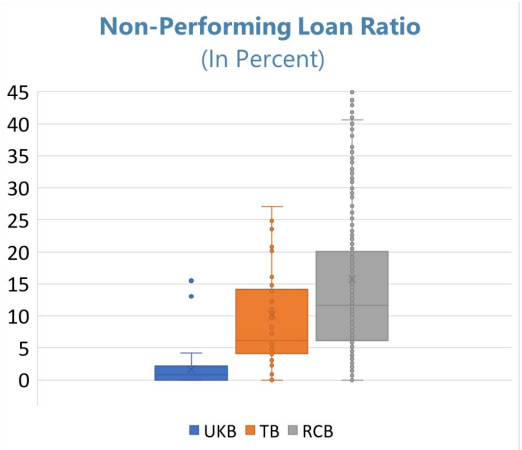
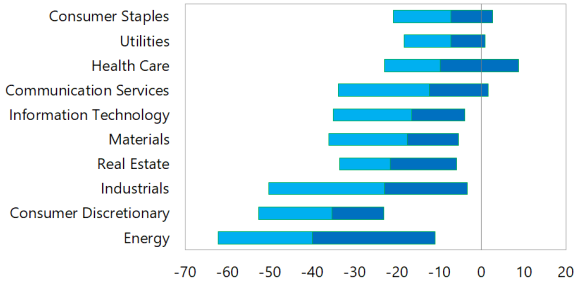


Figure 9. Philippines: Non-financial Corporate Stress Test Results

Market analysts forecast considerable earning shock in 2020, especially for the industrials, consumer discretionary, and energy sectors.

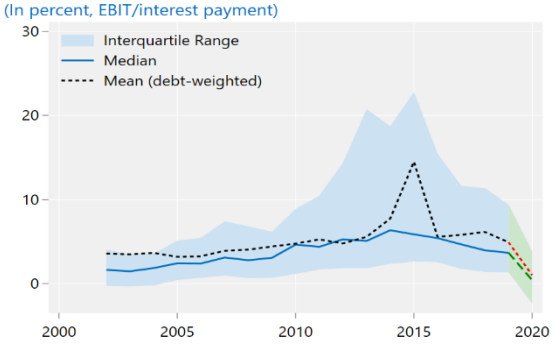
Expected Corporate Earning Shock by Industry 1/
(In percent, interquartile range)



Sources: S&P Capital IQ; and IMF staff estimates.
1/ Interquartile range of changes in analysts' 12-month-ahead company earning forecasts for each industry between January 2 and June 30.

Under these forecasts and October 2020 WEO baseline, ICR deteriorates noticeably…

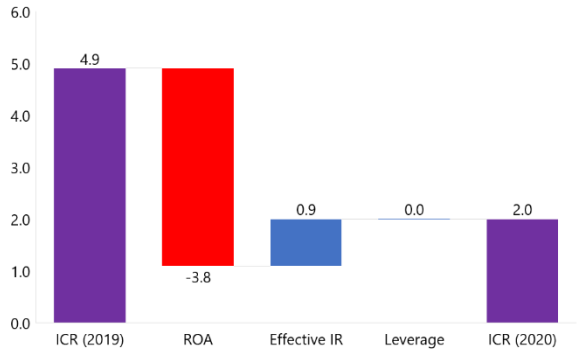
Philippines: Interest Coverage Ratio
(In percent, EBIT/interest payment)



Sources: S&P Global Market Intelligence; and IMF staff estimates.

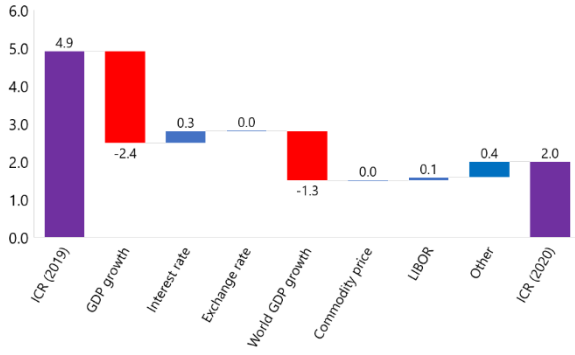
…mainly because of earning shocks…

Contribution to Change in ICR: 2019–2020
(Debt-weighted average)



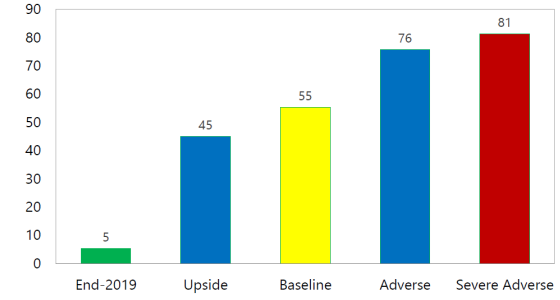
…as economic growth in the Philippines and the world drops rather than tighter financial conditions…

Contributon to Change In ICR: 2019–2020
(Debt-weighted average)



…and ICR deteriorates even more in adverse scenarios, causing systemic stress to the NFC sector…

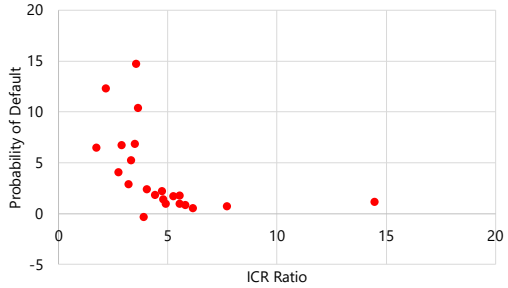
Philippines: Debt-at-Risk (ICR<1)
(In percent of total debt, end-2020)



Sources: S&P Capital IQ; and IMF staff estimates.

…which is likely to increase the NPLs of banks.

Correlation: ICR And Probability of Default 1/
(ICR: debt-weighted average, 1997-2019)

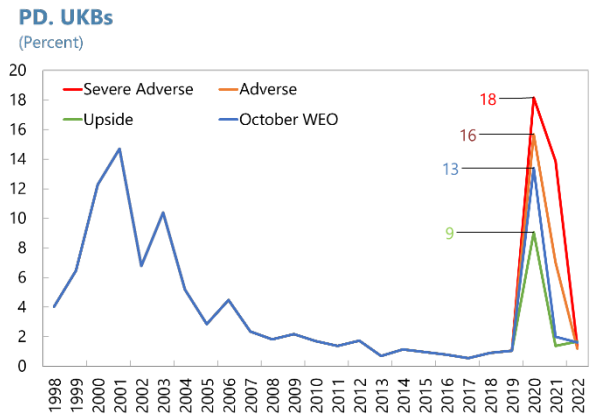


Sources: Bangko Sentral Ng Pilipinas; S&P Capital IQ; and IMF staff estimates.
1/ Defined as new flow into NPL/performing loans.

IDN = Indonesia, MYS = Malaysia, PHL = Philippines, SGP = Singapore, THA = Thailand, and VNM = Vietnam.

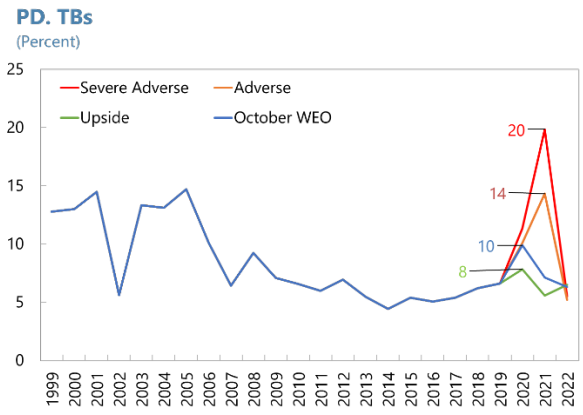
Figure 10. Philippines: Credit Risk

UKBs' PD are very responsive to real GDP and unemployment rates….



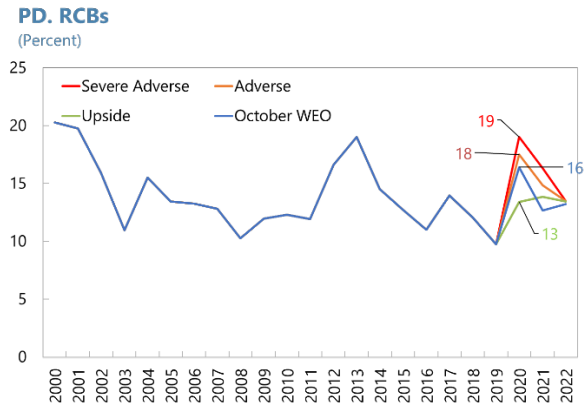
Sources: BSP, IMF staff estimates.

While TBs' PDs react to changes in real GDP and short-term rates….



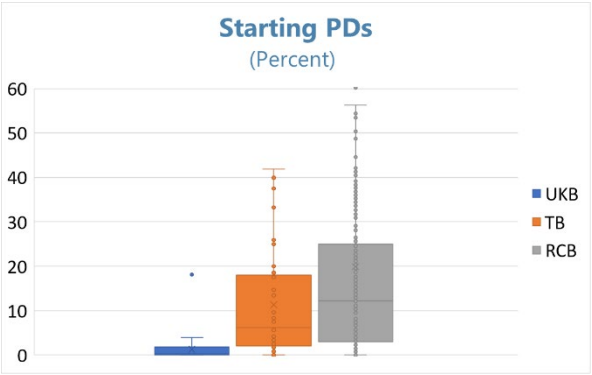
Sources: BSP, IMF staff estimates.

RCBs' PD are less responsive to macroeconomic variables.



Sources: BSP, IMF staff estimates.

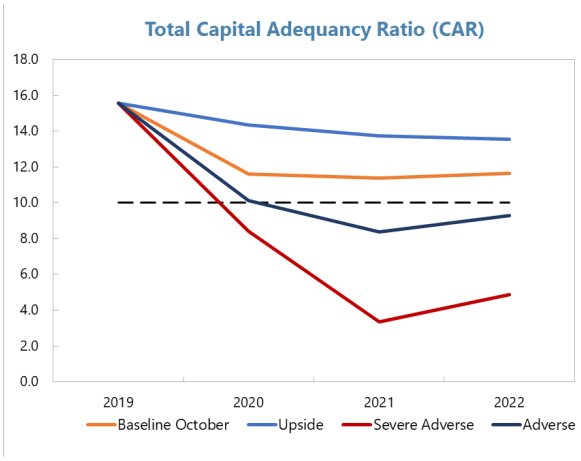
There is a large dispersion in starting PDs across banks.



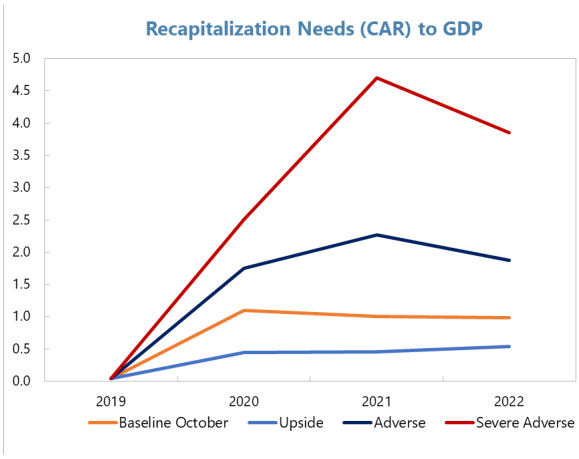
Boxplots include the mean (x), the 25th and 75th percentiles (boxes), the median (middle line) and the 15th and 85th percentiles (whiskers).

Figure 11. Philippines: Bank Solvency Stress Test Results

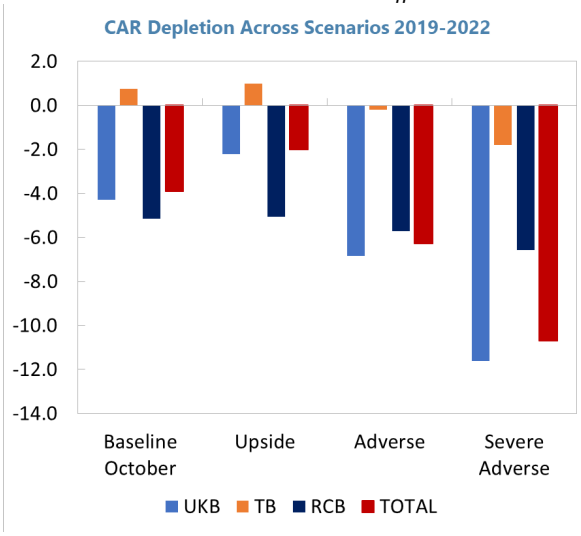
While banks can withstand the baseline shock, the system's CAR declines to below hurdle rate with some lags in the severe adverse scenario…



…and capital shortfalls compared to 10 percent CAR vary between 1 and 4.7 percent across scenarios.



CAR of RCBs declines the most except for the severe adverse case where UKBs are the most affected.



The large dispersion in starting CAR is reflected and accentuated along the stress-testing horizon.

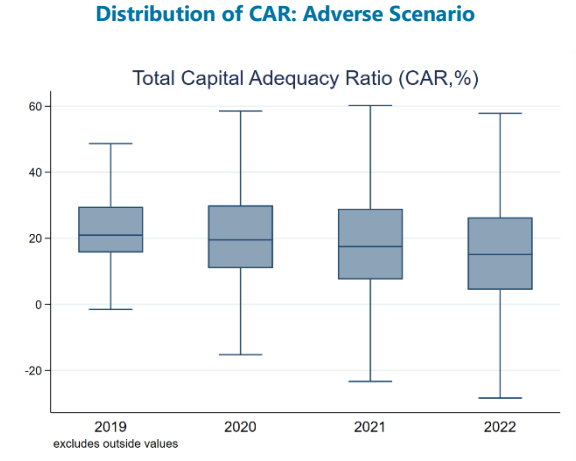
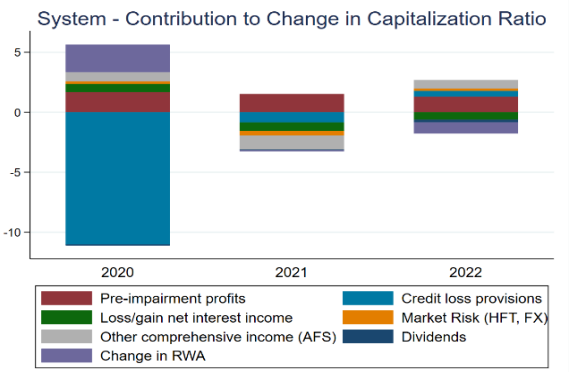


Figure 11. Philippines: Bank Solvency Stress Test Results (continued)

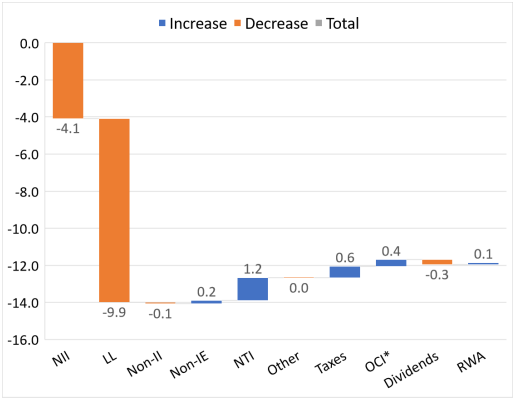
Provisions are the largest contributor to the decline in the adverse scenario…

Contribution to the Changes in CAR: Adverse Scenario



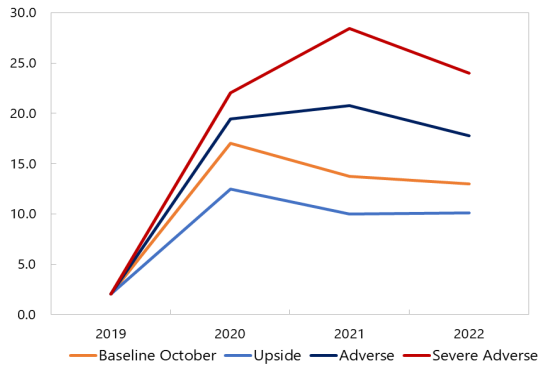
followed by reductions in net interest income (NII), contributing by 5 percent in the CAR decline under the adverse scenario…

Differences[1]: Adverse Scenario – Static 2019



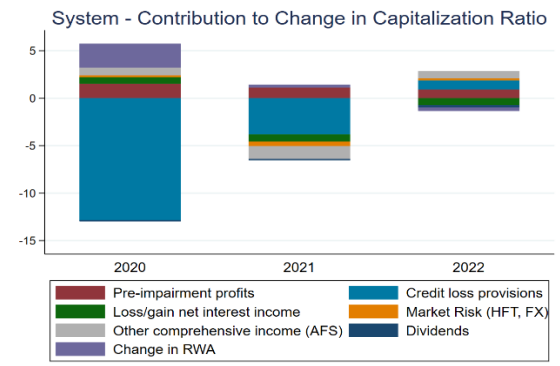
Reductions in NII are driven by decreases on interest income on loans as a result of the sharp rise in NPLs…

NPL Ratio



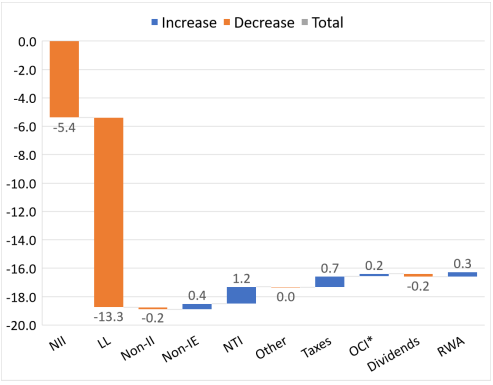
…as well as in the severe adverse scenario…

Contribution to the Changes in CAR: Severe Adverse Scenario



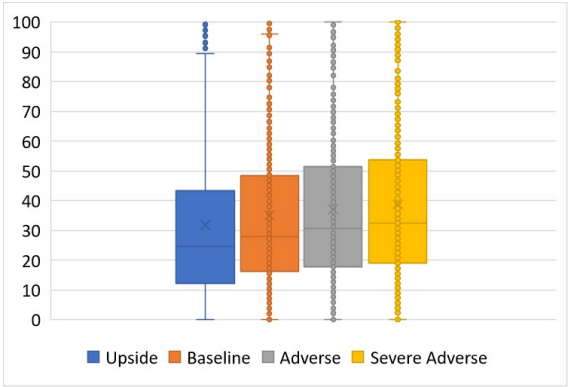
…and 7.5 percent in the severe adverse scenario.

Differences[1]: Severe Adverse Scenario – Static 2019



…which has a large dispersion across banks.

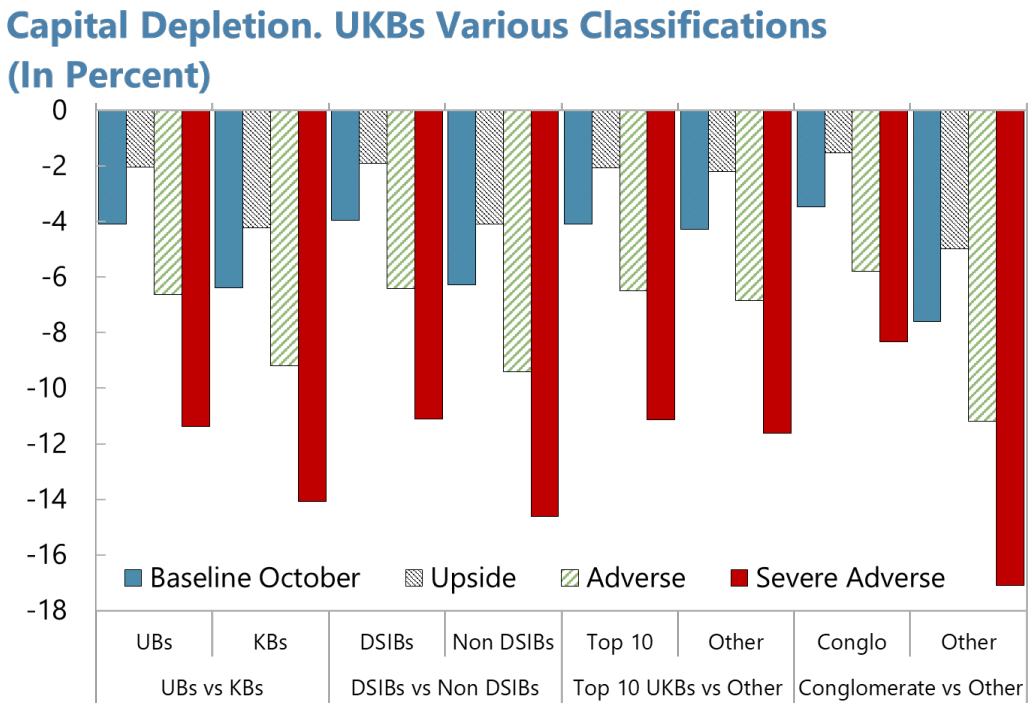
NPL Distribution for 2020.



1/ Contribution is measured as the 2019 profit and loss multiplied by three minus 2020-22 cumulative profit and loss projection in each scenario.
NII = net interest income; LL = loan loss (provision); Non-II = non-interest income; Non-IE = non-interest expense; NTI = net trading income; and OCI = other comprehensive income (valuation change of available-for-sales securities).

Figure 11. Philippines: Bank Solvency Stress Test Results (concluded)

Among UKBs, KBs, Non-DSIBs, smaller banks and banks that do not below to any domestic conglomerate have the largest declines across all scenarios…

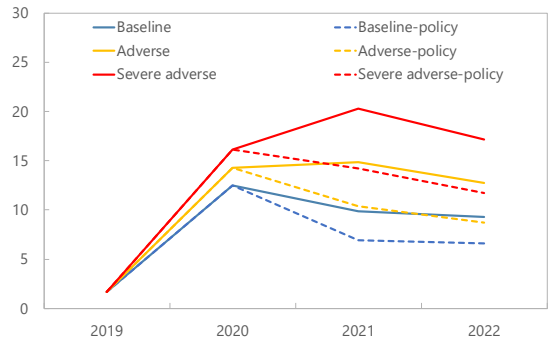


Sources: BSP, IMF staff estimates.

Figure 12. Philippines: Second-Round Effects and Policy Effects Simulation

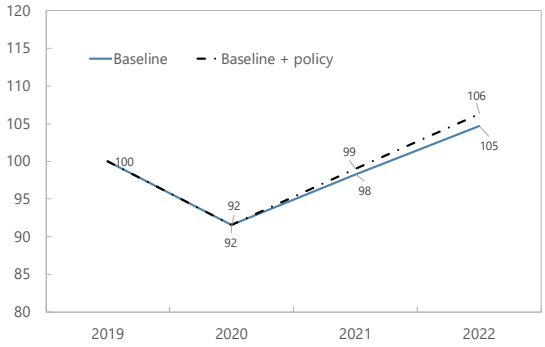
Counterfactual policy simulation considers the effect of one-time cash injection to bank that reduces 2021 LLP by 30 percent.

Counter-Factual Policy Simulation
(Loan loss provision in percent of total loans)



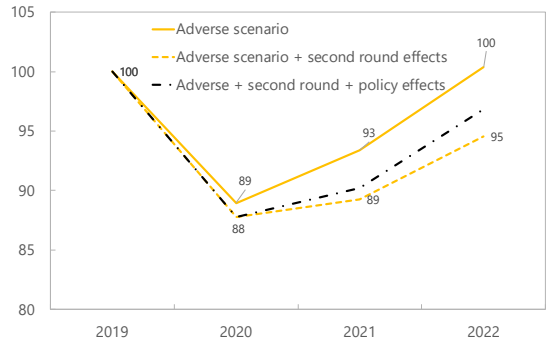
The policy might be able to improve national income for several years over the cost of implementing the measure in baseline…

Counter-factual Policy Simulation: Baseline
(2019 real GDP = 100)



…in adverse scenario…

Counter-factual Policy Simulation: Adverse Scenario
(2019 real GDP = 100)



…and in severe adverse scenario.

Second-Round Effects: Severe Adverse Scenario
(2019 real GDP = 100)

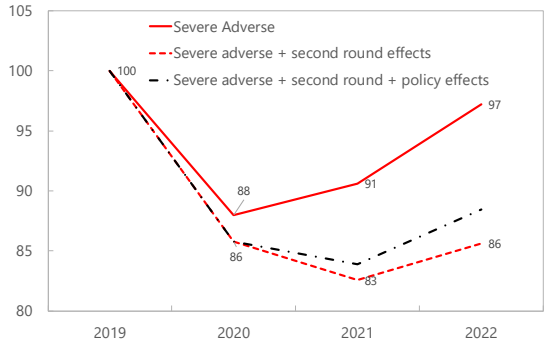
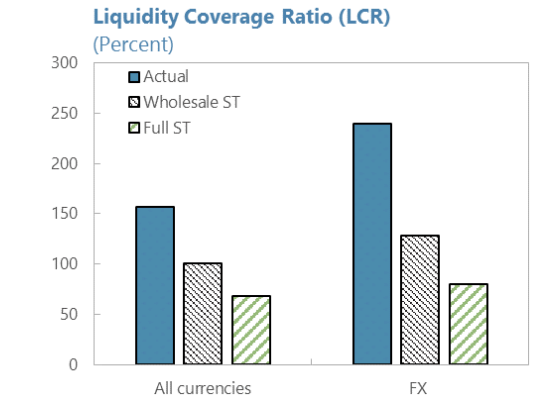
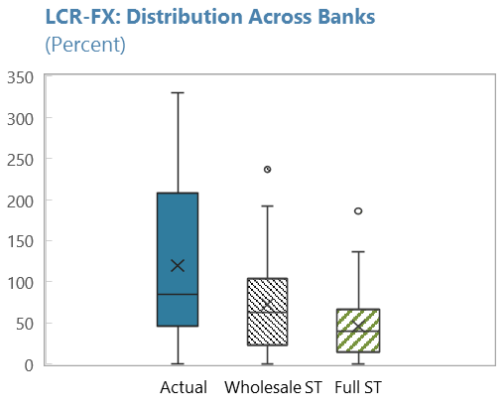


Figure 13. Philippines: UKB Liquidity Stress Test Results

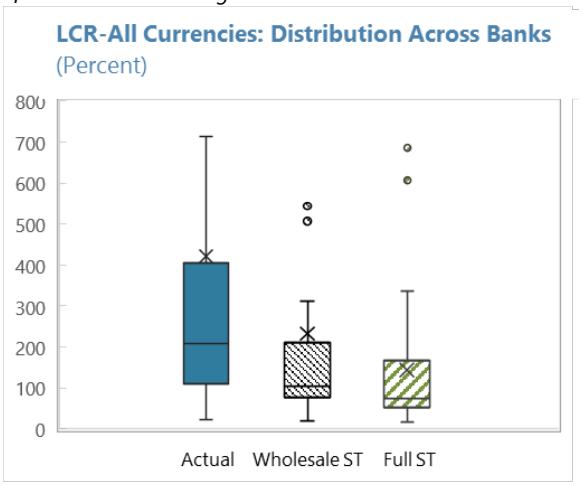
The whole system has sufficient liquid assets to absorb severe funding shocks, especially in FX.



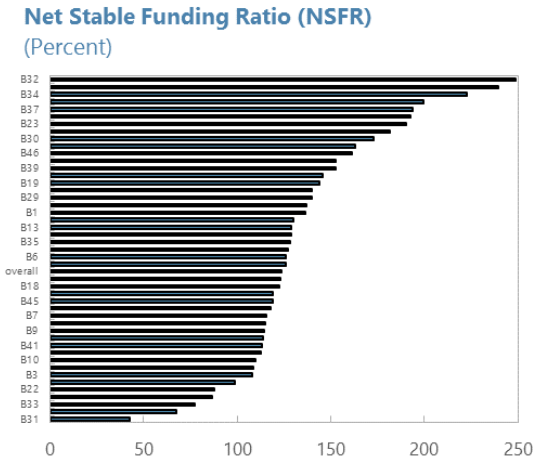
But FX-liquidity is concentrated in a few G-SIB branches.



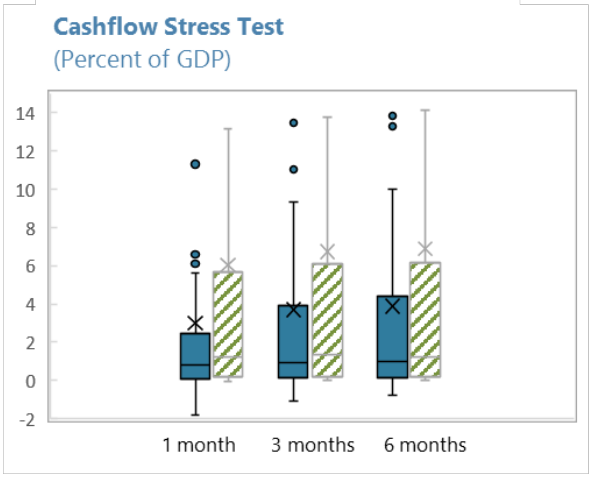
Liquidity buffers across banks appear to be better in terms of LCR calculated using all currencies.



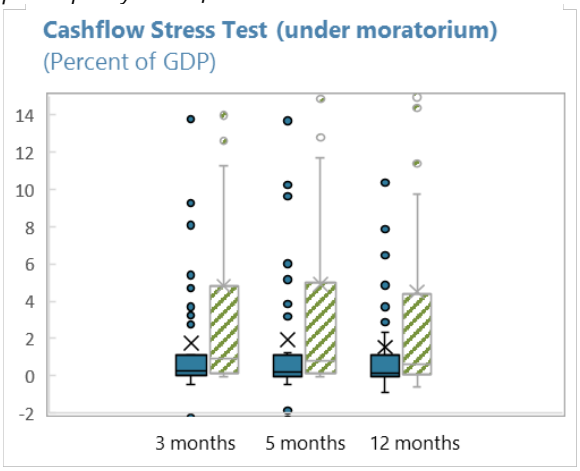
The long-term funding also appears mostly stable, except for handful of branches of foreign banks.



Liquidity buffers beyond 30 days also appear adequate for all banks, especially when all reserves are included.



While shorter-term loan repayment moratorium appears manageable for banks, with increasing horizon, moratoria pose liquidity issues for some banks.

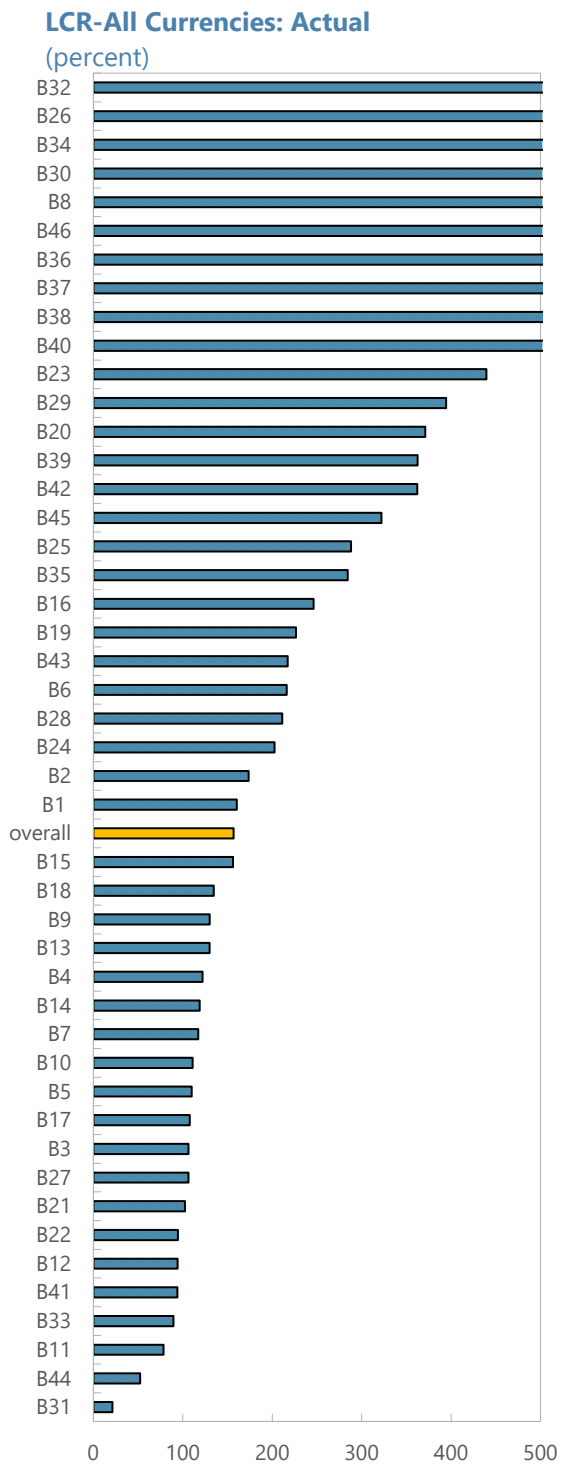


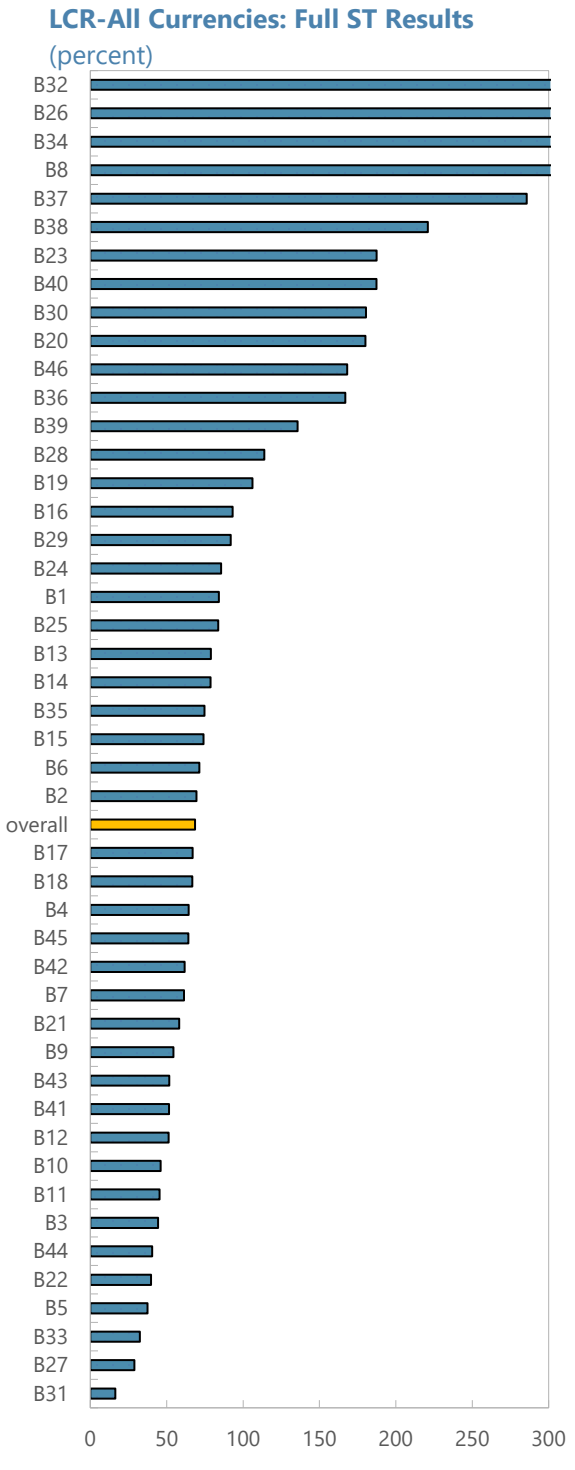
Source: BSP; and IMF staff calculations.
Note: The box and wiskers charts shows quartle information with a horizontal line for median. Marker × shows mean and dots indicate outliers.

Figure 14. Philippines: Liquidity Coverage Ratio—Results by Bank

The Actual LCR (calibrated using Basel 2013 weights) show large liquidity buffers, except for few branches of foreign banks.

The fully stressed LCR, i.e., with additional stress compared to Actual LCR, shows that most banks would be able to sustain large outflows for at least two weeks.



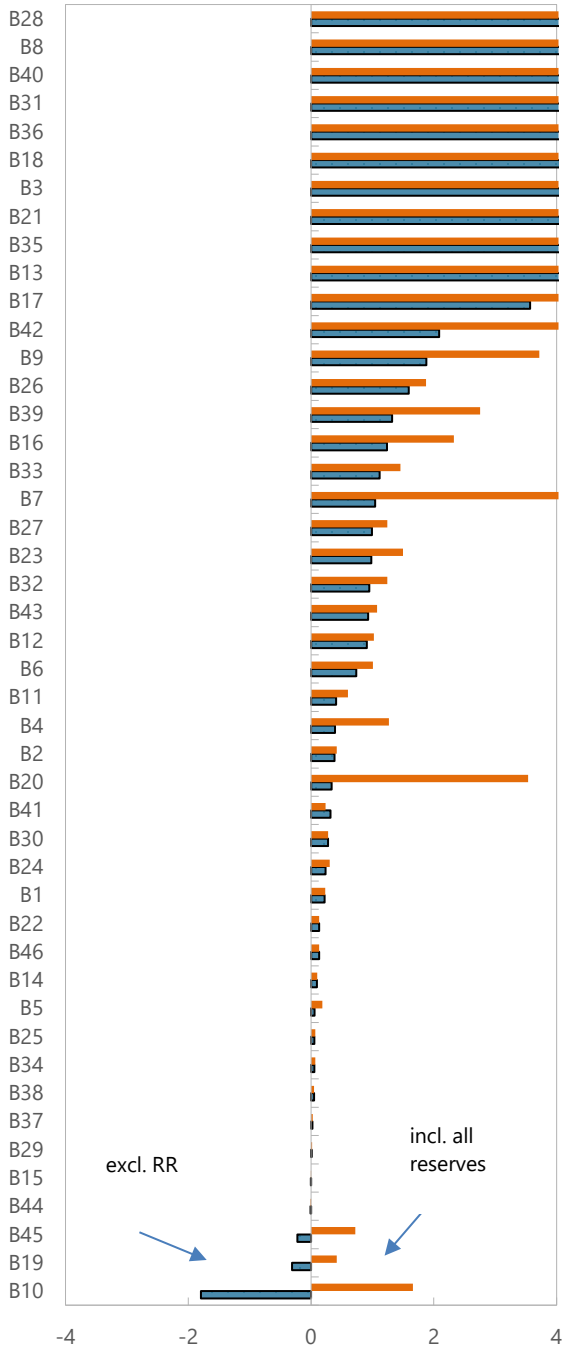


Source: BSP; and IMF staff calculations.

Figure 15. Philippines: Funding and HQLA of UKBs

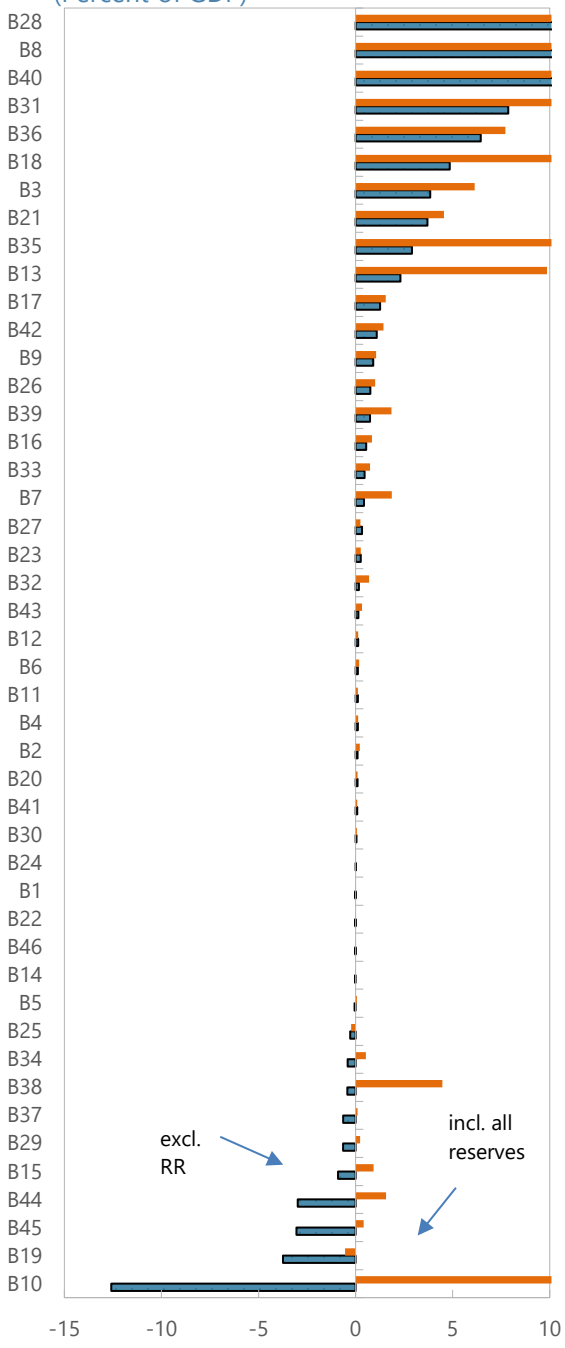
The short-term net funding gap appears to be significant only for handful of banks, which is however, fully addressed when including required reserves.

Net Funding Gap (1 month)
(Percent of GDP)



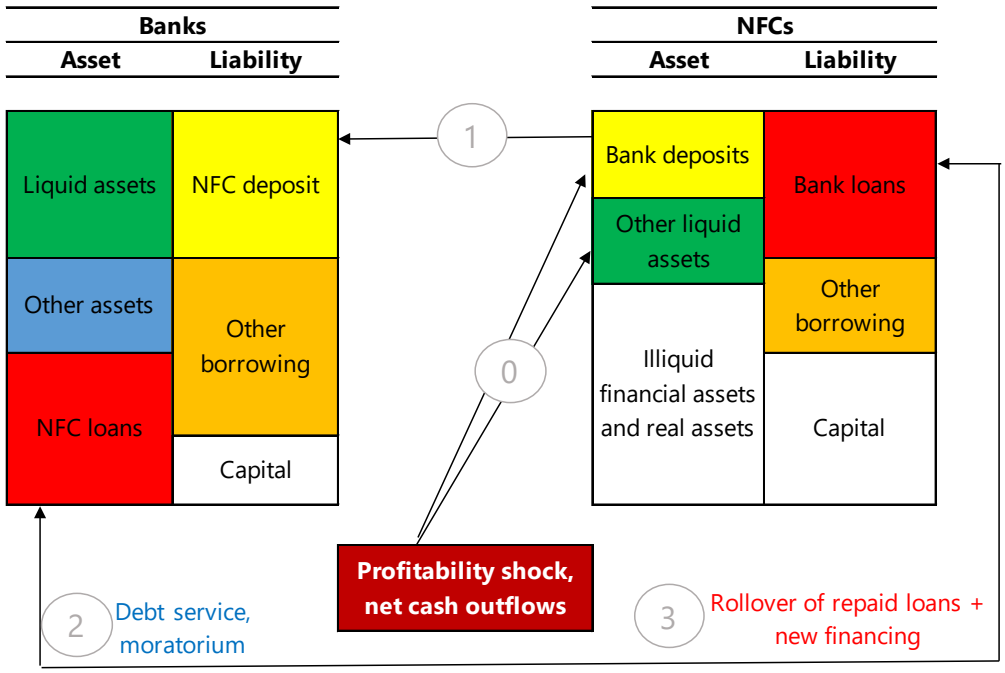
Under loan repayment moratorium, used by 70 percent of loans for 12 months, the net funding gap deepens and even using all reserves may not address fully the liquidity drain for a couple of banks.

Net Funding Gap (12 months; under 12 months Loan Repayment Moratorium)
(Percent of GDP)



Source: BSP; and IMF staff calculations.

Figure 16. Philippines: Bank-NFC Liquidity Linkages—Framework



The tool is based on cash-flow analysis of banks and NFCs. It incorporates three channels of liquidity contagion between banks and NFCs upon NFC earning shocks (step "0" in the figure) that reduces corporate liquid asset balance.

1. ***NFCs may cash their liquid assets, including bank deposits***, when their cash inflows from earnings are not enough to finance their operational expenditures and debt service obligation (indirect effect of moratoria). NFC deposit withdrawal rate is measured by (change of NFC cash balance between end-2020 and end-2019)/ (end-2019 cash balance), assuming NFCs liquidate all types of liquid assets proportionally. If they cash in assets other than bank deposits and find alternative financing (e.g., bonds), the withdrawal rate stays low.

2. ***Loan moratoria*** help NFCs to retain liquidity but reduce cash inflows to banks (direct effect of moratoria).

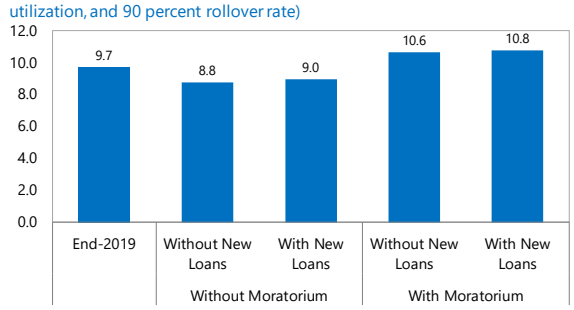
3. ***Additional bank lending***—rollover of repaid loans and new financing—also shifts liquidity from banks to NFCs.

Figure 17. Philippines: Bank-NFC Liquidity Linkage—Results

12-month moratoria and stress test period, 70 percent moratoria utilization by NFCs, and high rollover rate (90 percent)

Moratoria improve NFCs' cash balance to above the pre-stress level, but high refinancing rate limits the deterioration of cash position even without moratoria.

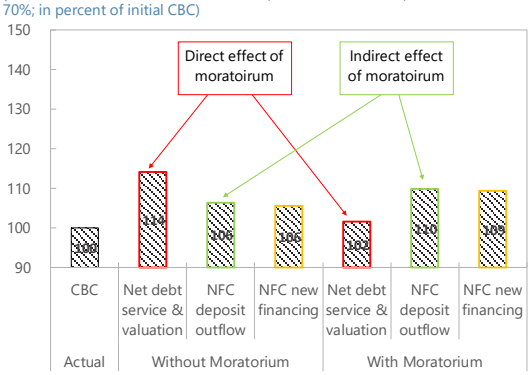
NFC Cash-to-Assets Ratio
(In percent of end-2019 total assets, 12 month, 70 percent moratorium utilization, and 90 percent rollover rate)



Sources: S&P Capital IQ; and IMF staff estimates.

While the direct effect of moratoria reduces banks' liquidity buffer noticeably, the policy effects declines once the indirect effects from deposit withdrawal is accounted for.

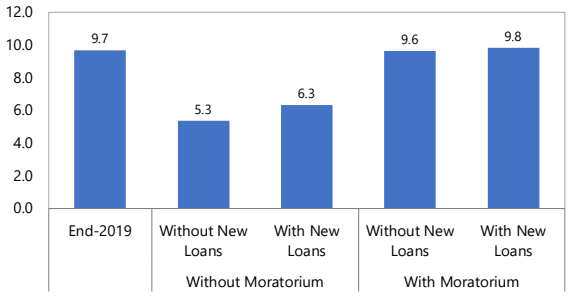
Bank Counter-Balancing Capacity (CBC)
(12 month moratorium and test horizon; rollover rate = 90%, moratoirum take up = 70%; in percent of initial CBC)



12-month moratoria and stress test period, 70 percent moratoria utilization by NFCs, and low rollover rate (50 percent)

Moratoria improve NFCs' cash balance substantially compared to the levels without the measure.

NFC Cash-to-Assets Ratio
(In percent of end-2019 total assets, 12-month, 70 percent moratorium utilization, and 50 percent rollover rate)



Sources: S&P Capital IQ; and IMF staff estimates.

With lower refinancing rate, the direct effect of moratoria on bank liquidity increase substantially. However, the policy effects becomes muted once the indirect effects from deposit withdrawal is accounted for.

Bank Counter-Balancing Capacity (CBC)
(12 month moratorium and test horizon; rollover rate = 50%, moratoirum take up = 70%; in percent of initial CBC)

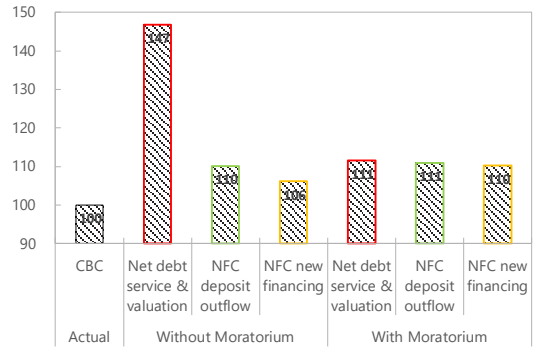
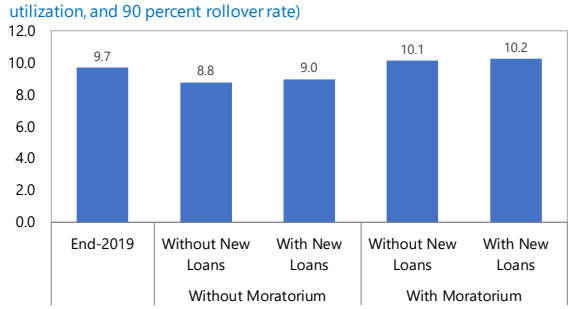


Figure 17. Philippines: Bank-NFC Liquidity Linkage—Results (concluded)

12-month moratoria and stress test period, 50 percent moratoria utilization by NFCs, and high rollover rate (90 percent)

When bank loan rollover rate is high, NFCs can maintain their cash at the 2019 levels even with lower moratorium utilization below 50 percent.

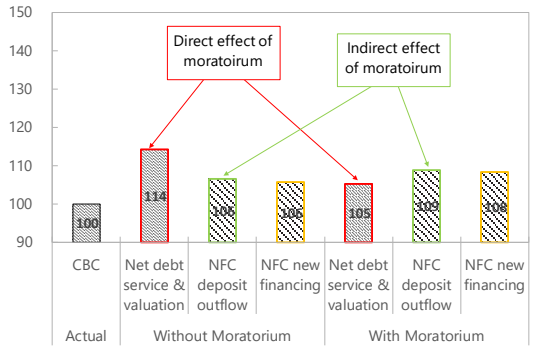
NFC Cash-to-Assets Ratio
(In percent of end-2019 total assets, 12 month, 50 percent moratorium utilization, and 90 percent rollover rate)



Sources: S&P Capital IQ; and IMF staff estimates.

Lower moratorium utilization reduces banks' liquidity loss slightly, but the overall impact including indirect effects of NFC deposit withdrawal remains the same as the case with higher moratorium utilization rate.

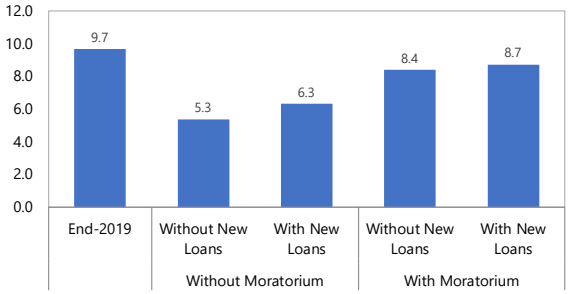
Bank Counter-Balancing Capacity (CBC)
(12 month moratorium and test horizon; rollover rate = 90%, moratoirum take up = 50%; in percent of initial CBC)



12-month moratoria and stress test period, 50 percent moratoria utilization by NFCs, and low rollover rate (50 percent)

As expected, when banks' rollover rate is low, NFCs would need to use moratorium more than 50 percent (indeed, close to 70 percent) to maintain the 2019 cash levels.

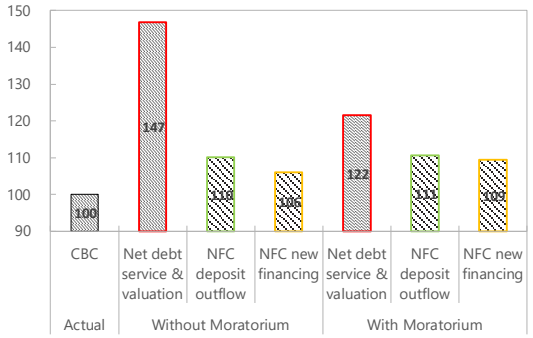
NFC Cash-to-Assets Ratio
(In percent of end-2019 total assets, 12-month, 50 percent moratorium utilization, and 50 percent rollover rate)



Sources: S&P Capital IQ; and IMF staff estimates.

Similar to the case above (50 percent utilization and 90 percent rollover rate), banks can withhold their liquidity by rolling over existing loans less. But the overall effects including deposit run-off remain the same.

Bank Counter-Balancing Capacity (CBC)
(12 month moratorium and test horizon; rollover rate = 50%, moratoirum take up = 50%; in percent of initial CBC)



Note/ 90 percent bank rollover rates are comparable to the distressed level observed during the past crises. During normal time, the rollover rates usually exceed 100 percent. 50 percent is the assumption from Basel III LCR.
Note/ The CBC balance remain above the 2019 level because the refinancing rate of banks' own term borrowing is set at high (90 percent), and household deposit withdrawal is not considered in the exercise (even though loan moratorium and rollover of existing bank loans to the household are accounted for. For banks, this exercise is a partial stress test exercise focusing on bank-NFC linkages, covering only a subset of possible shocks.

Table 2. Philippines: Financial System Structure

Type of Institution	Number of Insti-tutions	Assets December 2019			Asset December 2009		
		Billion PHP	Percent of total	Percent of GDP	Billion PHP	Percent of total	Percent of GDP
Bank	**547**	**18,338**	**76**	**94**	**6,512**	**74**	**81**
Universal and Commercial Banks	46	16,919	70	87	5,779	66	72
of which, Government Banks	3						
Thrift Banks	50	1,153	5	6	555	6	4
Rural and Coorperative Banks	451	267	1	1	178	2	2
Non Bank Financial Institutions (NBFI)		**5,673**	**24**	**29**	**2,303**	**26**	**29**
Insurance[1/]		1,716	7	9	554	6	7
Mutual Funds		258	1	1	59	1	1
Other NBFIs[1/,2/, 3/]		3,699	15	19	1,690	19	21
Total		**24,011**	**100**	**126**	**8,815**	**100**	**110**

Sources: National authorities
1/ Number of institutions is as of end-June 2019.
2/ Data on NBFIs is end-March 2019, except insurers and mutual funds, which is end-June 2019.
3/ Including investment houses, finance companies, investment companies, securities dealers/brokers, pawnshops, lending investors, non-stock savings and loan associations, venture capital corporations., and credit card companies, which are under BSP's supervision. The line also includes private and government insurance companies. Data is end-March 2019.

Table 3. Philippines: Selected Economic Indicators

Demographic: Population (2020): 108.8 million; Life expectancy at birth (2018): 71
Poverty (2015, percent of population): Below $1.90 a day: 6.1; Below the national poverty line: 21.6
Inequality (2015, income shares): Top 10 percent: 34.8; Bottom 20 percent: 5.7
Business environment (2019 country ranking): Ease of doing business: 95 (out of 190); Starting a business: 171 (out of 190)
IMF quota: SDR 2,042.9 million
Main products and exports: electronics, agriculture products, and business process outsourcing

	2016	2017	2018	2019	2020 Proj.	2021 Proj.
National account	(Annual percentage change, unless otherwise indicated)					
Real GDP	7.1	6.9	6.3	6.0	-9.6	6.6
Consumption	7.4	6.0	6.8	6.4	-4.9	7.7
Private	7.1	6.0	5.8	5.9	-7.4	7.3
Public	9.4	6.5	13.4	9.6	9.6	9.2
Gross fixed capital formation	20.9	10.6	12.9	3.9	-27.9	8.2
Domestic demand	10.2	7.1	8.2	5.8	-10.4	7.8
Net exports (contribution to growth)	-3.8	-0.9	-2.3	-0.1	3.6	-2.4
Real GDP per capita	5.4	5.2	4.7	4.5	-10.9	5.0
Output gap (percent, +=above potential)	0.1	0.4	0.2	-0.1	-2.4	-0.5
Labor market						
Unemployment rate (percent of labor force)	5.5	5.7	5.3	5.1	10.4	7.4
Underemployment rate (percent of employed persons)	18.3	16.1	16.4	13.8	16.2	...
Employment (percent change)	4.7	-1.6	2.0	1.9	-6.1	5.2
Non-agriculture daily wages (Q4/Q4) 1/	2.1	4.3	4.9	0.0	...	...
Price						
Consumer prices (period average, 2012 basket)	1.3	2.9	5.2	2.5	2.6	3.2
Consumer prices (end of period, 2012 basket)	2.2	2.9	5.1	2.5	3.5	3.1
Core consumer prices (period average, 2012 basket)	1.5	2.5	4.1	3.2	3.1	...
Residential real estate (Q4/Q4) 2/	3.3	5.7	0.6	10.2	...	...
Money and credit						
3-month PHIREF rate (percent, end of period) 3/	2.0	3.3	6.5	3.1	1.3	...
Claims on private sector (percent of GDP)	42.9	45.6	47.6	48.0	53.7	52.9
Claims on private sector (percent change)	16.6	16.4	15.1	7.8	3.1	8.7
Public finances (in percent of GDP)						
National government overall balance 4/	-2.3	-2.1	-3.1	-3.4	-7.7	-9.1
Revenue and grants	14.5	14.9	15.5	16.1	15.9	14.5
Total expenditure and net lending	16.8	17.1	18.7	19.5	23.5	23.6
General government gross debt	37.3	38.1	37.1	37.0	47.0	52.3
Balance of payments (in percent of GDP)						
Current account balance	-0.4	-0.7	-2.6	-0.9	2.6	-1.2
FDI, net	-1.8	-2.1	-1.7	-1.2	-1.6	-1.0
Gross reserves (US$ billions)	80.7	81.6	79.2	87.8	109.8	109.0
Gross reserves (percent of short-term debt, remaining maturity)	418.2	419.3	369.0	387.0	440.9	418.0
Total external debt	23.5	22.3	22.8	22.2	25.4	24.8
Memorandum items:						
Nominal GDP (US$ billions)	318.6	328.5	346.8	376.8	362.7	391.7
Nominal GDP per capita (US$)	3,108	3,153	3,280	3,512	3,334	3,547
GDP (in billions of pesos)	15,132	16,557	18,265	19,516	17,997	19,860
Real effective exchange rate (2005=100)	108.2	103.4	100.5	105.3	...	...
Peso per U.S. dollar (period average)	47.5	50.4	52.7	51.8	49.6	...

Sources: Philippine authorities; World Bank; and IMF staff estimates and projections.

1/ In National Capital Region.
2/ Latest observation as of 2019:Q4.
3/ Benchmark rate for the peso floating leg of a 3-month interest rate swap.
4/ IMF definition. Excludes privatization receipts and includes deficit from restructuring of the previous Central Bank-Board of Liquidators.

Table 4. Philippines: Financial Soundness Indicators
(In percent)

	2015	2016	2017	2018	2019	2020*
Capital adequacy						
Regulatory capital to risk-weighted assets	15.3	14.5	14.4	14.9	15.2	15.0
Regulatory tier 1 capital to risk-weighted assets	12.8	12.6	12.7	13.3	14.0	13.9
Capital to total assets	10.5	10.4	10.6	11.3	11.5	11.0
Non-performing loans net of provisions to capital	3.1	3.0	3.1	3.5	4.6	5.1
Net open position in foreign exchange to capital	2.4	2.0	7.9	4.7	5.8	3.5
Gross asset position in financial derivatives to capital	1.7	1.8	1.6	1.8	1.2	1.6
Gross liability position in financial derivatives to capital	0.0	0.0	0.0	0.1	0.4	0.6
Asset quality						
Nonperforming loan to gross loans	1.9	1.7	1.6	1.7	2.0	2.2
Specific provisions to nonperforming loans	70.1	69.7	66.9	63.2	58.0	57.6
Earnings and profitability						
Return on assets	1.4	1.4	1.3	1.3	1.5	1.4
Return on equity	13.8	13.7	13.6	12.7	13.9	13.0
Interest margin to gross income	70.7	69.2	73.9	75.2	74.0	76.3
Trading income to total income	5.7	8.3	4.3	3.2	7.8	9.4
Noninterest expenses to gross income	61.3	60.8	60.9	62.2	58.7	53.9
Personnel expenses to non-interest expenses	37.6	36.7	36.6	35.4	34.5	33.6
Liquidity and funding						
Liquid assets to total assets	38.8	35.6	32.9	32.6	32.1	30.6
Liquidity assets to short-term liabilities	60.6	54.6	51.8	50.7	48.8	46.9
Non-interbank loans to customer deposits	76.9	76.3	79.6	82.7	85.2	83.6
Sensitivity						
Foreign currency denominated loans to total loans	11.9	11.9	11.1	10.9	10.7	11.1
Foreign currency denominated liabilities to total liabilities	20.3	20.7	20.2	20.1	19.6	19.2
Real estate markets						
Residential real estate loans to total loans	7.2	7.3	7.2	7.1	7.3	7.4
Commercial real estate loans to total loans	13.9	14.3	14.1	12.3	13.2	13.7
Household Indebtedness						
Loans to households to total loans	17.4	17.8	17.9	17.6	18.3	19.3
Consumer loans to total loans	9.5	9.9	10.0	9.8	10.4	10.9
Mortgage loans to total loans	6.8	6.8	6.8	6.7	6.9	7.6
Loans to households as employers to total loans	1.1	1.1	1.1	1.1	0.9	0.8

Source: Philippines authorities; IMF, *Financial Soundness Indicators;* and IMF staff estimates.
*As of September 2020.

Table 5. Philippines: Main Policy Measures to Mitigate the Impact of COVID-19 (as of October 2020)	
Monetary	
1	Reduction of the policy rate four times in 2020 by a cumulative 175 bps to 2.25 percent
2	Lowering of the reserve requirement ratio for banks by 200 bps to 12 percent
3	Relaxation of requirements for accessing the rediscount window
4	Purchase of PHP 300 billion worth of government securities (about 1.5 percent of 2019 GDP) through a repurchase agreement with the government and secondary market transactions
5	Distribution of PHP 20 billion as dividend to the government
6	Inclusion of peso loans to micro and SME (MSME) and certain large enterprises and certain large enterprises to calculate the compliance with reserve requirements (unusual measure to encourage banks to maintain MSME loans). In end-August 2020, loans to MSME and large enterprises accounted for about 8 and 1 percent of required reserves respectively
Regulatory	
7	A 90-day moratorium (ending May 2020) on all bank loan repayments during the Enhanced Community Quarantine period (part of the Bayanihan Act, March 2020). The BSP estimates that the uptake of the moratorium covered about 70 percent of total loans. In August 2020, Congress approved another 60-day moratorium taking effect mid-September (part of the Bayanihan Act II).
8	Relaxation of asset classification and provisioning requirements: (i) exclusion from the past due loan ratio of loans to affected borrowers until December 2021, (ii) staggered booking of allowance for credit losses over a maximum period of five (5) years, subject to prior approval of the BSP (strong form of regulatory forbearance).
9	The temporary relaxation of some reporting requirements and penalties on required reserves and single borrower limits (subject to review March 2021, possible regulatory forbearance measure).
10	The temporary relaxation of prudential regulations that allow banks to reclassify available-for-sale securities subject to mark-to-market valuation to held-to-maturity securities that are valued at their book value, which expires September 30, 2020 (regulatory forbearance)).
11	The temporary reduction of micro and SME credit risk weights to 50 percent (below the Basel III minimum of 75 percent), subject to review end 2021 (regulatory forbearance).
12	Increase in the limit on banks' real estate loan share from 20 percent of their total loan portfolio (net of interbank loans) to 25 percent.
Exchange Rate and Balance of Payments	
13	The BSP has relaxed documentary and reporting rules for FX operations.
Fiscal	
14	The public response (part of the Bayanihan Act, March 2020) has four pillars: (1) PHP 205 billion cash aid program (1.1 percent of 2019 GDP) for 18 million low-income households for a period of two months (2) PHP 56 billion social protection measures for vulnerable workers, including for displaced and overseas Philippine workers (0.3 percent of 2019 GDP); (3) PHP 54 billion on COVID-19-related medical response (0.3 percent of 2019 GDP); (4) PHP 120 billion (0.6 percent of 2019 GDP) credit guarantee for small businesses and support to the agriculture sector.
15	Further fiscal support (part of the Bayanihan II Act, September 2020) will be provided to vulnerable households and to workers and businesses in hard-hit industries, such as agriculture, transportation, and tourism (0.8 percent of 2019 GDP).

Table 6. Philippines: Risk Assessment Matrix

Sources of risks	Relative likelihood	Impact and transmission channels
Unexpected shift in the Covid-19 pandemic. The disease proves harder to eradicate, requiring costly containment efforts and promoting persistent behavioral changes rendering many activities unviable.	**Medium**	**High** • A long-lasting pandemic with new strains prolongs containment measures and prevents fast recovery. It also increases corporate bankruptcies and longer-term unemployment, causing persistent scarring effects. • While risk assets are sold-off, strong fiscal and external positions before the COVID shock contains depreciation pressures. The central bank manages to maintain low policy rates, keeping funding costs at low levels. • NPLs will increase as macroeconomic shocks increase bankruptcies and reduce the repayment capacity of corporate borrowers. Higher unemployment could affect the repayment capacity of the household as well. • Bank capital declines substantially and, in turn, depresses economic recovery with weaker credit growth for a prolonged period (second-round effects). • While issued regulatory forbearance measures may optically help banks to maintain capital adequacy, these measures may create moral hazard and reputation risk and reduce the effectiveness of Basel III and macroprudential framework based on buffers (capital conservation, D-SIB, and CCyB).
Higher severity of natural disasters related to **climate change** causes severe economic damage.	**Medium**	**High for extreme tail events. Moderate otherwise.** • The Philippines has high exposure to the physical risk of climate change with natural disasters such as typhoons, landslides, floods, droughts, and sea-level rise. • Country-specific climate science models show that climate change could increase typhoons' intensity but reduce their frequency under the high global greenhouse gas emission and temperature increase scenario. • Physical capital losses reduce GDP directly and indirectly by reducing productivity for a prolonged period. • Such events could have a systemic impact on banks due to higher credit risk from macroeconomic shocks and operational risk. Certain industries (e.g., agriculture, real estate) and regions could be affected more, though large banks have little exposure to typhoon-prone regions and the agricultural sector. • Climate change is likely to increase the impact of extreme tail events on banks (especially when typhoon risk materializes with other disasters like pandemic). In contrast, the impact of less intense and more frequent events remains more or less the same and moderate. • Additional effects from sea-level rise, floods, and drought, among others, are likely to increase the impact of climate change even more. • Transition risk is concentrated in the coal-based power generation sector and the sectors with high fuel/electricity inputs.
The reputation risk to the country's frameworks for financial stability and AML/CFT from major financial crime events and limited actions to amend the bank secrecy law.	**Medium**	**Medium** • International confidence could diminish from insufficient supervision and monitoring of casinos, the gaming industry, and cryptocurrency exchanges, which could be abused for financial crimes. • The strict bank secrecy laws that limit financial supervisors' access to individual depositors could encourage criminals to misuse Philippine banks for fraud, money laundering, terrorism financing, and other financial crimes. • The reputational risk could pressure correspondent banking relationships, limit Philippine banks' access to global markets, and affect the flow of international remittances, resulting in depreciation pressure on the Philippine Peso.

Domain		Assumptions
		Top-down by FSAP Team
BANKING SECTOR: SOLVENCY RISK		
1.Institutional Perimeter	Institutions included	• 542 banks: 46 UKBs (21 universal banks, 25 commercial banks), 49 TBs, 447 RCBs) for macro scenario tests.
	Market share	• Nearly 100% of total banking sector assets
	Data and baseline date	• Supervisory data (balance sheet and income statements) • Started position: December 2019 • Data on a 'solo basis.'
2. Channels of Risk Propagation	Methodology	• IMF Solvency Stress Test Workbox (Balance-sheet model)
	Satellite Models for Macro-Financial linkages	• Credit Risk: Satellite models per bank type to estimate loan losses. Regression model for logit transformed PDs. Regressors include the lagged dependent variable and contemporaneous and lagged macroeconomic variables: GDP growth, short term rates, term spread, unemployment, stock price, and exchange rate. • Market risk: valuation losses for HfT and AfS securities are calculated using a Mark to Market (MtM) approach. Valuation losses for held-to-maturity (HtM) securities are calculated using a credit risk approach. As a sensitivity analysis, an MtM approach is used for the HtM securities. • Net interest income: A gap analysis is conducted based on granular data on asset/liability structure of individual banks broken into types of funding sources and time to re-pricing buckets. Interest margin shocks vary per scenario. • Pre-impairment income for banks: Income in the absence of shocks is assumed to stay at the level observed for 2019 with the additional feature that non-performing loans will not generate any income. • No effects from sector-specific mitigation policies are incorporated. The scale of government credit guarantee is small (0.6 percent of GDP and given only to SMEs and the agricultural sector), and moratoria (introduced twice) already expired at the end- 2020. While the effects of forbearance to delay NPL recognition and loan-loss provisions continues over the five years, such measures are not consistent with Basel III and, therefore, should not be reflected in stress tests. We use end-2019 data instead of 2020 data because 2020 data are likely to be influenced by temporary or Basel III inconsistent measures. Starting with 2019 data allow us to estimate the potential 2020 figure without policy measures.
	Stress test horizon	• 3 years (2020-2022)

Domain		Assumptions
		Top-down by FSAP Team
3. Tail shocks	Scenario analysis	• Three macro scenarios, baseline, adverse, and severe adverse scenarios with varying degrees of COVID-19 impact, are considered. Across all scenarios, shocks affect mostly real economic activities. Financial conditions remain relatively benign: pressures on exchange rates are limited, and the central bank can cut policy rates supported by fairly strong economic fundamentals and ample global liquidity. • The **baseline** scenario follows October 2020 WEO, which factors in the tight containment effects in the first half of 2020 and a slow recovery path in the second half as the measures are relaxed and exhibit a sharp V-shaped recovery in 2021. The scenario shows a sharper GDP contraction in 2020 than the AFC but is followed by stronger medium-term growth in line with the potential growth rate of about 6½ percent. Compared to January 2020 WEO, the two-year cumulative growth in 2021 is 14.8 percentage points lower, corresponding to a three standard deviation shock using data from 1990-2019. Unemployment remains high at 11.3 percent at the end-2020 but returns to pre-COVID levels by 2021. • The **upside** scenario is similar to the baseline scenario but assumes a faster recovery in the second half of 2020. The real GDP contracts by -6.7 percent in 2020, compared to a contraction of -8.4 percent for the same period under the baseline. The unemployment rate shows a fast recovery, returning to pre-COVID levels by the end-2020. • The **adverse** scenario assumes prolonged containment measures throughout 2020 and some scarring effects (prolonged demand shock and rise in corporate bankruptcies and credit spreads) in 2021. The BSP manages to cut policy rates, reducing short term interest rates 290 basis points in 2020. However, stock prices decline by over 14 percent in 2020-21, and corporate credit spreads rise. As observed during the AFC, the net interest margin also declines by 15 percent at the worst point in the three years. Unemployment remains elevated at 14.8 percent by 2020 and 8.6 percent by 2021, returning to pre-COVID levels by 2022. • The **severe adverse** scenario assumes prolonged and even more stringent containment in 2020 with much severer and longer scarring effects in 2021 than the adverse scenario equivalent to a 3.8 standard deviation shock to the two-year cumulative growth. Still, the scarring effects are temporary, and the medium-term growth rate stabilizes at the same potential as the baseline by 2024. The BSP manages to cut policy rates subject to zero lower bound, reducing short term interest rates 290 basis points in 2020. However, stock prices decline by over 14 percent in 2020-21, and corporate credit spreads rise. The net interest margin also declines by 20 percent at the worst point in the three years. Unemployment remains elevated at 18.4 percent by 2020 and 11.9 percent by 2021, returning to pre-COVID levels by 2022. • Adverse macro scenarios are constructed using the DSGE model developed for the climate scenario.

Domain		Assumptions
		Top-down by FSAP Team
4.Risks and Buffers	Risks/factors assessed (How each element is derived, assumptions).	• Credit risk (provision costs) • Market risk, including FX risk • Stress on pre-provision profits, including interest margin
	Behavioral adjustments	• Balance sheet growth assumption: Quasi-Static—balance sheet size/GDP remains constant. • Balance sheet composition remaining constant over the stress test horizon. • Banks can only accumulate capital through the retained earnings. • Banks pay dividends only if net income after taxes is positive, with the dividend payout ratio consistent with individual banks' 2019 ratios for UKBs and individual banks' historical experience during 2014-2019 for TBs and RCBs. Out of the 542 banks, only 45 banks (11 UKBs, 2 TBs, and 32 RCBs) paid dividends with an average payout ratio of 13 percent for UKBs, 0.8 percent for TBs, and 0.9 percent for RCBs. • Tax rate: 30% (corporate tax rate).
5. Regulatory and Market-Based Standards and Parameters	Calibration of risk parameters	• PDs: proxies based on actual and estimated new NPL flows over performing loans. PDs for banks with limited credit information is taken as the weighted average PD of the rest of the institutions. • LGDs: 68 percent for UKBs, 35 percent for TBs, and 66 percent for RCBs, based on average historical provision coverage ratio (provisions/NPLs) that appear consistent with cross-bank type variation over collection and cure rates of NPLs. • Cure rates with respect to NPL(t-1): 10 percent for UKBs, 22 percent for TBs, and 24 percent for RCBs per year, equivalent to a quarter of historical averages to be conservative but more realistic than typical FSAPs that assume zero cure rates. In addition, an extra annual cure rate of 18 percent on New NPLs (2020) is assumed for UKBs in 2021 (totaling 28 percent). This, given the concentration of their loan portfolio to the Manila area that has been the focus of the containment measures. This means that some of the loan defaults of 2020 are driven by shortage in liquidity rather than solvency issues.
	Regulatory/Accounting and Market-Based Standards	• Basel II standardized approach. • The hurdle rates are based on minimum capital requirements: 6 percent for Common Equity Tier 1 (applies only to UKBs), 7.5 percent for Tier 1, and 10 percent for total capital (T1+T2). • RWAs evolve with credit growth, net of increases in provisions. RWAs are further adjusted by the new NPLs net of provisions (to reach the weight of 150% required by regulation).

Domain		Assumptions
		Top-down by FSAP Team
6. Reporting Format for Results	Output presentation	• Capital shortfalls per bank type • Number of banks and percentage of assets that fail to meet the hurdle rates per bank type • Evolution of capital ratios under the scenario horizon per bank type\and for various bank classifications. • Decomposition of the drivers of changes in capital ratios per bank type • Distribution of capital ratios per bank type over the scenario horizon
BANKING SECTOR: SECOND ROUND (BANK-MACRO TRANSMISSION)		
1. Institutional Perimeter	Institutions included	• 46 UKBs (21 universal banks, 25 commercial banks)
	Market share	• 90.8% of total banking sector (gross) loan.
	Data and baseline date	• Solvency stress test results for Baseline (October WEO), Adverse and Severe Adverse scenarios • Started position: End of 2019 data
2. Channels of Risk Propagation	Methodology	• A simplified application of Catalan and Hoffmaister (2020) • Elasticities of (individual) bank loan growth to macroeconomic variables and bank-specific characteristics • Elasticities of macroeconomic variables to aggregate bank loan
	Satellite Models for Macro-Financial linkages (Bank-Macro transmission)	• **Credit Growth Model** (to estimate bank loan growth response to changes in macroeconomic variables and bank-specific characteristics): Panel model of UKB's bank with individual bank's credit growth as the dependent variable. After examining models with various regressors, the final model's regressors include lags of real credit growth, both contemporaneous and lags of macroeconomic variables (real GDP and the change in policy rate), and bank-specific factors (the change in NPL ratio and loan loss reserve ratio). Estimation period: 2008Q1-2019Q3. In contrast with the standard theoretical prediction, CAR and the difference between actual CAR and regulatory minimum requirements did not play significant roles. Therefore, they are excluded from the final model. This may reflect historical reliance on forbearance measures to delay NPL recognition and builds loan loss provisions (LLPs) only slowly (see Appendix IV). • **SVAR** (Structural Vector Auto Regression) macro-financial model: Five equations capture the interactions of key macroeconomic variables, including real credit, real GDP, inflation, real policy rate, and nominal exchange rate. The Cholesky decomposition is used to characterize the contemporaneous relations among the variables. Real credit is modeled as an autoregressive process and enters as the first variable in the model so that the other variables can react contemporaneously to changes in bank credit, but the reverse is not true. Estimation period: 200Q4-2019Q3.

Domain		Assumptions
		Top-down by FSAP Team
2. Channels of Risk Propagation (continued)	Satellite Models for Macro-Financial linkages (Bank-Macro transmission)	**Counterfactual policy experiment**: Given that NPL ratio and loan-loss reserve models are the only two bank-specific explanatory variables significant in the final credit growth model, we considered the effect of reducing LLP stock by 30 percent (only) in 2021. The measure could be interpreted as using bank capital and income to write off NPLs by closing the gap between NPL and LLP (1-LGD).
	Adjustments and Assumptions	• UKBs' aggregate loan growth is used as an approximation of the overall banking sector's loan growth • Baseline real credit growth is assumed to be equal to baseline's real GDP growth • Real credit growth in adverse scenarios is calculated based on the baseline's real credit growth and the changes in real credit growth due to deviation of macroeconomic and bank-specific variables between non-baseline and baseline scenarios.
	Horizon	• 3 years (2020-2022)
3. Reporting Format for Results	Output presentation	• Second Round (bank-macro transmission) output: GDP growth path and GDP level path (relative to 2019 GDP). • Policy Simulation output: benefit and cost. Benefit is calculated as: (1) maximum difference in the level of GDP (based on cumulative GDP growth), and (2) sum of differences in the level of GDP (based on cumulative GDP growth. Cost is calculated as the amount of funds injected into the banking sector to implement the policy.
BANKING SECTOR: LIQUIDITY RISK		
1. Institutional Perimeter	Institutions included and their share	• 40 UKBs for modified LCR tests (90 percent of the banking system) • 46 UKBs for cashflow tests and NSFR (92 percent of the banking system)
	Data and baseline date	• Supervisory data on a solo basis • September 2019 (to be updated using March 2020 data)
2. Channels of Risk Propagation	Methodology	• LCR (one month) • Cashflow test (one, three, and six months) NSFR (one year)
3. Risks and Buffers	Risks	• Funding liquidity • Market liquidity • Moratoria effects
	Buffers	• LCR: (stressed) cash inflows and HQLA • Cashflow: (stressed) cash inflows and counterbalancing capacity • N.A.

Domain		Assumptions
		Top-down by FSAP Team
4. Tail shocks	Size of the shock	LCR • Run-off rates: Household deposits-highest historical cash withdrawals at bank levels—20 percent for less stable deposits and 10 percent for stable deposits. Institutional deposits: 60 percent for corporate deposits, 35 percent for operational deposits, and 20 percent for less stable, and 10 percent for stable retail deposits. • Haircuts: 50 percent haircut to Level 2a assets (corporate bonds) Cashflow • Run-off rates: 1 month—50 percent on institutional deposits and 20 percent on household funding; and roll-off rate of 50 percent on cash inflows. These rates gradually decline over 1-3 months and 3-6 months to reach 30, 10, and 10 percent. • Haircuts: 20 percent on unencumbered eligible collateral and 50 percent on equities. NSFR • Same as Basel III
5. Regulatory and Market-Based Standards and Parameters	Regulatory standards	• LCR: 100 percent, liquidity shortfall by bank • Cashflow: net funding gap (shortfall) by bank • NSFR: 100 percent
NON-FINANCIAL CORPORATE SECTOR		
1. Institutional Perimeter	Institutions included	• 151 non-financial firms (147 listed and 4 non-listed)
	Market share	• 44 percent of total NFC debt • 70 percent of total market capitalization • 46 percent of total bank loans
	Data and baseline date	• Capital IQ, S&P Global Market Intelligence • Consolidated balance sheets • Balance sheet data as of end-2019
2. Channels of Risk Propagation	Methodology	• Debt service capacity: ICR (one-year) • Cash flow: cash ratio = cash and cash equivalent / current liabilities (one-year)
	Test horizon	• 2020
3. Tail shocks	Size of the shock	• ICR - Macroeconomic shocks: ▪ Interest payment shock: 0 percent

Domain		Assumptions
		Top-down by FSAP Team
3. Tail shocks (continued)		▪ Exchange rate shock: 4 percent appreciation against the USD - Operating income shock (in percent of operating income in 2019, varying across industries): ▪ Baseline: between -35 percent and -137 percent ▪ Upside: between -26 percent and -103 percent ▪ Adverse: between -39 percent and -151 percent ▪ Severe Adverse: between -47 percent and -185 percent ▪ In all scenarios, the least affected industry is utilities, and the most affected is consumer discretionary. • Cash flow analysis - $Capex_{2020}$ = minimum of 0.25*$Capex_{2019}$ and 0.5*$depreciation_{2019}$ - Debt rollover ratio = 0.9 of maturing debt - Dividend payments = 0
4. Reporting Format for Results	Output presentation	• Distribution of ICR (median and interquartile range) • Debt-at-risk share by industry • Firm-at-risk share by industry • Cash ratio by industry
BANK-NFC LIQUIDITY LINKAGE		
1.Institutional Perimeter	Institutions included	• 151 non-financial firms (147 listed and 4 non-listed) and 40 UKBs
	Market share	• 44 percent of total NFC debt • 70 percent of total market capitalization • 46 percent of total bank loans • 90 percent of the banking system (UKBs)
	Data and baseline date	• Capital IQ, S&P Global Market Intelligence, the BSP (UKB data) • Consolidated balance sheets for NFCs, solo-based balance sheet for UKBs • Balance sheet data as of end-2019 for both UKBs and NFCs
2. Channels of Risk Propagation	Methodology	• Based on the 2020 IMF COVID-19 note in "system-wide FX liquidity stress test." • Cash-flow based liquidity stress tests for banks and NFCs and link assumption parameters (see Figure 16) • For banks, the analysis only considers shocks to transactions with NFCs. • Aggrege results of the NFC liquidity stress test (e.g., deposit withdrawal rate and new financing need) are applied to bank-by-bank liquidity stress tests (uniform assumption across banks). • NFC cash flow calculation formula *Cash balance* (x months in 2020)

Domain		Assumptions
		Top-down by FSAP Team
		= Cash balance 2019 + earnings shock × net cash flows from operations × (x/12) - stressed capital expenditure × (x/12) - debt repayment with moratorium (= original debt repayment × (**1-moratorium utilization) × (**x/12)) + rollover of repaid debt (= debt repayment with moratorium × r**ollover rate**) + interest income × (x/12) – interest expense × (**1-moratorium utilization**) × (x/12) - dividend payment × (x/12) + **new financing** (to bring cash balance(x, 2020) to zero for each firm) - In the case with 5-month moratorium, debt payments (principal and interest) are set at about 40 (=5/12) percent of the original amounts in the baseline. - $Capex_{2020}$ = minimum of 0.25 × $Capex_{2019}$ and 0.5 × $depreciation_{2019}$ - Dividend payments = 0 • Bank cash flow calculation formula *Counterbalancing capacity (CBC) at month x in 2020* = CBC at end 2019 +net cash flows from operation within x (excl. loans and interests) + debt service receipt (= bank loan principal repayment in x months × **(1-moratorium utilization)**) – rollover rate × debt service receipt + interest income in x months × (**1-moratorium utilization**) – interest expense in x months - matured bank debt repayment within x + refinancing rate for banks (90 percent) × banks' repaid borrowing - deposit runoff rate × stock of deposits (**NFC deposit runoff rate = Δcash by x month in 2020/cash at end 2019**) - **new financing to NFCs** (to bring NFC cash position to 0 or above for each firms) - dividend payment within x + new financing inflows into banks + valuation change of CBC (i.e., haircut) - Note: Moratoria and loan rollovers affect all loans (including household credit) but we only consider deposit withdrawal of NFCs.
	Test horizon	• 5 and 12 months (moratorium period = stress testing horizon)

Domain		Assumptions
		Top-down by FSAP Team
3. Tail shocks	Size of the shock	• Moratorium utilization rate = {0 (no moratorium), 50, 70, 90} percent • NFC loans rollover rate = {50, 90} percent • New financing to NFCs = {yes, no} • Refinancing rate of repaid loans by banks = 90 percent • Liquid asset haircuts 0% for cash, 2% for high-quality sovereign securities, 8% for low-quality sovereign securities, 11% for corporate bond, 10% for covered bond.
4. Reporting Format for Results	Output presentation	• NFC: change in cash balance in month x, 2020/ cash balance at end 2019 • Bank: change in CBC by month x, 2020/ CBC at end 2019

Appendix II. Non-Financial Corporate Sector Stress Test

This appendix provides additional details on the methodology underlying the non-financial corporate sector stress test, which aims to project sample firms' debt service capacity, proxied by the interest coverage ratio (ICR), and their cash positions end-2020 under different macroeconomic scenarios.

The traditional regression-based approach would not adequately capture cross-industry differences in the impact of the COVID-19 crisis. Unlike other crisis episodes in the past, the COVID-19 crisis is characterized by large supply disruptions caused by lockdowns to contain virus transmission. As a result, the cross-industry impact on non-financial corporates is expected to differ markedly from the patterns observed in other crisis episodes in which demand contraction was the major driver. For example, the impacts on industries such as transportation, tourism, and other labor-intensive industries, are expected to be disproportionately larger in the COVID-19 crisis. A typical regression-based stress testing approach would not adequately capture this unique aspect of the COVID-19 crisis, however, as they entirely rely on the historical data.

In this study, we take a hybrid approach, in which the regression-based approach is augmented with information from the consensus earnings forecasts by market analysts to incorporate differences across industries. Specifically, we follow the following steps to obtain each firm's ICR at end-2020 under different macroeconomic scenarios:

Step 1. We directly apply relevant shocks to the subcomponents of the ICR ratio—namely, the operating income (numerator) and the interest payment (denominator).

- To set the shock to the operating income, we first take the consensus earnings forecasts of individual firms for FY2020 from both the January 2 vintage and the June 30 vintage.[1] Next, for each firm, we calculate the percentage change of the earnings forecasts between these two vintages. Finally, as these forecasts are only available for a relatively small subset of sample firms, we apply the industry-median earning shock to individual firms' earnings in 2019 (i.e., common operating income shock for firms *j* in the same industry *i*) to obtain the estimated earnings for 2020.

$$EBIT_{2020,\,j} = (1+EBIT\ shock_i/100) \times EBIT_{2019,\,j}$$

- Meanwhile, we apply two separate shocks to the interest payment—the interest payment shock and the exchange rate shock. The exchange rate shock is set as the percent change of the bilateral exchange rate vis-à-vis the USD between the end-2019 level and the projected end-2020 level in the October 2020 IMF WEO. The exchange rate shock is applied to the actual—not imputed—foreign currency-denominated portion of each firm's outstanding debt as of end-2019. The interest payment shock is set at 0, which is somewhat more conservative than the

[1] The June 30 vintage is used as the reference vintage as it provides the earnings forecast that is the closest to the magnitude of economic downturn implied by the 2020 October IMF WEO projection. The quantitative results, however, are robust to using alternative reference vintages.

macroeconomic scenarios considered where interest rates are projected to decline slightly, and hence the only effective shock to the interest payment is the exchange rate shock (e.g., currency depreciation leading to higher FX debt interest payment in local currency terms). Specifically, the expected interest payment for firm *j* in 2020 would be given as follows:

$$INTP_{2020,j} = [FX\ debt\ share_{2019,j} \times (1+FX\ shock_{2020}/100) + local\ currency\ debt\ share_{2019,j}] \times (1+INTP\ shock_{2020}/100) \times INTP_{2019,j}$$

- Finally, we obtain preliminary estimates of individual firms' ICR in 2020 as follows:

$$ICR^{1}_{2020,j} = EBIT_{2020,j}/INTP_{2020,j}$$

Step 2. In the second step, we use a regression-based approach to obtain alternative forecasts of ICRs for end-2020 ($ICR^{2}_{2020,j}$). The sample used for the regression approach consists of 29,161 non-financial firm-year observations over the period of 2002—2019 from ASEAN-6 economies (Indonesia, Malaysia, the Philippines, Thailand, Singapore, and Vietnam).

- This approach involves running separate regressions with each firm's return on assets (ROA), effective interest rate, and leverage (defined as the debt-to-asset ratio) as the dependent variable and a set of macroeconomic ($X_{k,t}$: real GDP growth, bilateral exchange rate against the US dollar, and domestic interest rate), global (W_t: world GDP growth, commodity price, and LIBOR) and firm-level variables ($Z_{i,t}$: lagged dependent variable, lagged total assets, and lagged tangible assets-to-total assets ratio) as the explanatory variables. The values for the macroeconomic and global variables in 2020 come from the October 2020 IMF WEO forecasts.

$$ICR = \frac{EBIT}{Int.\ payment} = \frac{(EBIT/Assets)}{(Int.payment/Debt) * (Debt/Assets)} = \frac{ROA}{Eff.IR * Leverage}$$

$$y_{i,j,k,t} = \beta_0 + \beta_1 X_{k,t} + \beta_2 Z_{i,t} + W_t + \delta_j + \mu_k + \varepsilon_{i,j,k,t},$$

where $y_{i,j,k,t}$ denotes the dependent variable of interest for firm *i* in industry *j* in country *k* in year *t*, and δ_j and μ_k denote industry and country fixed-effects, respectively. Table II-1 presents the regression results.

- Using the predicted values of the ROA, effective interest rate, and leverage, we then back out the predicted ICR for each firm in 2020 as follows:

$$\widehat{ICR^{2}_{2020,j}} = \widehat{ROA}/\widehat{Eff.IR} \times \widehat{LEV}$$

Step 3. In the final step, we reconcile the difference between the two alternative estimates of ICR obtained from Steps 1 and 2 above. The difference stems from the fact that the earnings shock estimates from consensus earnings forecasts are much more optimistic than what would have been implied by the macroeconomic scenarios considered. The reconciliation procedure involves recalculating the predicted earnings in Step 1 by multiplying a constant re-scaling factor θ to the earnings shock as follows:

$$EBIT_{2020,j}(\boldsymbol{\theta}) = (1+ \boldsymbol{\theta} \times EBIT\ shock_i/100) \times EBIT_{2019,j},$$

where the value of θ is chosen such that the following condition is satisfied:

$$Median(ICR^{1}_{2020}(\theta)) = Median(ICR^{1}_{2020}).$$

- The re-scaling factor θ would vary depending on the severity of real GDP growth shock. Under the baseline scenario, θ is estimated at 3.2. For the upside, adverse, and severe adverse macro scenarios, the re-scaling factors are estimated to be 2.4, 3.5, and 4.3, respectively.

- It is worth noting that, by construction, the final ICR estimate obtained for firm j, $ICR^{1}_{2020,j}(\theta)$, captures both the severity of macroeconomic shocks at the aggregate level, as reflected in the sample median level of ICR, as well as the relative magnitude of earnings shock across different industries.

Appendix II. Figure 1. Regression Results: ICR

	ROA	Effective Interest Rate	Leverage (in logarithm)
Lagged Dep. Var.	0.453 (103.62)**	0.461 (94.45)**	0.834 (236.02)**
Real GDP Growth	0.002 (5.52)**	0.009 (3.12)**	0.002 (0.570)
Exch. Rate (LCU/USD)	0.000 (5.87)**	0.000 (6.45)**	0.000 0.000
Lending Rate	-0.001 (2.37)*	0.052 (12.38)**	0.012 (2.91)**
LIBOR	0.000 (0.430)	0.034 (10.63)**	0.004 (1.210)
World GDP Growth	0.002 (3.59)**	-0.005 (1.030)	-0.007 (1.640)
Commodity Price Index	0.000 (0.370)	0.000 (1.98)*	0.000 (0.640)
Lagged Assets	0.004 (9.16)**	-0.046 (17.36)**	0.032 (12.54)**
Lagged Tangibility	-0.003 (1.040)	-0.043 (2.29)*	0.072 (3.87)**
Constant	0.069 (4.43)**	-2.132 (20.46)**	-0.625 (6.36)**
Adjusted R2 Observations	0.30 29,161	0.34 28,218	0.67 30,803

Note: All macroeconomic variables come from 2020 October IMF WEO forecasts. Lagged assets is defined as the log of total assets from the previous year. Lagged tangibility is defined as the ratio of tangible assets-to-total assets from the previous year. The figures in paranthesis indicate standard errors, and the symbols *, **, *** indicate statistical significance at the 10, 5, and 1 percent.

To project firms' net cash positions at end-2020, we take the end-2019 stock of cash and cash equivalents and adjust for the expected changes in the cash flow. Specifically, we assume the end-2020 cash position of a firm to be determined as follows:

$$cash_{2020} = cash_{2019} + EBIT\ shock \times (cash\ flow\ from\ operations_{2019}) - capital\ expenditure_{2020} - debt\ amortization_{2020} + net\ interest\ payment_{2019} - dividend\ payment_{2020}$$

$$Capital\ expenditure_{2020} = min\{0.5*depreciation_{2019}, 0.25*capital\ expenditure_{2019}\}$$

$$Debt\ amortization_{2020} = 10\ percent\ of\ maturing\ debt\ (i.e.\ debt\ rollover\ ratio = 90\ percent)$$

$$Dividend\ payment_{2020} = 0$$

While the shock parameter values are arbitrary, they are set at plausible levels based on the sample data. In the case of capital expenditure (CAPEX), for example, the sample median value during the Global Financial Crisis in 2009 was about 80 percent of the level in 2008. Considering the relative severity of the current COVID-19 crisis, however, we set this value at 25 percent of the CAPEX in 2019 or 50 percent of the depreciation value in 2019, whichever is lower. In the case of the debt rollover ratio, we set it at 90 percent of the maturing debt, which is slightly lower than the median level observed in 2009 (about 100 percent) in the ASEAN-6 sample.[2]

A few caveats should be noted, however. Importantly, the analysis does not consider the effects of policy support measures. Moreover, sample firms account for only a small share of non-financial firms in the Philippines and do not include micro-sized firms in the informal sector. As a result, the estimated impact of COVID-19 shocks on the financial health of the non-financial corporate sector in the economy is likely to be downward biased.

[2] In normal times, the sample median rollover ratio is estimated at about 110 percent, implying a nominal debt growth of about 10 percent.

Appendix III. Technical Details of Bank Solvency Stress Test

A. Methodology to Calculate Proxy PDs

The BSP does not currently collect PDs and LGDs as most banks are regulated following the Basel standardized approach.[1] Therefore, we calculate proxy PDs using NPL flow data. While information on the stock of non-performing loans is available since 1996 for UKBs and since 1999 for TBs and RCBs. Information on the flow of new NPLs (and exit out of NPL to write off, collection, back to performing loans, etc.) is only available since 2014.

When the flow of new NPLs is available, the PDs can be approximated through the following equation:

$$Proxy\ PD_t = \frac{4 * New\ NPL_t}{Performing\ Loans_{t-1}}$$

For periods in which only the stock of NPLs is available, the PDs can be approximated through the following equation:

$$Proxy\ PD_t = \frac{4 * [NPl_t - (1 - \bar{\alpha})NPl_{t-1}]}{Performing\ Loans_{t-1}}$$

Where $\bar{\alpha}$ represent the proportion of NPLs that are either collected, written-off, cured to performing, restructured, sold to special purpose vehicles (SPVs), or transferred to the real and other properties acquired (ROPA) category.

The value of $\bar{\alpha}$ is derived using the information available for the period 2014–2019. In particular, the change of NPLs between two consecutive periods can be rewritten as:

$$\begin{aligned}\Delta NPL_t = NPl_t - NPl_{t-1} = New\ NPL_t - Collections_t - Writeoffs_t - Transf.\ ROPA_t \\ -Transf.Performing_t - Transf.Restructure_t - Sale\ SPV_t \\ +Adjustments_t\end{aligned}$$

$$\Delta NPL_t = NPl_t - NPl_{t-1} = New\ NPL_t - \alpha_t * NPL_{t-1}$$

The formula of alpha for a period is given by the following expression:

[1] The Philippines adopted IFRS 9 in 2019. However, we use data up to end-2019, where IFRS 9 based PD and LGD data are still scant.

$$\alpha_t = \frac{Collections_t + Writeoffs_t + Transf.ROPA_t + Transf.Performing_t - Transf.Restructure_t + Sale\ SPV_t - Adjustments_t}{NPL_{t-1}}$$

Appendix III Figure 1, shows the evolution of the alpha during the period 2014-2019 for each bank type.

The flow of new NPLs can be expressed as:

$$\rightarrow New\ NPL_t = NPl_t - (1 - \alpha_t)NPl_{t-1}$$

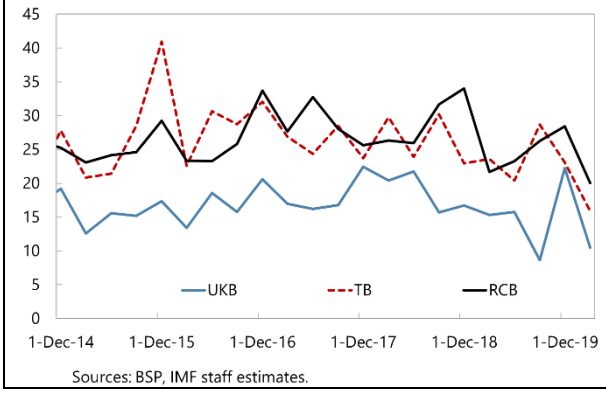
Assuming a constant alpha over time, taken as the average over the sample period, the flow of new NPLs could be approximated through the following equation:

$$\rightarrow New\ NPL_t = NPl_t - (1 - \bar{\boldsymbol{\alpha}})NPl_{t-1}$$

The average alpha is 16.8 percent for UKBs, 25.9 percent for TBs, and 26.4 percent for RCBs. The right chart in Appendix III, Figure 1, shows the evolution of the proxy PD for the system and each bank type. Relatively high PDs at the beginning of the sample period are consistent with the increase in credit risk experienced during the AFC. The PD of UKBs gradually reduced after the AFC, reaching one percent by December 2019. The PD of TBs and RCBs also decrease following the AFC but remained relatively elevated, reaching 6.6 percent and 9.7 percent, respectively, by the end of 2019.

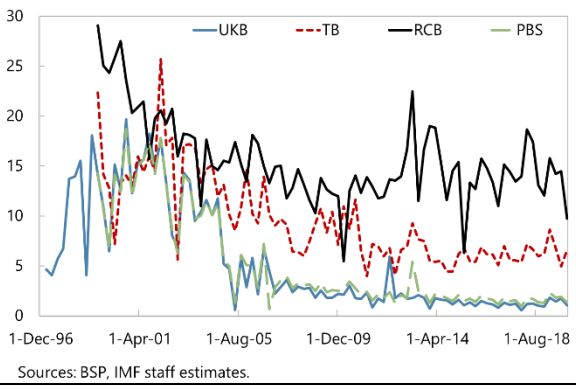
Appendix III. Figure 1. Philippines: Proxy PDs

Alpha remains stable during the sample period.



Sources: BSP, IMF staff estimates.

And Proxy PDs peak during the AFC.



Sources: BSP, IMF staff estimates.

B. Credit Risk Models

Credit risk satellite models are estimated for each bank type (UKBs, TBs, and RCBs). The credit risk models link the macro-financial scenario to the proxy PDs using quarterly data for 1999-2019. For the estimation of the credit risk models, all the possible combinations of key macroeconomic variables (e.g., real GDP growth, unemployment rate, short term interest rates, term spread, stock prices, exchange rate), as well as different lag structures are considered.

Extremely severe shocks envisaged under the stress test scenarios due to the COVID-19 crisis pose a challenge to project PDs. Given that the magnitude of the macroeconomic shocks is exceedingly large when compared to any shock observed during the sample period, the estimated coefficients are unable to fully capture the sensitivity of PDs shocks considered.

Projected PDs should be interpreted with caution, given remarkably high model uncertainty. The FSAP team considered alternative approaches to estimate credit risk models, and different sample periods were taking as training sets. Alternative approaches yield a wider than usual range of possible PD paths. Final models and training periods were selected based on in-sample fit, the significance of long-run multipliers among a pool of models that comply with sign constraints (selected based on economic theory), and expert judgment. The selected models are presented in Appendix III, Table 1.

Appendix III. Table 1. Philippines: Credit Risk Models

Sample Period: 2005 -2019

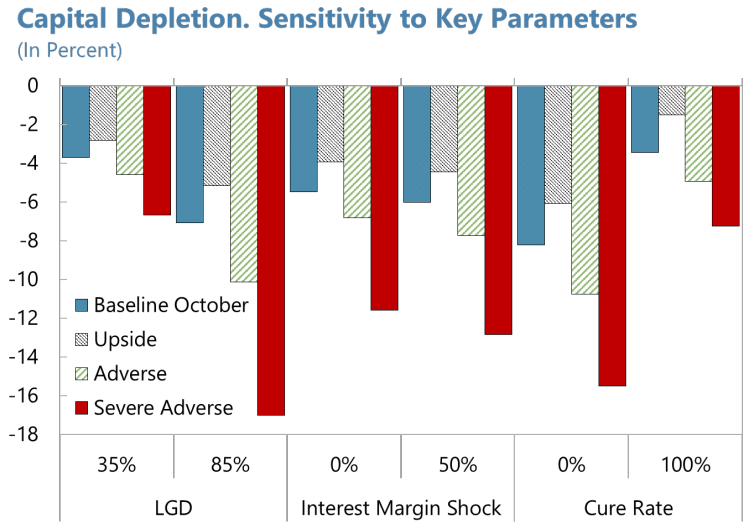
	UKB		TB		RCB	
VARIABLE	Coef.	P-value	Coef.	P-value	Coef.	P-value
AR Lags	0.060	0.739	0.259	0.112	0.207	0.177
Real GDP Growth	-0.134	0.009	-0.031	0.023		
Short Term Rate			0.054	0.021		
Unemployment Rate	0.103	0.062	0.054	0.044	0.035	0.016
Exchange Rate	-0.029	0.018				
Stock Price Growth					-0.002	0.137
Observations	60		60		60	
R-squared	0.484		0.556		0.194	
Adjusted R-squared	0.403		0.486		0.146	

C. Sensitivity of Bank Solvency Stress Test Results to Various Assumptions

The solvency stress test results of banks are highly sensitive to some parameters, particularly to the LGD, the cure rate, and the interest margin shock. Appendix III, Figure 2 and Table 2, presents key results for the total banking system, using variations on these parameters. Changes in parameters are applied one at a time to all banks, while other assumptions are kept constant. The parameters considered are as follows: i) LGD of 35 percent and 85 percent, ii) interest margin shock of zero during the entire stress-test horizon and an interest margin shock equivalent to 50 percent of the paths consistent with the ones observed during the AFC, iii) Cure rate of zero (as a percent of NPL_{t-1}) and cure rate equivalent to 100 percent of the average annualized cure rate observed for each bank type.

Appendix III. Figure 2. Philippines: Sensitivity of Stress Test Results

Stress test results are highly sensitive to LGD and Cure Rate assumptions…



Sources: BSP, IMF staff estimates.

Appendix III. Table 2. Philippines: Sensitivity of Stress Test Results

Bank Solvency Stress Tests: Sensitivity to Key parameters						
Scenarios	**Capital ratios[1]** (In percent)					
	LGD		**Interest Margin Shock**		**Cure Rate**	
	35%	**85%**	**0%**	**50%**	**0%**	**100%**
Latest actual	15.6					
Baseline October	14.2	10.0	12.0	11.3	10.2	14.6
Upside	15.1	12.5	13.9	13.2	12.5	15.7
Adverse	12.9	6.9	9.8	8.7	7.1	13.5
Severe Adverse	10.5	1.0	5.7	4.1	1.8	11.5
Scenarios	**Capital Shortfalls[1]** (in percent of GDP)					
	LGD		**Interest Margin Shock**		**Cure Rate**	
	35%	**85%**	**0%**	**50%**	**0%**	**100%**
Latest actual	0.0					
Baseline October	0.3	1.5	0.9	1.0	1.3	0.3
Upside	0.1	0.8	0.5	0.6	0.7	0.1
Adverse	0.7	2.9	1.7	2.1	2.7	0.5
Severe Adverse	1.3	5.6	3.5	4.2	5.1	1.0

1/ Figures at the end of the stress test horizon (2022).
UKBs have to comply with the following minima (hurdle rate for the stress tests): CAR 10 percent (Basel III 8 percent), CET1 ratio 6 percent (Basel III 4.5 percent) and Tier 1 ratio 7.5 percent (Basel III 6 percent). Moreover, UKBs are required to hold a 2.5 percent capital conservation buffer and, if applicable, a D-SIB buffer (of 1.5 or 2 percent). The minima for TBs and RCBs are: CAR 10 percent and Tier 1 ratio 6 percent (Basel I based). TBs and RCBs are not subject to buffer and leverage ratio requirements.

Appendix IV. Macro-Financial Linkage

Appendix IV. Table 1. Philippines: Panel Estimates of Credit Growth Model

	Sum of coefficients	F-statistic	Marginal significance	Long-run elasticity
Real Credit Growth (lagged)	-0.225	89.130	0.000	
Real GDP Growth	3.235	7.023	0.001	2.641
Change in Nominal Policy Rate	-3.029	2.811	0.060	-2.473
Change in Non-performing loan rate	-3.285	11.317	0.000	-2.681
Change in Loan loss reserve rate	-4.701	17.268	0.000	-3.838
Adjusted R2	0.134			
Standard error of the regression	0.139			
Number of observations	1701			

Note: The autoregressive distributed lag (ARDL) models contain 1 lag of all regressors and contemporaneous values for predetermined regressors. Model estimates are summarized by the sum of each regressor's coefficients. Long-run elasticities are obtained by dividing the sum of the estimated coefficients for the explanatory variable by one minus the sum of the estimated coefficients corresponding to lagged dependent variable terms. The F-statistic corresponds to the null hypothesis that all the coefficients for a specific regressor equal zero; the alternative hypothesis is that at least one of the coefficients is different from zero. The marginal significance level reflects the statistical significance level at which the null hypothesis is rejected. For instance, rejecting the null at a statistical significance level of 5 percent requires the marginal significance to be less than 5 percent (0.05).

Appendix IV. Table 2. Philippines: Structural Identification in SVAR

Dependent Variables	Independent Variables				
	Real credit	Real GDP	Inflation	Real Policy Rate	Nominal Exchange Rate
Real credit	*				
Real GDP	*	*			
Inflation	*	*	*		
Real Policy Rate	*	*	*	*	
Nominal Exchange Rate	*	*	*	*	*

Appendix IV. Table 3. Philippines: SVAR Model's Lag Structure

Dependent Variables	Independent Variables				
	Real credit	Real GDP	Inflation	Real Policy Rate	Nominal Exchange Rate
Real credit	*				
Real GDP	*	*	*	*	*
Inflation		*	*	*	*
Real Policy Rate		*	*	*	*
Nominal Exchange Rate		*	*	*	*

Appendix IV. Table 4. Philippines: SVAR Model's Elasticities

	Shock Variables: Real Credit
Real GDP	
One year	0.07
Two years	0.16
Inflation	
One year	0.08
Real Policy Rate	
One year	-0.02
Nominal Exchange Rate	
One year	-0.03