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Managing Financial Sector Risks from the COVID-19 Crisis in the Caucasus and Central Asia

Prepared by Iulia Ruxandra Teodoru and Klakow Akepanidtaworn

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Executive Summary

The COVID-19 crisis raises the risk of renewed financial sector pressures in the Caucasus and Central Asia (CCA) region in the period ahead. Bank distress and its economic and fiscal fallout have been recurring features of many CCA countries, as seen after the global financial crisis and the 2014-15 oil price shock. Strong policy responses have delayed the full impact of the COVID crisis so far, but financial sector risks will increase once public support is phased out. If these risks are not preemptively addressed, banks' ability to lend during the recovery phase could be impaired and there may be a need for costly public interventions, as in the past.

The crisis impact will exacerbate longstanding vulnerabilities in CCA banking systems. CCA banking systems are relatively small and concentrated, leading to high costs of finance and low levels of financial inclusion. A legacy of problem loans and large credit cycles could magnify systemic risks in some countries. In addition, persistently high dollarization may pose indirect foreign exchange (FX) credit risks, and high loan-to-deposit ratios and reliance on FX funding contribute to liquidity risks.

Stress test analysis allows identifying the most significant risk factors in the region's financial systems at this juncture, especially FX risks. Under adverse macroeconomic scenarios, CCA bank's capital adequacy ratios could drop significantly but would likely remain above regulatory minimums. However, vulnerabilities due to FX exposures appear substantial: FX-induced credit risk could severely impact bank capitalization, and half of the banks in the region could become illiquid under acute FX funding stress. In addition, a simultaneous realization of these risks would have compounded effects, and the largest and state-owned banks seem to be the most vulnerable.

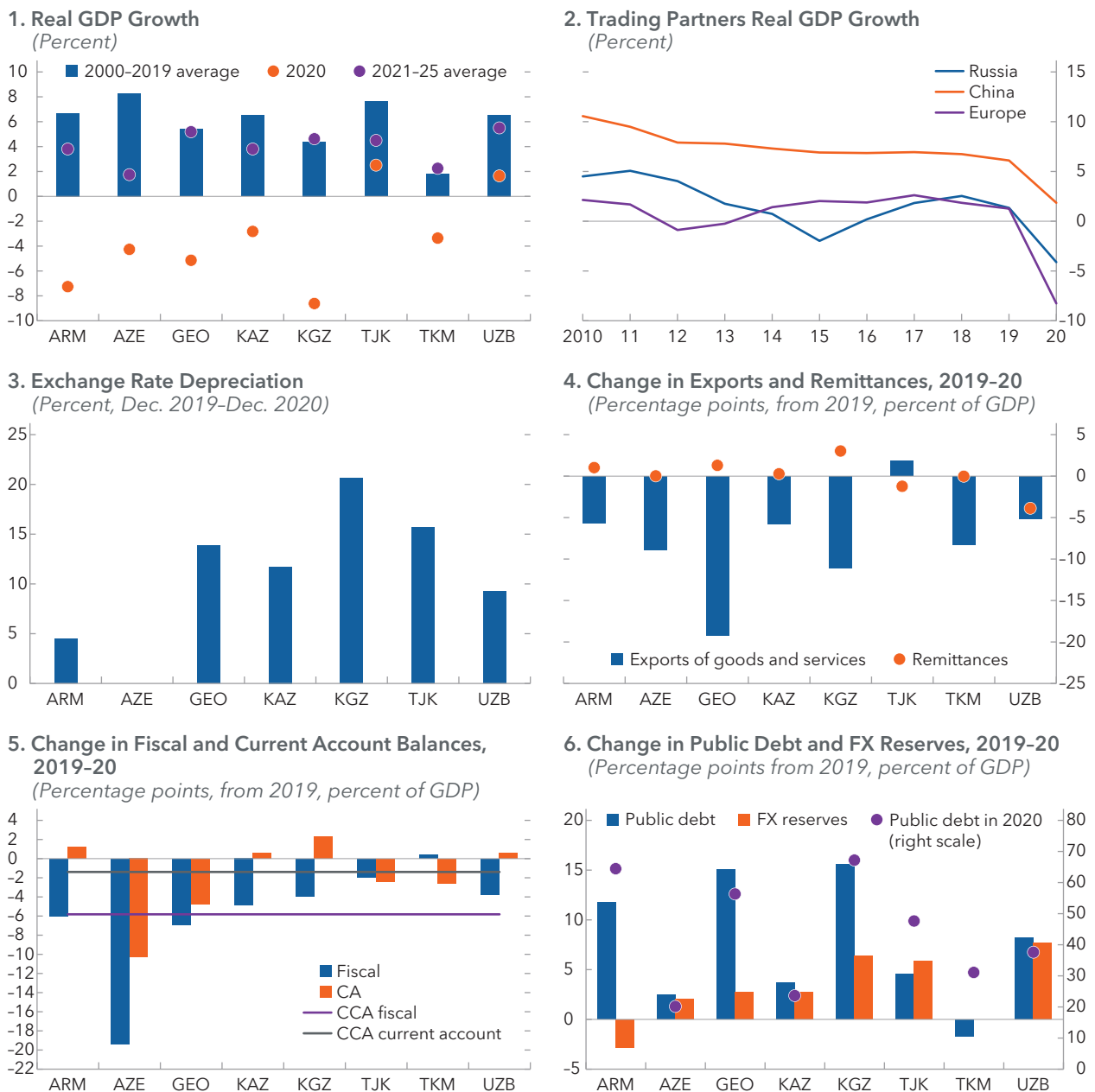
A range of policies are needed to preemptively address these risks, building on best international practices and lessons from past experience in CCA countries. Supervisory policy should be based on in-depth risk diagnostics. Macroprudential policy frameworks should continue to be upgraded to build up resilience across credit cycles. Stronger bank resolution and insolvency regimes are needed to support swift balance sheet repair. In the longer term, reducing the role of the state and promoting competition in banking systems, and diversifying financing sources, including through capital market and fintech development, will help promote safe and sustainable credit growth and financial inclusion. Lessons from the 2014-15 crisis in the region confirm that appropriate policy responses, such as strengthened prudential regulation or decisive measures to rebuild capital, can help maintain market confidence and restore buffers without incurring large fiscal costs.

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1. Introduction

The COVID-19 pandemic has increased financial sector risks in the Caucasus and Central Asia (CCA) (Figure 1). On average, economic growth across the region was 7 percentage points lower in 2020 than expected in 2019. A slower rollout of vaccines and high dependence on hard-hit sectors including hydrocarbon (CCA oil exporters), and tourism and remittances (CCA oil importers) may delay the recovery. As a result, corporate and household default risks will likely increase, adding to other financial sector vulnerabilities, such as elevated non-performing loan (NPL) ratios, or sensitivity to exchange rate volatility from dollarization.

Figure 1. CCA Countries: Real, Fiscal and External Effects of the COVID-19 Pandemic



Sources: World Economic Outlook; and IMF staff calculations.

Strong policy responses have delayed the full impact of the crisis in 2020–21. Large-scale fiscal support has been extended to hard-hit households and businesses. In most countries, monetary authorities have cut policy rates and provided liquidity to stabilize financial market conditions. Also, where available, macro-prudential tools have been deployed to alleviate constraints on credit supply. While banking systems in the CCA region entered the COVID-19 pandemic in a relatively strong position, banks are likely to face rising capital and liquidity pressures due to lower profits and deteriorating asset quality once these various forms of public support are phased out.

Looking ahead, episodes of bank distress may have large macro-financial implications. Weakened balance sheets could impair banks' ability to lend and support the post-COVID recovery. In addition, severe financial sector distress could lead to costly public interventions, potentially affecting fiscal sustainability. Indeed, several CCA governments stepped in to prevent bank failures in recent years, and the resulting fiscal costs were very high—exceeding 20 percent of GDP in a few cases.

This departmental paper assesses the key financial sector risks in CCA countries and proposes policies to prevent costly bank failures, including based on past experience in the region. It is organized as follows: the next chapter presents key macro-financial risks in the CCA region. Chapter 3 quantifies their relative importance. Chapter 4 discusses near-term challenges and lessons from past experiences in rebuilding buffers in CCA banking systems. Chapter 5 concludes and provides policy recommendations to deal with current vulnerabilities and help secure durable financial stability and sustainable credit deepening in support of economic growth in the region.

2. Key Macro-Financial Risk Factors in the CCA Region

A. CCA Banking Systems—Key Features

CCA financial systems are dominated by commercial banks performing traditional financial intermediation, with a generally strong state footprint (Figure 2). Banks represent almost 90 percent of total financial system assets on average, while stock markets and nonbank financial institutions are underdeveloped throughout the region. Banking sectors are relatively concentrated, with the top five banks (ranked by assets) holding between 55 and 85 percent of system assets (similar levels to those observed in emerging Europe). Georgia has the highest concentration in the region. State ownership of banks and quasi-fiscal banking activities are high in three countries (Azerbaijan, Tajikistan, Uzbekistan). Loans constitute the largest part of banks' assets and loan concentration by sector and/or client is high, reflecting limited economic diversification. Corporate loans represent 57 percent of the total loan portfolio on average. On the liability side, deposits are the dominant funding source, with a high share of demand deposits. Net interest income constitutes over 65 percent of banks' income on average, with income from fees and commissions accounting for about 20 percent.

CCA banking systems are relatively small and associated with high costs of finance and low levels of financial inclusion. In Azerbaijan, Kazakhstan, Kyrgyz Republic, and Tajikistan, total banking assets are below 50 percent of GDP, less than half the size of banking sectors in emerging Europe. Georgia and Armenia have the largest banking sectors in the region, with total assets of more than 90 percent of GDP. Interest rate spreads (between lending and deposit rates) are very high in Uzbekistan, Kyrgyz Republic, and Tajikistan (8, 10, and 24 percent, respectively), and collateral requirements surpass 200 percent of loan amounts in Armenia, Azerbaijan, Kyrgyz Republic, and Georgia, constraining financial deepening and inclusion (Vera-Martin and others 2019).¹

B. Credit Risk

Many CCA countries need to manage a legacy of elevated problem loan levels from the 2014–15 oil price shock. The corporate sector is a larger source of credit risk (NPLs) in Azerbaijan, Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan than the household sector. In contrast, in Armenia, credit risk is higher for the household sector given the concentration of loan portfolios in this sector. Across the CCA region, NPL ratios are generally the highest in the trade and construction sectors.²

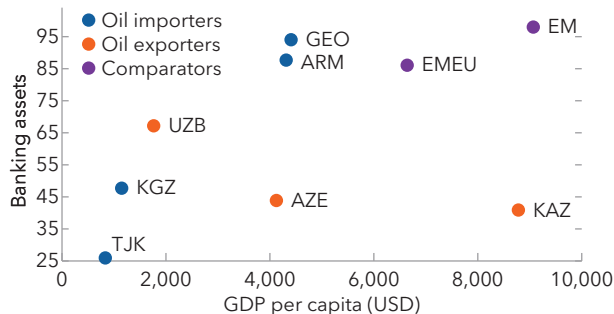
Large and externally driven credit cycles have often magnified systemic risk in the region. Khandelwal and others (2020) shows that many CCA countries experienced rapid credit expansions ahead of the GFC and prior to the 2014–15 oil price slump, which were followed by financial distress triggered by external shocks. In 2019, high corporate and household credit growth and positive credit-to-GDP gaps in some countries (Armenia, Georgia, Kyrgyz Republic, Uzbekistan) may have raised underlying credit quality risks. With accommodative policies during the pandemic, excessive leverage and risk-taking may also have developed again in CCA countries, including due to expectations of continued government interventions. In addition, foreign currency lending to unhedged borrowers has frequently added to the build-up of credit risk (see below).

¹ A key reason for high collateral requirements is lack of information to assess credit risk. Vera-Martin and others (2019) estimate that relaxing collateral constraints could increase GDP by 5 to 15 percentage points.

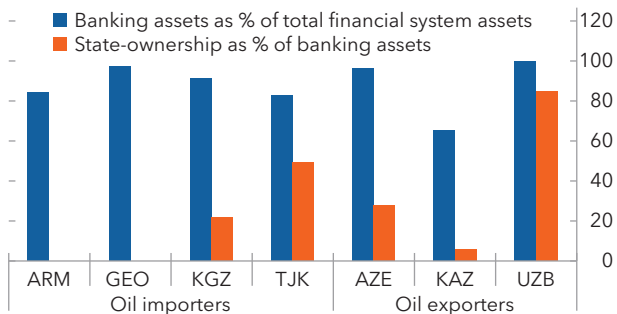
² This can reflect credit policies, such as in Uzbekistan, where the government orients credit toward strategic sectors and state-owned enterprises (SOEs).

Figure 2. CCA Countries: Characteristics of Banking Systems, 2020

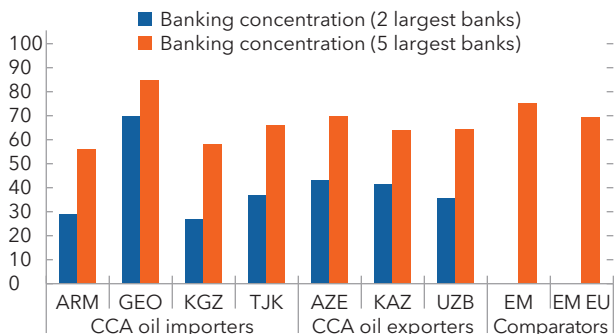
1. Banking Assets and per Capita Income
(Percent of GDP)



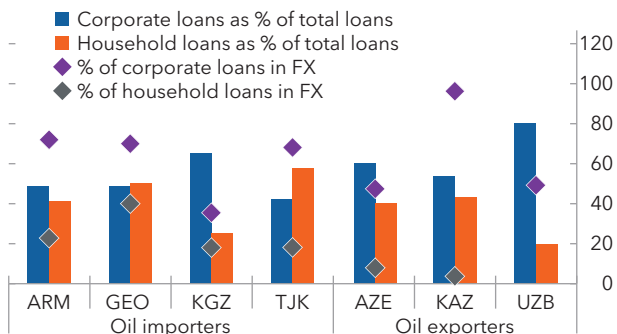
2. Banking Assets and State-Ownership
(Percent)



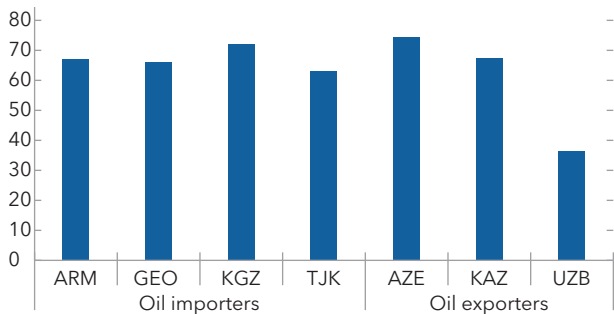
3. Banking Concentration
(Percent in total banking assets)



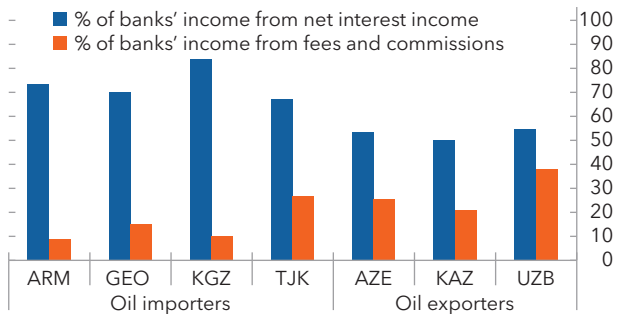
4. Household and Corporate Loans
(Percent)



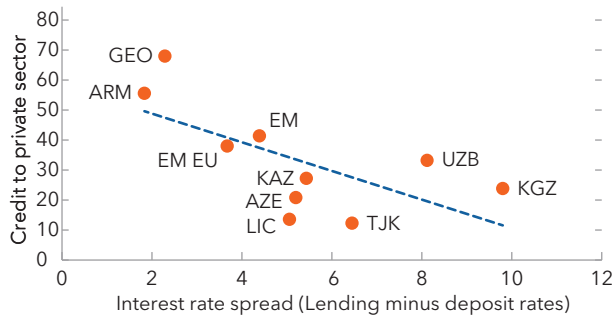
5. Deposits
(Percent of total bank funding)



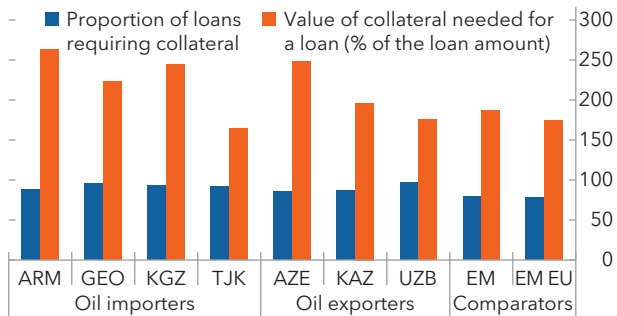
6. Banks' Income
(Percent)



7. Private Sector Credit and Interest Rate Spreads
(Percent of GDP)



8. Collateral
(Percent)



Sources: World Economic Outlook; IMF Financial Soundness Indicators; National Authorities; World Bank's Enterprise Surveys; and IMF staff calculations.

Significant weaknesses in regulatory and supervisory frameworks need to be addressed to reduce credit risk. Transitions to risk-based supervision are still underway, and such weaknesses relate, for example, to related-party lending practices, or poor corporate governance, accounting, and underwriting standards (Azerbaijan, Kazakhstan, Kyrgyz Republic, Tajikistan, Uzbekistan). Several countries, such as Armenia, Georgia, and Kazakhstan are addressing decisively some of these shortcomings, while others, such as Tajikistan, Turkmenistan, and Uzbekistan, have been slower in adopting best international practices and still relied on compliance-based supervision.³

C. Currency Risk

Most CCA banking systems are highly dollarized. While progress has been made in reducing dollarization over the past 5 years, especially in Armenia, Georgia, Kazakhstan, Kyrgyz Republic, and Tajikistan, it remains about 45 percent, well above the average emerging market (EM) or emerging European (EMEU) economy (Figure 3). More than 50 percent of household deposits are denominated in FX in Armenia and Azerbaijan, and 65 percent in Georgia. About 70 percent of corporate loans are denominated in FX in Armenia, Georgia, and Tajikistan, and as much as 40 percent of household loans (mainly mortgages) are denominated in FX in Georgia. Persistent dollarization can be attributed to a combination of factors, such as macroeconomic instability, asymmetric exchange rate policies, or inadequate prudential regulations. In some countries (Armenia, Georgia, Kazakhstan), a transition to inflation targeting, higher interest rates, and macroprudential measures have helped with de-dollarization.⁴

Dollarization generates several types of financial sector risks. Although CCA banks generally maintain small open FX position on their balance sheets, they face indirect FX credit risks as many FX loans are to unhedged borrowers. Indeed, levels of NPLs on FX loans are higher than those in domestic currencies for both households and firms in Georgia, and for firms in Azerbaijan, Kyrgyz Republic, and Tajikistan. Dollarization can also magnify FX liquidity risk in financial systems (see below).

D. Dollarization Risk

Despite stable funding sources, high loan-to-deposit ratio contribute to liquidity risks in the CCA region. Deposits generally make up a large part of CCA banks' funding. Together with strong deposit insurance systems in some countries (Armenia, Georgia, Kazakhstan), and with the small size of domestic interbank markets, this helps limit the risks of bank runs and interbank contagion. Yet, loan-to-deposit ratios are well above 100 percent in Armenia, Georgia, and Uzbekistan (about 120, 140, and 220 percent, respectively) and much higher than in emerging Europe, potentially creating liquidity risks if deposits were to be withdrawn in a crisis. In some countries, a large part of non-deposit funding stems from long-term lending by international financial institutions and can reduce overall liquidity risks due to its low risk of outflows.

A key source of liquidity risk in CCA banking systems reflects their reliance on FX funding. CCA banks rely on FX-denominated deposits from residents and nonresidents, as well as on wholesale FX funding. FX funding is the highest in Azerbaijan, Uzbekistan, and Georgia (about 50 percent in Azerbaijan, and 60 percent of total liabilities in the latter two countries), while it is closer to 35 percent in the other CCA countries. Loan-to-deposit ratios in FX are almost 300 percent in Uzbekistan given higher non-deposit FX funding. Nonresident FX deposits—more than 20 percent in Armenia and Georgia—are more prone to be withdrawn in times of

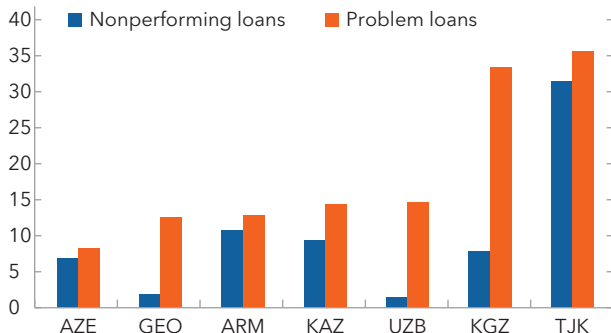
³ Georgia was very successful in adopting risk-based supervision framework and strengthening the private sector insolvency framework. Armenia, Kazakhstan, and Kyrgyz Republic also adopted risk-based supervision and macroprudential tools to deal with build-up of risks.

⁴ Examples of measures aimed at reducing dollarization include higher risk weights for FX assets, outright bans on FX loans for consumer lending and mortgages, higher loan loss provisions on FX loans, higher reserve requirements on FX deposits, and deposit insurance premiums.

Figure 3. CCA Countries: Asset Quality, Credit Gaps, Dollarization, and Loan-to-Deposit Ratios, 2020

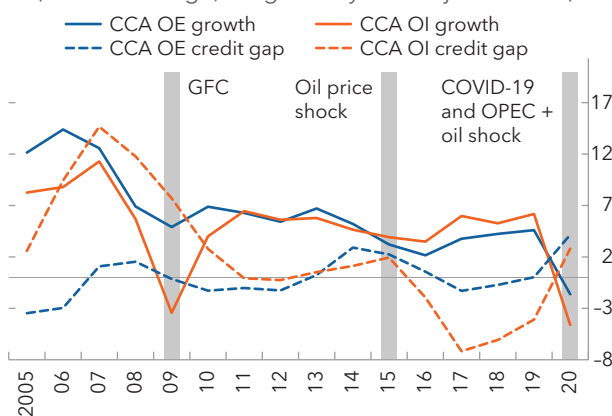
1. Asset Quality

(Percent of total loans, latest data available)

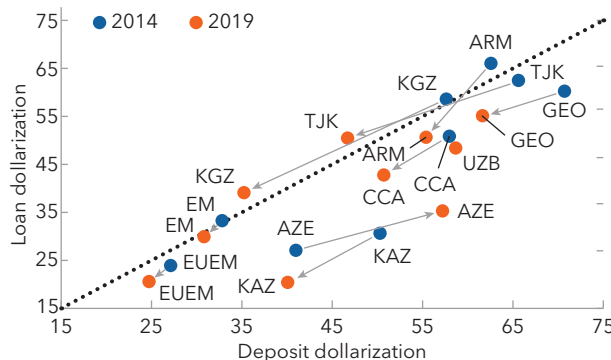


2. Real GDP Growth and Credit Gaps

(Percent change; weighted by PPP-adjusted GDP)

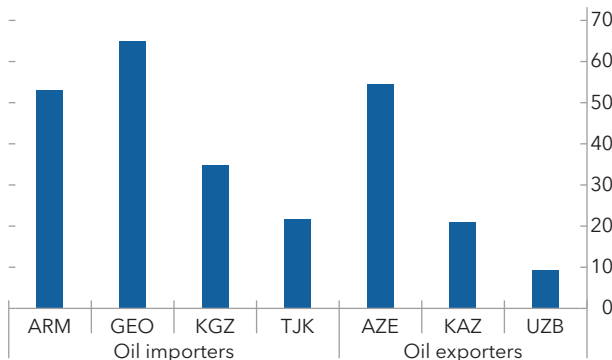


3. Dollarization



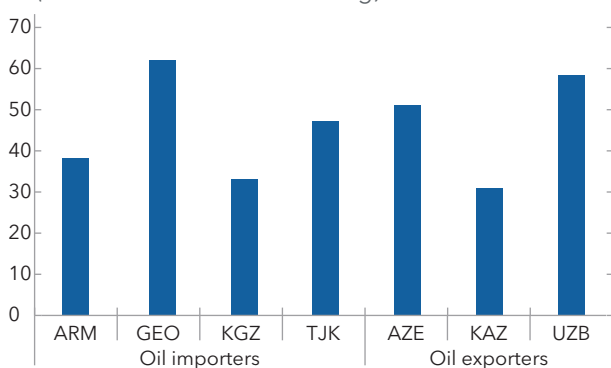
4. Household Deposits in FX, 2020

(Percent of total deposits)



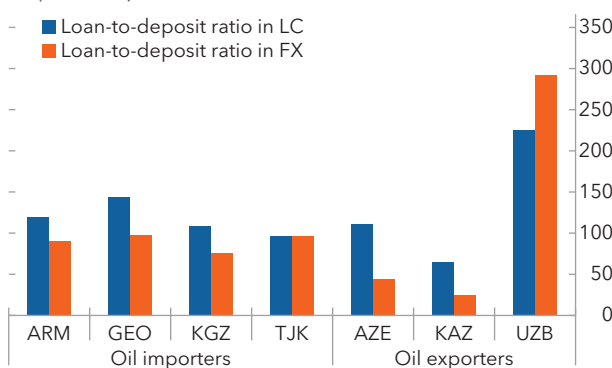
5. FX Funding

(Percent of total banks' funding)



6. Loan to Deposit Ratios by Denomination

(Percent)



Sources: World Economic Outlook; National Authorities; and IMF staff calculations.

Note: In panel 1, problem loans include (1) overdue loans >90 days; (2) watch loans <90 days; (3) restructured/prolonged loans; (4) write-offs; and, (5) transfer to special-purpose vehicles or other vehicles.

stress than resident deposits. These exposures raise macro-financial risks as central banks have limited capacity to provide FX liquidity support. In early 2020, several CCA central banks (Armenia, Georgia, Kyrgyz Republic) had to intervene and provide FX liquidity support to prevent disorderly FX market conditions.

E. Interest Rate Risk

Interest rate risk in CCA banks' balance sheets arise from their credit and sovereign bond portfolio exposures. Given the dominance of fixed-rate loans of longer maturity, a sudden increase in funding costs (for example, shock to deposit interest rates) could squeeze banks' profit margins. In addition, banks generally hold large government bond portfolios (about 17 percent of bank assets in Kazakhstan, 10 percent in Armenia, and 8 percent in the Kyrgyz Republic). Where a large share of these bonds is held in the available-for-sale portfolio category (for liquidity management purposes), they are subject to market risk and marked to market.

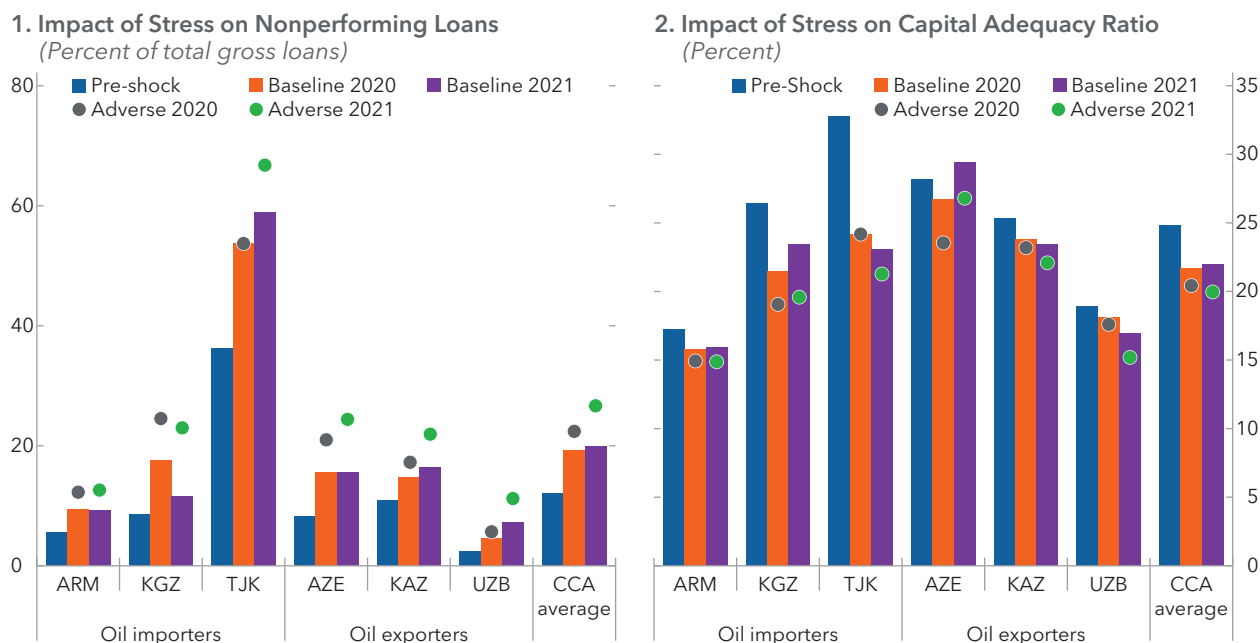
3. Quantifying Financial Stability Risks

Once key risk exposures in CCA banks have been identified, quantifying their potential macro-financial impact is essential to guide policy responses. Several stress test approaches were used to quantify credit, FX, liquidity, and interest rate risks in each CCA country. Top-down stress tests allowed assessing banks' liquidity and capital situations under specific shock scenarios and reflecting country specific circumstances. In addition, sensitivities to FX, liquidity, and interest rate risks were also gauged under shocks calibrated based on historical experience.

Under an adverse macroeconomic scenario, bank capital adequacy would decline significantly, but would still likely remain above regulatory minima (Figure 4). Specifically:

- NPL ratios would almost triple in Azerbaijan and Kyrgyz Republic, and increase significantly in the other countries, except Armenia. The average NPL ratio in the region would increase to 26.7 percent in 2021 (from 12 percent in June 2020), ranging from 11.2 percent (Uzbekistan) to 66.7 percent (Tajikistan).
- The average capital adequacy ratio (CAR) would drop from 24.8 percent to 20 percent in 2021, suggesting a low risk of bank failure in aggregate.¹ Nonetheless, eight banks in the region (ranging from 13 percent to 24 percent of assets in their country)—with higher initial NPL ratios and lower initial CARs—would see their CAR ratios fall below the Basel II regulatory minimum (8 percent) in the absence of policy response. Only three banks (about 0.6 percent to 7 percent of assets in their country) may face bankruptcy as their CAR could turn negative.

Figure 4. NPLs and CARs under Stress Scenarios

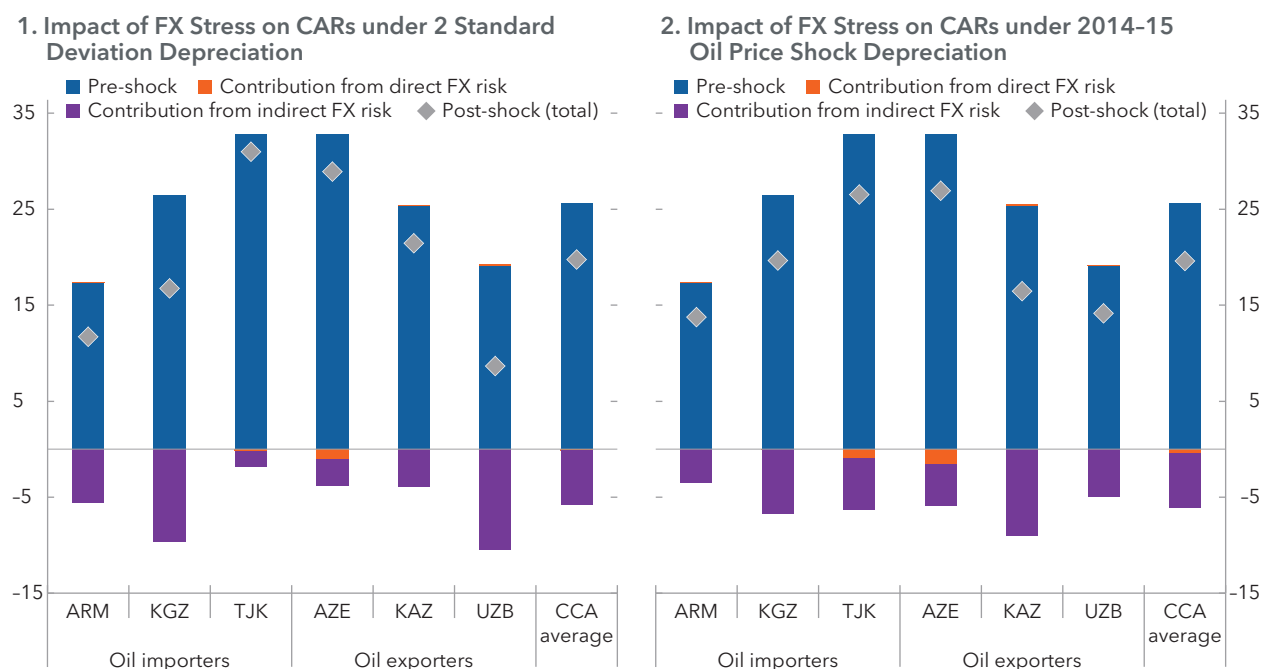


Source: IMF staff calculations.

Note: The Pre-Shock NPLs and CARs refer to the 2019 scenario shown in Table 1 of Annex I.

¹ While the risk of bank failure appears to be low, it could be higher if the quality of capital is not sufficiently loss-absorbing.

Figure 5. Sensitivity to Exchange Rate Shocks
(Percent)



Source: IMF staff calculations.

- While U- or L-shaped alternative recovery scenarios for 2021 were not considered, they would likely incur larger reductions in CARs compared to the outcomes of the V-shaped recovery scenario above. More broadly, the goal of these stress testing analyses is to assess vulnerabilities that may materialize in the medium term, for instance when extraordinary policy support is removed.

Stress tests indicate that vulnerabilities due to FX-induced credit risk are substantial (Figure 5). Assuming exchange rate depreciation by 2 standard deviations,² the decline in CARs is about 6 percentage points on average across the region, with considerable variation across countries.³ More vulnerable countries to this shock are Armenia, Kyrgyz Republic, and Uzbekistan (from 5.6 to 10.5 percentage points). For the other CCA countries, CARs would decline by less than 4 percentage points (Azerbaijan, Kazakhstan, Tajikistan). Assuming exchange rate depreciations similar to what countries experienced during the 2014-15 shock leads to comparable results.

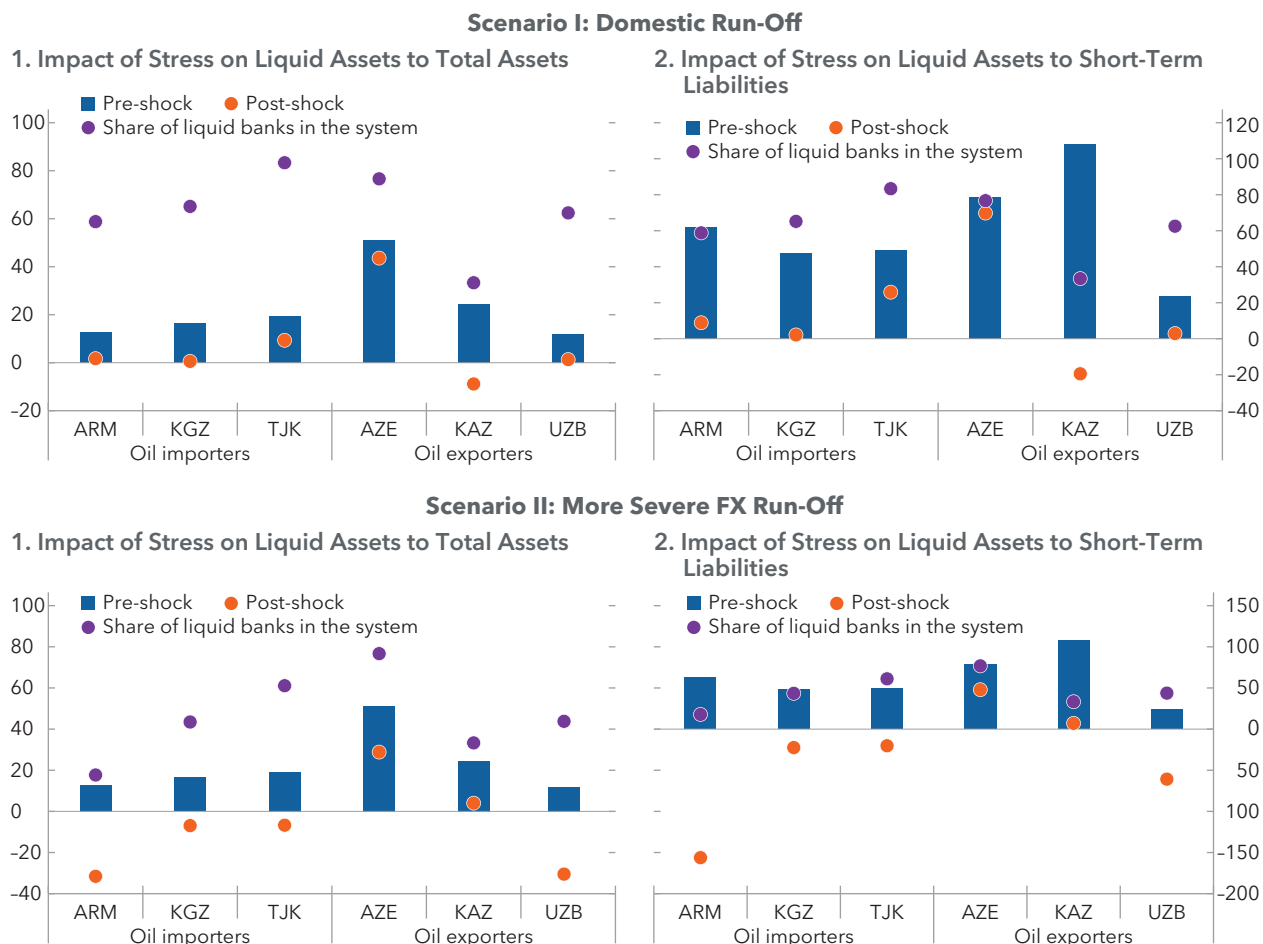
Liquidity stress tests confirm that many CCA banking systems are vulnerable to funding stress, especially in foreign currency (Figure 6). The banking systems' stock of high-quality liquid assets (HQLA) appears sufficient to absorb liquidity outflows while cash inflows decline over a period of four months in most countries. Nonetheless, liquidity ratios deteriorate significantly across the board and the number of illiquid banks surges if access to central bank liquidity support is curtailed.

- When the withdrawal of domestic demand deposits and other liabilities is assumed to be 15 and 10 percent per month, respectively, most banking systems would see liquidity ratios drop close to zero or become negative in one case. Liquidity risks may be mitigated given that a significant share of bank deposits is

² The FX shock of 2SDs is more extreme than the standard credit risk shocks (1SD) and likely accounts for its large impact on capitalization.

³ Out of a 5.9 percentage point decline in CARs, indirect FX risks contributed 5.7 percentage points.

Figure 6. Impact of Stress Testing on Liquidity
(Percent)



Source: IMF staff calculations.

from the government and SOEs, which are less likely to be withdrawn suddenly, and other liabilities are to a large extent long-term liabilities (such as loans from the government, international financial institutions, and bilateral development banks).

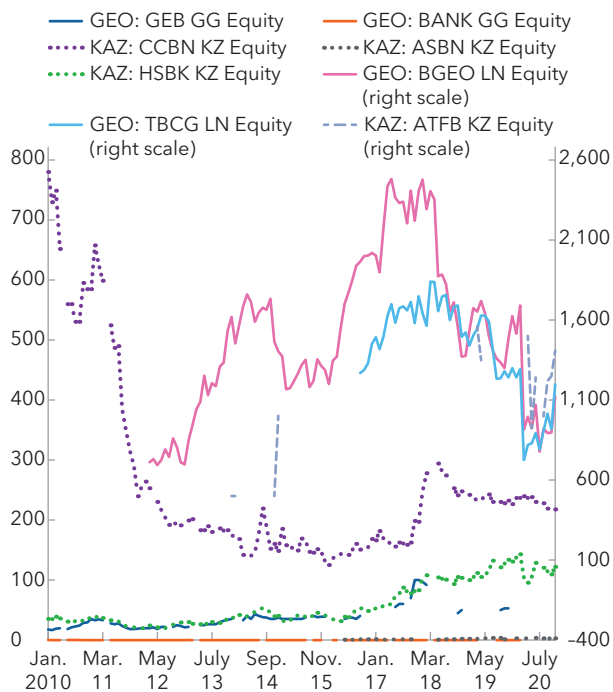
- FX funding pressures are a key risk in many CCA countries. Assuming run-off rates of 25 percent on FX deposits and 35 percent on other FX liabilities, liquidity ratios after four months would be negative for most CCA countries (except Kazakhstan and Azerbaijan). However, this scenario is unlikely to materialize, as FX deposits by domestic residents represent the largest share in total FX funding in most countries and they are a relatively stable funding source (especially where a strong deposit insurance system covering FX deposits is in place).
- Without policy support, some banks will have high risks of liquidity shortfall if shocks materialize. Under the first shock, 92 out of 147 banks (63 percent of banks) will remain liquid. In the second more severe scenario of FX funding pressures, 70 out of 147 banks (48 percent) of banks will remain liquid.

Some CCA banking systems appear vulnerable to interest rate risks, mainly due to their sovereign debt exposures. Assuming interest rate increases of 2 percent, CARs would drop by 2.4 percentage points in Kazakhstan, 11.2 percentage points in Armenia, and 1.4 percentage points in the Kyrgyz Republic. Most of the impact comes from repricing, with little impact through net interest income.

In general, the largest CCA banks and state-owned banks seem to be the most vulnerable. Within each country, banks' post-shock CARs depend heavily on initial conditions, and small banks are generally better capitalized in CCA countries - although in Kazakhstan and Tajikistan, they appear to be more vulnerable to shocks given higher NPL ratios, while in Azerbaijan, large banks have strong capital buffers. Liquidity shocks also appear to have the largest impact on large banks, except for Azerbaijan and Kazakhstan, which have high liquidity buffers to begin with. While the above analysis does not distinguish between state-owned and private banks, financial soundness indicators for state-owned banks in Uzbekistan, Tajikistan, Azerbaijan, and Kyrgyz Republic are generally weaker than their private counterparts. Thus, shocks might impair their balance sheets to a greater extent than they affect private banks.

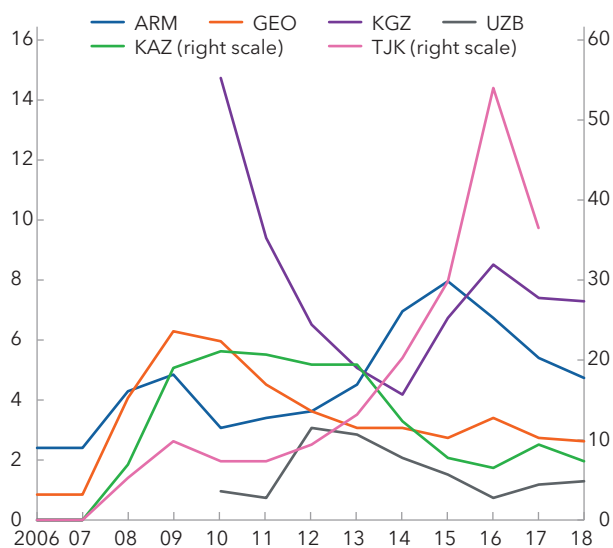
4. Near-Term Challenges and Lessons from Earlier Crises in the CCA Region

Figure 7. Stock Prices of Georgian and Kazakh Banks



Source: Bloomberg Finance L.P.

Figure 8. Nonperforming Loans, 2006-18
(Percent of total gross loans)



Sources: IMF, Financial Soundness Indicator database; and IMF staff calculations.

Despite their significant capital and liquidity buffers, CCA banks still need to absorb the full impact of the COVID crisis. Decisive policy interventions helped alleviate the economic and financial fallout of the pandemic, but their unwinding needs to be carefully timed and managed (Box 1). The removal of policy support is likely to exacerbate important vulnerabilities in the region's banking systems, including exposures to oil price volatility, elevated debt levels and financing needs, weak asset quality, and high dollarization. These may hinder the recovery and increase loan losses and risk premiums, while exchange rate depreciations could magnify credit risk. Some CCA economies (Azerbaijan, Georgia, Kazakhstan) that are more integrated in the global financial system may also face risks from weaker trade and capital outflows (Figure 7), which have caused credit downturns in the past (Khandelwal and others 2020).

Indicators of banking soundness deteriorated somewhat in the first half of 2020 (Table 1) and are likely to worsen going forward. NPLs usually respond with a lag to declining activity and firm profitability and, as noted, public support and regulatory relaxation measures during the pandemic will further delay the realization of NPLs (Figure 8). Since the end of 2019, bank profitability has declined (except in Azerbaijan and Kazakhstan), and loan loss provisions have not increased. Bank capital ratios have receded in some countries (Armenia, Georgia, Tajikistan, Uzbekistan), and the equity market valuation of some CCA banks has fallen.

Against this background, lessons from experience in preserving or rebuilding buffers during the 2014-15 crisis in the region are useful. The 2014-15 oil price had a strong impact on CCA banking systems. NPL ratios reached peaks ranging from 7 percent in Georgia and

Table 1. Financial Soundness Indicators

	Capitalization <i>Net total capital to risk-weighted assets (percent)</i>	Liquidity <i>Liquid assets to short-term liabilities (percent)</i>	Asset Quality <i>Nonperforming loans to gross total loans (percent)</i>	Loan Loss <i>Loan loss provisioning to nonperforming loans ratio (percent)</i>	Profitability <i>Return on equity (percent)</i>
	Percentage point change since Dec 2019 (decrease = red)	Percentage point change since Dec 2019 (decrease = red)	Percentage point change since Dec 2019 (increase = red)	Percentage point change since Dec 2019 (decrease = red)	Percentage point change since Dec 2019 (decrease = red)
ARM	-0.6	10.4	0.6	-0.5	-1.3
GEO	-0.3	2.6	0.3	6.3	16.9
KGZ	-1.6	-1.7	3.4	2.1	-0.1
TJK	0.6	29.4	-10.7	2.8	3.0
AZE	2.9	-3.3	-2.1	-1.6	-0.6
UZB	-6.1	3.8	3.1	-8.2	-7.5
KAZ	2.5	10.2	-1.0	-1.9	1.7

Sources: IMF, Financial Soundness Indicators database; and IMF staff calculations.

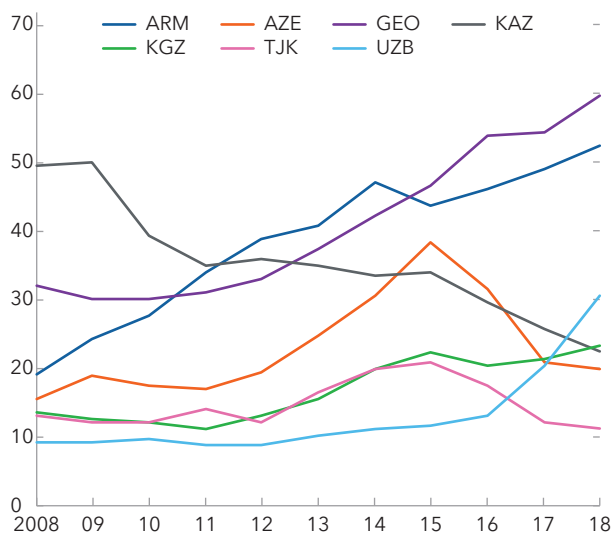
Note: Latest data are July 2021 for Kyrgyz Republic, June 2021 for Armenia, Georgia, and Tajikistan, May 2021 for Uzbekistan, March 2021 for Kazakhstan, and December 2020 Azerbaijan.

Armenia to 54 percent in Tajikistan. Bank capital, liquidity, and profitability declined much more in some CCA countries than in EM and EMEU peer countries (Annex 2), even though net interest margins (NIM) were relatively resilient.

Interventions to preserve financial stability in CCA countries often entailed large public sector liabilities in recent years. In Azerbaijan, state support to the publicly owned and largest banks amounted to 22 percent of GDP, of which the largest share of support was directed to the largest bank—IBA, which held about 40 percent of the banking system's assets at the time. It covered the cost of purchasing IBA's bad assets by a publicly funded asset management company (AMC), a deposit by the sovereign wealth fund, a capital injection by the government, and loans from the central bank. In Kazakhstan, the two largest banks merged and state support amounting to about 4 percent of GDP was provided. Kazakhstan also used an AMC to offload sizable NPL portfolios from its biggest banks, at significant fiscal costs. In Tajikistan, the government aided the two largest banks (6 percent of GDP), and, in Uzbekistan, public support to banks reached 6.6 percent of GDP. In several CCA countries, smaller insolvent banks were merged or liquidated.

At the same time, certain policies helped restore bank balance sheets after the 2014-15 oil price shock without weakening public finances or creating moral hazard. Box 2 presents some examples of such good practices in the region. These included supervisory measures to strengthen capitalization (Armenia, Azerbaijan, Georgia, Kazakhstan, and Kyrgyz Republic) and deposit insurance schemes (Armenia, Georgia, Tajikistan), as well as market interventions such as FX swaps (Armenia, Kazakhstan) to maintain liquidity in the system. Additional capital was raised from existing and new private shareholders, while higher capital requirements triggered mergers and acquisitions in a few cases, and retained earnings also aided capital restoration.

Figure 9. Credit to the Private Sector, 2008-18
(Percent of GDP)



Sources: National authorities; and IMF staff calculations.

Stronger NPL resolution frameworks also played a role in restoring bank capital buffers.¹ Indeed, experience during 2014-17 suggests that in some cases, bank capitalization improved significantly due to a combination of increased profitability and lower NPL levels.²

Appropriate policy responses to shocks helped support the credit recovery (Figure 9). Credit growth rapidly increased in Armenia, Georgia, Kyrgyz Republic and Uzbekistan, buoying profitability after the losses from the previous shocks. Georgia and Armenia had strengthened corporate governance and underwriting standards by 2018, while Kazakhstan and the Kyrgyz Republic have introduced corporate governance regulations only more recently as part of transitions to more risk-based supervision. On the other hand, countries which did not strengthen financial sector policy frameworks, did not see a recovery.

Box 1. CCA Countries: Macro-Financial Measures Taken by Regional Central Banks

Central banks in the region have deployed monetary and financial policy to cushion the impact of the COVID-19 shock. Most central banks cut their policy rates and supplied additional liquidity into the banking system. Central banks also deployed many instruments to boost lending, including cutting the reserve requirement ratio, encouraging loan repayment moratoriums, introducing repo arrangements, providing liquidity support for lending and loan guarantees, and lowering the cost of re-financing. The Central Banks of Azerbaijan and Georgia opened a bilateral swap line with the European Bank for Reconstruction and Development. Central banks in the region have also loosened their macro-financial stance. They have relaxed counter-cyclical capital requirements (Azerbaijan, Kazakhstan) while also relaxing liquidity ratios (Kazakhstan, Kyrgyz Republic), capital adequacy requirements (Armenia, Azerbaijan, Kazakhstan), other macroprudential policies, and, in some countries, loan classification and provisioning rules (Kazakhstan, Kyrgyz Republic). These measures have managed to stifle negative macro-financial feedback loops and to avoid widespread bankruptcies that could have amplified the impact of the crisis.

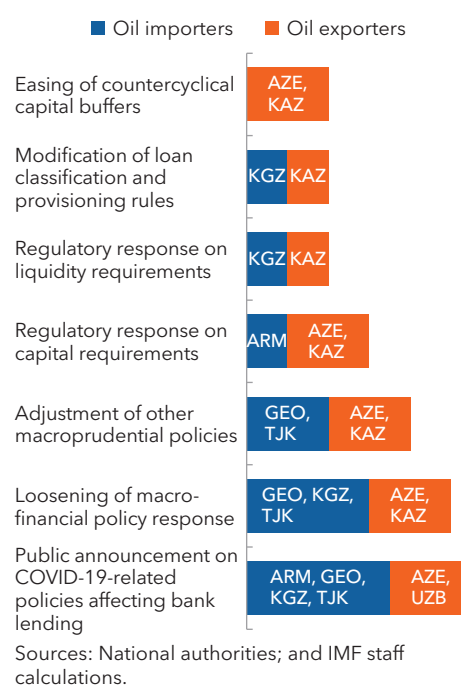
In 2021, while several CCA central banks reversed their monetary policy stance, financial sector support measures often remained in place. Several central banks increased their policy rate in 2021 to curb inflationary pressures, while others were expected to follow. At the same time, most supervisors did not phase out moratoria-related measures or government guarantees, while Armenia and Georgia planned to phase them out in 2021 and Azerbaijan reduced public guarantees. Supervisors

¹ Azerbaijan, Georgia, and Kazakhstan improved their Resolving Insolvency score by 22.4, 22.5, and 15.2 points, respectively, from their 2009 level. The Kyrgyz Republic tightened regulations on NPL definitions, provisioning, and restructuring. Armenia has barely made progress, while Tajikistan has regressed in this metric.

² All else equal, a 1 percentage point increase in ROE in one year increased regulatory capital ratio by 0.55 and the Tier 1 capital ratio by 0.3 in the following year. Similarly, a 1 percentage point decrease in NPLs improved next year's Tier 1 capital ratio by 0.22. Liquidity buffers in the region were restored through improvement in net interest margins.

Box 1. (continued)

did not reverse the relaxation of loan classification and provisioning rules, with the exception of the Kyrgyz Republic. Most supervisors exited from lower liquidity requirements, while maintaining lower capital requirements. Most countries in the region continued to restrict dividend payments in 2021, and authorities in the region also strengthened financial safety nets and contingency planning in case of a relapse of the pandemic.

Box Figure 1.1. Macro-Financial Responses to Coronavirus**Box 2. Georgia and Armenia: Policies Supporting Balance Sheet Recovery**

Georgian and Armenian banks managed to withstand the 2014–15 oil price shock without public support. Healthy liquidity and capital buffers made their banking systems resilient enough to withstand the shock, without any recourse to public support. NPLs in Georgia increased only marginally because of the banks' stringent lending standards, high profitability and proactive loan restructuring. Capital buffers in both countries were quickly rebuilt after the shock through additional capital and retained profits. At the same time, NPLs gradually declined in both countries as loans were restructured and/or restarted performing, or were written off in a timely way, supported by effective insolvency regimes (Box 3).

Bank capital in both countries was restored rapidly after the 2014–15 oil price shock. Bank profitability (ROE) improved immediately after the shock and remained relatively high thereafter, helping restore capital. Higher profits were driven by a combination of credit growth, loan restructuring and NPL write-offs. Raising banks' minimum capital requirements (to GEL50 million in 2017 up from the GEL12 million in 2014; and to AMD30 billion in effect in Jan-2017 from AMD5 billion in 2014) and introducing additional capital buffers also helped strengthen capitalization levels going forward. Furthermore, the two largest banks in Georgia (Bank of Georgia and TBC Bank) each bought smaller banks, and the license of a third bank was revoked. Higher capital requirements in Armenia also triggered mergers and acquisitions (M&As), with the number of commercial banks operating in Armenia shrinking from 21 to 17. While these M&As helped improve capital, their consequences on banking system concentration should still be carefully monitored.

Box 2. *(continued)*

Both countries strengthened their overall financial stability frameworks to supporting the buildup of buffers. The NBG and CBA introduced capital buffers for systemically important banks (D-SIB), capital conservation buffer (CCB), and the countercyclical capital buffer (CCyB). Furthermore, the NBG became the only central bank in the region to impose additional Pillar-2 capital requirements,¹ such as the unhedged Currency-Induced Credit Risk (CICR) buffer, the credit portfolio concentration buffer (CPCB), and the General Risk Assessment Program (GRAPE) buffer. The GRAPE guidelines integrate stress tests with Pillar-2 buffers under the Basel framework. The NBG also introduced Basel Pillar-3 disclosure requirements and gained oversight of credit information bureaus. The introduction of liquidity coverage ratios in Georgia, and deposit insurance in 2017-19 also helped strengthen banking sector resilience against liquidity risks. Armenia had established a deposit guarantee fund before the 2014-15 oil price shock, and the deposit insurance schemes in both Armenia and Georgia covered both local and FX deposits. In 2017, the CBA formally added to its mandate financial stability as a primary objective along with price stability, and the CBA continues to strengthen its risk-based tools in line with Basel III guidelines.

¹ Capital requirements under Pillar 2 covers buffers related to credit, liquidity, market, operating, business model, and profitability risks. They also consider the macroeconomic environment, group structure, and corporate governance.

5. Conclusions and Policy Recommendations

While CCA bank balance sheets have been resilient in the initial phase of the COVID crisis, risks will likely increase in the near term once public support is phased out. Stronger pre-pandemic bank buffers in the CCA than in other EMs and EMEU, along with decisive policy interventions, helped alleviate the economic and financial fallout of the pandemic in 2020. However, risks to financial stability will need to be carefully managed going forward, as prolonged reliance on emergency measures (borrower support, relaxed prudential requirements) may reduce transparency, undermine credit discipline and threaten future financial stability. In particular, it will be critical to have a well-communicated strategy to unwind policy support.¹

Previous sections have helped identify key pockets of vulnerability. Stress test analyses show that key vulnerabilities in the region relate to credit risk, especially indirect risk through FX exposures, and liquidity risk, including in foreign currency. CCA countries are thus vulnerable to sharp exchange rate depreciations, and shocks arising from higher leverage and rising delinquencies in the corporate and household sectors could erode banks' profitability and capitalization and affect their ability to lend.

A range of reforms should be considered to address these vulnerabilities and durably strengthen financial sector resilience and policy frameworks in CCA countries. Key objectives should be to both reduce risks of bank distress and ensure that they do not lead to costly public interventions, as they did in the past. The range of financial sector policies includes: (i) supervisory policies to help repair balance sheets and preserve or enhance bank resilience, (ii) bank restructuring and resolution policies, and private sector insolvency regimes to limit the impact of bank failures, (iii) macroprudential policy to shield against systemic shocks, and (iv) broader reforms to facilitate greater financial inclusion and the provision of safe and sustainable credit to the economy.

A. Supervisory Frameworks

Supervisory policy strategies should be guided by in-depth risk diagnostics, including based on stress tests. It is essential to accurately assess the sources and magnitude of potential losses in bank portfolios, and to focus limited supervisory resources accordingly. Therefore, banks should be required to maintain close monitoring and reporting on underlying asset quality, and loan classification and provisioning rules should be reestablished as soon as possible.²

- Credit risk: monitoring asset quality will be essential to deal with expected increases in delinquencies in the CCA region. Granular information and analysis (that is, NPLs by sector, large borrowers, and restructured loans) allow supervisors to accurately identify potential deterioration in asset quality and assess banks' capital plans on a forward-looking basis.³ Given the importance of indirect FX-related credit risk in dollarized CCA countries, supervisors should focus on FX exposure data, including how borrowers hedge such exposures. CCA experience also illustrates the potential benefits from limiting capital distributions (that is, dividend payouts, share buybacks, bonus payments) during crises.⁴

¹ Refer to MCM COVID-19 Special Note on this topic.

² For further guidance on regulatory/supervisory tools to deal with each of the risks below, see [Supervisory Actions and Priorities in Response to the COVID-19 Pandemic Crisis, 2020](#).

³ The Central Bank of Armenia, for example, incorporated loan-level data from credit registry into its stress testing exercise (<https://www.cba.am/en/SitePages/oecrintroduction.aspx>).

⁴ See [Restriction of Banks' Capital Distribution during the COVID-19 Pandemic](#). The National Bank of Georgia issued the statement indicating that banks shall not use the relief on capital requirements for dividends, share buybacks, equity investments, increasing variable remuneration for management or other types of distributions and payments, which causes reduction of bank capital (<https://www.nbg.gov.ge/index.php?m=340&newsid=3901>).

- Liquidity risk: frequently monitoring bank funding and liquidity positions is critical in CCA economies, especially in foreign currency. The use of liquidity buffers and other liquidity management tools should reflect market conditions and be based on forward-looking reporting—including Basel III liquidity ratios where they have been introduced (that is, Georgia, Kazakhstan).
- Market risk: in some CCA countries, exposures to government bonds and interest rate- or FX-linked instruments are significant. The value of such instruments can be volatile and impact bank capital in periods of market stress. Close monitoring of market illiquidity, volatility, and issuer or counterparty risk should help detect related changes to banks' risk profiles.

Lessons can be drawn from good practices in CCA countries in implementing risk-based supervision (RBS):

- Georgia pursued holistic reforms in recent years to strengthen prudential supervision and incorporate macroprudential priorities into it. In line with Basel III, the NBG imposed additional Pillar-2 capital requirements⁵ and introduced an LCR (2017) and an NSFR (2019). To remain ahead of the curve, the supervisor conducted frequent stress tests in 2020, which informed banks' loan loss provisioning and capital restoration plans.
- In Kazakhstan, following an AQR in 2019, a new regulatory agency introduced RBS in 2020, including the implementation of a supervisory review and evaluation process (SREP) model covering banks' financial sustainability, business models, corporate governance, capital risks, and liquidity risks.⁶ Going forward, the supervisor will conduct stress tests and AQRs regularly.
- In 2016, the National Bank of the Kyrgyz Republic (NBKR) developed a three-year Strategic Plan (2017–2019) to adopt RBS in line with relevant international standards, including amending the legal/regulatory frameworks and strengthening the bank risk assessment frameworks. The objective going forward is to fully implement Basel III standards, prepare and adopt ICAPP and SREP regulatory enhancements, and ensure that banks' capital reflects well their risk profile and business strategy.

B. Macroprudential Perspective

Macroprudential policy can have a key role in building up financial sector resilience in the CCA. Given that CCA countries are susceptible to large cycles and external shocks, credit and asset price booms and busts, and structural vulnerabilities, an enhanced role for macroprudential policies could support financial stability as they directly address those vulnerabilities (Khandelwal and others 2021). Macroprudential policy can also help reduce dollarization, complementing the role of macroeconomic stability, strong macroeconomic policy frameworks and exchange rate flexibility.

Most CCA countries have started to upgrade their macroprudential policy frameworks. Tools to build capital buffers and to contain the build-up of risks in specific sectors are relatively recent in the region, while tools to mitigate FX risks have been used for more than 10 years in many CCA countries. Further strengthening these tools may be needed. For example, Armenia plans to adopt a stressed loan-to-value limit to further de-dollarize its economy. Efforts to develop or deepen markets for domestic public debt would support use of local currency. In countries with more limited data and analytical capacity (Kyrgyz Republic, Tajikistan,

⁵ Capital requirements under Pillar 2 covers buffers related to credit, liquidity, market, operating, business model, and profitability risks. They also consider the macroeconomic environment, group structure, and corporate governance.

⁶ The AQR covered the 14 largest banks, accounting for 87 percent total banking assets, and identified a capital shortfall of about \$1 billion as of April 2019, concentrated in 4 banks. Measures taken by these banks reduced this amount by half, and it is expected that the rest will be covered by shareholders, with the benefit of state guarantees and, in the case of one bank, a loan from the central bank, in the context of well-defined capital improvement plans.

Turkmenistan, Uzbekistan), simple and rules-based tools can help increase the resilience of the financial system (IMF 2014). For countries with better data and deeper markets, such as Georgia, more sophisticated time-varying tools can be considered.⁷

C. Bank Resolution Frameworks and Insolvency Regimes

Stronger bank resolution frameworks and insolvency regimes are needed in CCA countries to reduce scarring risks from the COVID crisis, financial stability risks, and contingent public liabilities.⁸ Past experience with public bailouts of CCA banks illustrates the importance of strengthening financial sector safety nets in the region. While CCA bank resolution frameworks have improved in recent years, there is generally substantial room for further progress.

Swift and efficient NPL resolution is critical for balance sheet repair and to maximize value recovery. Reverting to precrisis NPL levels took many years in the CCA in the past, and the COVID pandemic is likely to leave behind large amounts of distressed assets in bank portfolios. Banks should be required to develop internal NPL management capabilities, plans, and tools, and to set ambitious operational targets to write-off problem loans. Based on international experience, successful postcrisis strategies often combine three Pillars: (1) bank recapitalization or restructuring; (2) strengthening insolvency legal frameworks⁹; and (3) moving NPLs off balance sheet through bilateral sales or Asset Management Companies.

D. Broader Structural Reforms

In the long term, safe and sustainable credit growth will require holistic reforms in the CCA region. In many CCA countries, reducing the role of the state in the financial sector (through ownership or credit subsidies and guarantees), promoting competitive banking systems, and entrenching market discipline and a “risk culture” are still priorities to reduce moral hazard and ensure that banks implement sound risk management practices. As noted above, state-owned banks in the region generally have higher NPLs and lower profitability. Strong institutions are equally important, including sound financial supervision and regulation, credit information availability, and strong legal frameworks to enforce collateral, lower the cost of credit, and make it more accessible.

Increasing financial inclusion, including for SMEs, remains a key policy priority in the region. CCA countries have one of the lowest level of SME access to credit in the world (about 7 percent of total bank lending—MCD DP 19/02). Scaling up access to finance for SMEs would bring large macroeconomic benefits and support long-term economic diversification and growth.

As in most countries, diversifying the sources of financing, including through capital market and fintech development, will be beneficial. Capital markets and fintech remain underdeveloped in the CCA. Armenia launched a medium-term capital market development strategy in July 2020, aiming to develop new markets and to establish proper regulatory frameworks.¹⁰ Accelerating fintech adoption could help increase access

⁷ NBG’s Financial Stability Department, created in 2017, developed a macro-financial model incorporating interlinkages between the real economy and financial sector to conduct macro-stress tests and support macroprudential policymaking. It publishes macroeconomic risk scenarios to assist financial institutions’ transition to IFRS 9 accounting rules, enabling forward-looking provisioning. Other macroprudential instruments were also introduced, such as the payment-to-income and loan-to-value ratios, to control credit growth.

⁸ See [IMF DP 20/05 Managing Systemic Banking Crises, 2020](#).

⁹ Special out-of-court restructuring could provide solutions for the case when a rise in insolvencies may overwhelm the capacity of the insolvency and debt enforcement system. Standardized restructuring solutions (Iceland, 2010-11) offer a simple, less-costly solution than a tailor-made restructuring plan (that is, for small businesses, predetermined solutions based on the value of the firm; for households, writing down mortgage loans to a percentage of the reassessed value of the property).

¹⁰ The capital market development plan lays out actions to deepen or kickstart various markets such as crowdfunding, equity financing, or government bonds.

Box 3. Georgia: Resolving Insolvency

Georgia has a strong and rapidly improving framework for resolving borrower insolvency. It has improved considerably from 2014 (indicated by recovery rates) and now ranks better than the EU & CCA average, as indicated by the World Bank Resolving Insolvency indicator. Its recovery time is two years, and the recovery rate is above 40 percent (against cost of 10 percent). Since 2018, with IMF technical assistance support, Georgia has also been revamping its insolvency law to bring it in line with international standards.

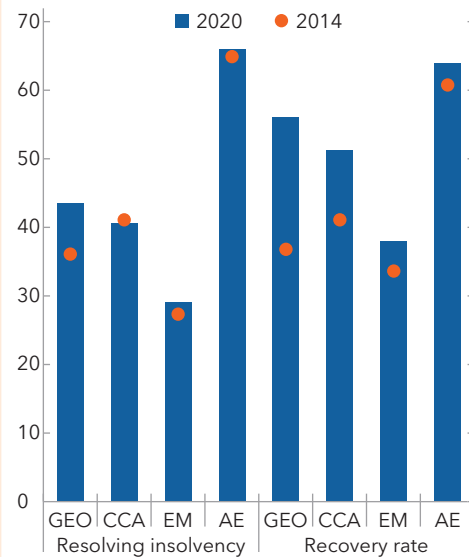
The previous 2007 Insolvency Law failed to meet international best practice. Previously, Georgia's Insolvency law was primarily oriented toward rapid liquidation of insolvent firms with subsequent distribution of remaining assets among creditors. Key shortcomings of the insolvency system included (1) inefficient and costly processes; (2) insufficient protection of creditors, including secured creditors; (3) lack of a proper rehabilitation framework; and (4) lack of tools for optimal debt restructuring and asset disposal. Stakeholders complained about inefficiencies and delays due to the lack of capacity and resources of the National Bureau of Enforcement (NBE), which was the only legal provider of insolvency services and charged high fees.

In 2018, Georgia started working on a new insolvency law to address these shortcomings. A key element of the reform was the transformation of the NBE into a purely supervisory agency, with its current managerial duties being assumed by a new class of insolvency professionals. The new law also provided for a new pre-insolvency framework intended to facilitate debt restructuring with limited court involvement. The new law stipulated that all creditors' rights in restructuring proceedings should be protected by the requirement of the "best interest of creditors' test" for dissenting creditors (that is, all creditors should receive at least what they would have received in a liquidation) and secured creditors should be allowed to vote on the restructuring plan where it affects their rights.

The rehabilitation framework was strengthened by providing clear and definite statutory remedies for the breach of procedural deadlines, as well as by added flexibility in the timeframe for approval of the plan and ensuring the availability of a wide range of restructuring tools (for example, debt-to-equity swaps and ability to decide on the executory contracts). Liquidation/bankruptcy processes allowed credit-bidding, secured creditor sale of its security under certain conditions and explicit capping of the level of administrative expense associated with asset sales.

In September 2020, the Parliament approved the new insolvency law and timely implementation of new law will be critical to deal with the aftermath of the COVID-19 shock. The law provides adequate protection of creditor rights, timely and efficient insolvency processes, and an effective rehabilitation framework in line with best international standards. This law will promote more efficient insolvency procedures, which would be critical if corporate insolvencies increase in the aftermath of the COVID-19 shock. To advance the reform, it will be important to implement the framework for insolvency professionals and begin licensing professionals.

Box Figure 3.1. Resolving Insolvency and Recovery Rate Scores
(Indices, 0–100 best)



Sources: World Bank; and IMF staff calculations.

to finance and reduce its cost. Fintech firms (for example, P2P lending and crowdfunding platforms) offer opportunities to mobilize private savings, attract investors, create digital trails of cashflow history and collateralization (including moveable assets), enhance credit risk assessment, improve regulatory (for example, AML/CFT) compliance, and develop new lending instruments tailored to SMEs' needs and risk profiles. However, this requires upgraded regulatory frameworks to limit risks to financial stability and integrity and to consumer protection ([MCM DP 20/09](#)).

Appendix 1. Methodology and Assumptions for Stress Tests

Stress tests were conducted using simplified balance sheet and income statement data of banks in the region. We obtained simplified bank-level balance sheet and income statement data from authorities for 6 CCA countries including Armenia, Azerbaijan, Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan. In the stress test analysis, we shock certain components of the balance sheet or income statement and assess the impact on the relevant financial stability indicators. The NPL empirical models were estimated using annual bank-level data from FitchConnect (Azerbaijan, Kazakhstan), or data from the authorities (Armenia, Kyrgyz Republic, Tajikistan, Uzbekistan).

Two macroeconomic scenarios were applied to each country (Annex Table 1.1), that is, the December 2020 baseline scenario and a more adverse scenario which simulates a sharp recession and a V-shaped recovery, which could expose hidden vulnerabilities and risks that might emerge if the unwinding of policy interventions is premature.

- a. In the baseline scenario, real GDP falls sharply in 2020 and rebounds strongly in 2021, as projected in the December 2020 WEO, and very similar to the actual outcome. Exchange rate depreciation is large in most CCA countries in 2020, reflecting weaker exports due to the pandemic and regional conflict, and are expected to depreciate by less in 2021. Inflation rates are driven by changes in growth and exchange rates (with pass-through to inflation assumed to be about 35 percent across countries). Interest rates are assumed to increase to mitigate inflationary and depreciation pressures, and to deepen the impact on NPLs. Remittances fall in 2020, but they are expected to rebound in 2021 in line with the recovery in Russia, where most of remittances originate from.
- b. In the adverse scenario, the decline in real GDP is slightly larger than in the baseline scenario (2 SD from the mean for most countries), but real GDP is assumed to recover in a V-shape in 2021 similar to the baseline scenario. In addition, with the sharper recession, the exchange rate depreciation is higher. While policy interventions have absorbed the severity of the impacts on banking systems, consideration of such an adverse scenario (irrespective of the timing of the scenario) is relevant to identify pockets of vulnerabilities and hidden risks, especially from the unwinding of policy interventions.
- c. Scenarios of a U or L-shaped recoveries have not been considered systematically, given the still high uncertainty surrounding potential assumptions on growth paths.

To estimate the potential impact of macroeconomic scenarios on bank solvency, we employ an NPL empirical model, with some slight differences among countries.¹¹ These quantify the effect of the macroeconomic shocks on bank CARs by modelling NPLs. Lending is the core of the banking business in the CCA countries, and loan losses are the key risk to banks' profitability and capital. We estimate credit risk of each country by modelling its NPLs with its key macroeconomic indicators. This approach involves three steps: (1) estimating the elasticities between NPLs and macroeconomic indicators using a dynamic panel model with bank-specific fixed effects; (2) using the elasticities to calculate the implied change in NPLs consistent with the macroeconomic scenarios (see below); and finally (3) estimating the amount of loan loss provisions resulting from the change in NPLs. With banks' pre-impairment net income assumed to be zero, any additional loan

¹¹ These differences also reflect availability of bank-level or sectoral NPL data.

Annex Table 1.1. Macroeconomic Assumptions

	Baseline			Adverse	
	2019	2020	2021	2020	2021
Oil Importers					
Armenia					
Real GDP growth	7.6	-7.3	-12.0	-12.0	-1.0
Inflation	1.4	1.0	0.0	0.0	1.5
Real lending rate	13.4	12.7	12.6	12.6	13.9
ER change	3.5	-6.2	-15.2	-15.2	-5.8
Remittances change	2.7	-8.0	-20.0	-20.0	-10.0
Kyrgyz Republic					
Non-gold real GDP growth	3.8	-8.7	6.5	-12.9	2.3
Inflation	3.1	7.5	5.3	8.3	8.1
Real lending rate	11.8	10.3	12.1	9.2	11.7
ER change	0.3	-22.1	-5.0	-30.2	-12.9
Remittances change	-10.4	-1.4	5.1	-15.0	2.0
Tajikistan					
Real GDP growth	7.5	1.0	6.0	-4.0	1.0
Inflation	7.8	8.1	7.0	9.0	10.5
Real lending rate	15.9	18.9	15.5	17.3	16.6
ER change	-9.5	-10.3	-11.0	-11.2	-13.1
Remittances change	6.3	-11.5	2.4	-14.0	0.5
Oil Exporters					
Azerbaijan					
Real GDP growth	2.2	-4	2	-5.3	0.7
Inflation	...	...	...	...	...
Real lending rate	14.3	13.8	13.7	13.8	13.7
ER change	-1.7	-1.7	-1.7	-1.7	-1.7
Kazakhstan					
Real GDP growth	5.7	-2.8	3.3	-6.0	2.0
Inflation	5.4	7.5	5.9	9.0	7.7
Real lending rate	9.4	8.7	9.7	8.2	9.9
ER change	-5.0	-13.5	0.0	-19.6	-2.4
Remittances change	...	...	...	...	...
Uzbekistan					
Real GDP growth	5.6	0.7	5.0	-3.3	1.0
Inflation	14.5	12.9	10.5	18.9	16.5
Real lending rate	8.9	9.5	9.9	8.1	9.1
ER change	-8.7	-12.1	-8.1	-17.6	-14.1
Remittance Change	29.6	-6.8	-5.0	-15.0	-9.0

Sources: IMF, *World Economic Outlook*; and IMF staff calculations.

loss provisions are directly drawn from the CAR.¹² While the COVID shock will be more pronounced for some sectors (that is, trade, services, tourism, transport), and the increase in NPLs will be higher for those sectors, limited data precludes a deeper analysis into this issue.

The dynamic panel for NPLs is specified as follows:

$$\text{LNPL}_{i,t} = \mu_i + \alpha \cdot \text{LNPL}_{i,t-1} + \beta_1 \cdot g_t + \gamma_1 \cdot r_t + \gamma_2 \cdot \text{infl}_t + \gamma_3 \cdot \text{DEP}_t + \gamma_4 \cdot \text{REMIT}_t + e_{i,t}^j$$

where indices i and j denotes banks, and time, respectively. LNPL denotes the logistic transformation of NPLs ratio ($\text{LNPL} = \ln\left(\frac{\text{NPL}}{1 - \text{NPL}}\right)$).¹³ The regressions are estimated separately for each country to capture heterogeneity. The regressors include bank fixed effects (μ_i), lagged NPL, and macroeconomic variables including real GDP growth (g_t), inflation (infl_t), interest rate (r_t), percentage changes in bilateral exchange rates (DEP_t - NEER or Spot rate in USD), and percentage changes in remittances (REMIT_t). We projected NPLs in 2020 using the most up-to-dated regressor data of each country as follows.

$$\text{NPL}_t^{\text{stress}} = \left(\frac{\text{NPL}_{t-1}^{\text{initial}}}{1 - \text{NPL}_{t-1}^{\text{initial}}} \right) \exp\{\beta \Delta X_t\} / \left[1 + \left(\frac{\text{NPL}_{t-1}^{\text{initial}}}{1 - \text{NPL}_{t-1}^{\text{initial}}} \right) \exp\{\beta \Delta X_t\} \right]$$

where X_t is the vector of macroeconomic factors used and β is the vector of coefficients (from the credit risk model). ΔX_t represents the change in the levels of macro variables. Standard errors are computed using Heteroskedasticity-consistent Robust standard errors. The table below presents country-specific estimated coefficients that are included to predict NPLs, regardless of their statistical significance. To estimate NPLs in 2021, we update the initial NPLs to be 2020 projected NPLs. The coefficient can be interpreted as follows: holding all other variables constant, the odd of loans becoming non-performing changes by $100 \times (\exp\{\beta\} - 1)$, for a one-unit increase in an independent variable.¹⁴

NPLs are very persistent across CCA regions, but their determinants vary across countries. Past NPLs are the most statistically significant determinant of current NPLs in the region with estimated logit loadings ranging from 0.3 to 0.8. Among all macroeconomic variables, growth is a statistically significant determinant of NPLs (correlating negatively) in all countries, although its elasticity varies. Lower growth of 1 percentage point raises the ratio (logarithmic scale) of NPLs by 0.015 in Uzbekistan to 0.097 in Azerbaijan.¹⁵ For CCA OI countries, remittances are also a statistically significant driver of NPLs; lower remittances of 1 percentage point increase the ratio (logarithmic scale) of NPLs by 0.002 to 0.01. Statistical significance of loadings on other macro variables are mixed.

Annex Figure 1.1 provides details on how NPLs are mapped to CARs in the top-down approach. The projected stock of NPLs is proportionally translated into three asset categories (substandard, doubtful, and loss loans), each of which has its own provisioning rate. After adding up the provision amount, the new capital equals existing capital less additional provisions needed. The capital adequacy ratio is the new capital divided by risk-weighted assets.

Some caveats of the credit risk analysis include a top-down approach, and the use of aggregate data in a few countries in the region. A top-down approach ensures uniformity in methodology and consistency of assumptions across institutions and full understanding of the details and limitations of the model used. While this approach is broadly in line with stress testing in some IMF FSAPs and by some CCA national

¹² Where the NPL responsiveness is low, loan loss provisions capture the impact of the cycle in many CCA countries, therefore, indirectly affecting CARs through profits. Provisions have started to increase in some countries, reflecting an expected increase in borrowers' probability of default.

¹³ The authors' specification is similar to other Credit Risk Satellite Models in FSAPs. They allowed for non-unit roots.

¹⁴ The mapping between changes in log-transformed variable or changes in odd to changes in probability is not straightforward. The odd and probability have the following relationship: $\text{probability} = \left(\frac{\exp\{\text{odd}\}}{1 + \exp\{\text{odd}\}} \right)$

¹⁵ Because of small loading on macroeconomic variables, the authors estimated partial univariate elasticity for Armenia under stress episodes (GFC and Oil Price Shock) to perform stress.

Annex Table 1.2. NPL Logistic Regression Results for Credit Risks

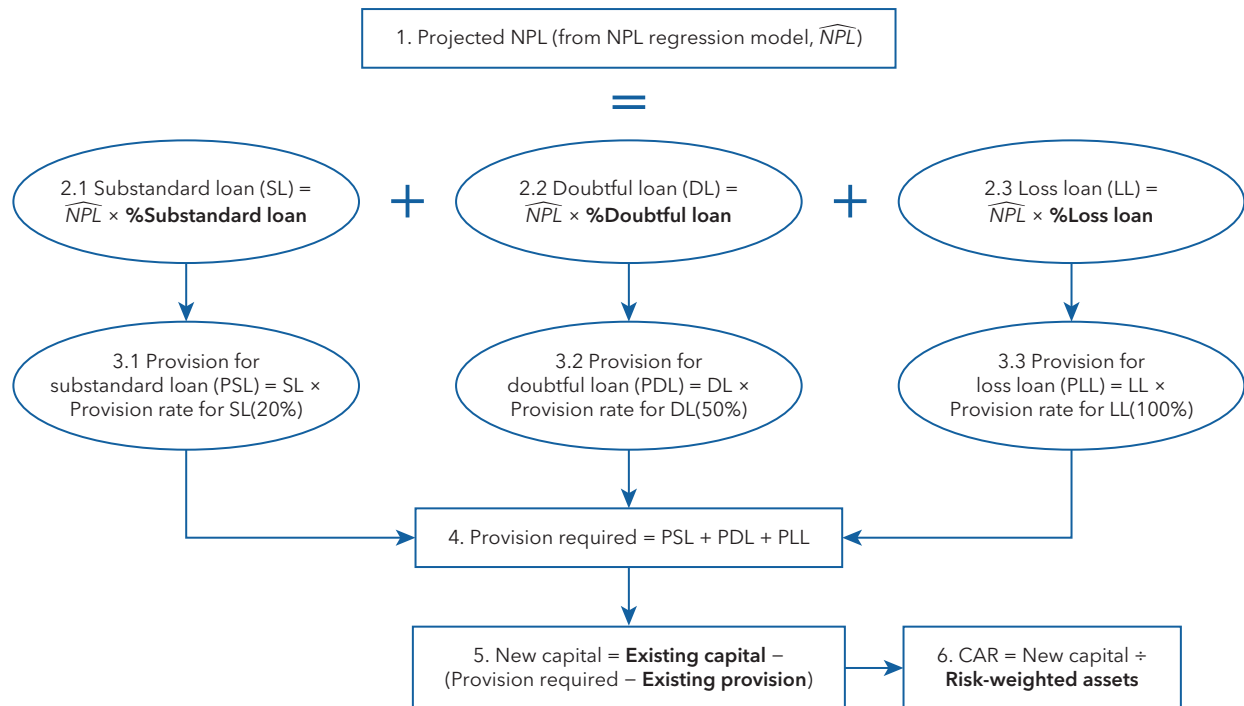
Countries Dependent Variable:	CCA OI				CCA OE		
	Armenia Logit(NPL)	Armenia (Partial Univariate) Logit(NPL)	Kyrgyz Republic Logit(NPL)	Tajikistan Logit(NPL)	Azerbaijan Change in logit(NPL)	Kazakhstan Logit(NPL)	Uzbekistan Logit(NPL)
Logit NPL _{t-1}	0.803*** (12.33)	0.669** (3.98)	0.588*** (6.88)	0.35 (1.52)		0.62*** (10.81)	0.338*** (4.78)
GDP growth (%y-o-y)	-0.008** (-2.39)	-0.031*** (-9.16)	-0.084*** (-2.7)		-0.097*** (-2.4)		
GDP growth _{t-1} (%y-o-y)				-0.058 (-0.8)		-0.058*** (2.58)	-0.015 (-0.28)
Inflation (% y-o-y)	-0.011 (-1.44)	-0.125** (-5.08)	0.018* (1.92)				0.034 (1.61)
Inflation _{t-1} (% y-o-y)				0.128** (2.19)		0.043*** (2.45)	
Exchange Rate (% y-o-y)	0 (-0.14)	-0.136* (-2.86)	0.003 (0.41)		0.136 (0.15)	0.006*** (2.52)	0.001 (0.48)
Exchange Rate _{t-1} (% y-o-y)				0.045 (1.77)			
Interest Rate on Loan (%)	0.003 (0.26)	0.422** (4.73)	0.003 (0.34)	0.0011** (2.1)	0.133** (2.18)	0.06*** (2.58)	0.021 (0.88)
Remittance (% y-o-y)	-0.002*** (-3.28)	0 (0.15)		-0.01*** (-2.47)			
Remittance _{t-1} (% y-o-y)			-0.006** (-2.02)				-0.01 (-1.71)
Unit of analysis	Country x Quarter	Country x Quarter	Bank x Year	Country x Year	Bank x Year	Bank x Year	Bank x Year
Fixed effect	No	No	Bank	No	Bank	Bank	Bank
Observations	73	8	247	13	182	349	322
R-squared	0.839	N/A	0.74	0.8747	0.121	0.74	0.51
RMSE	0.183		0.799	0.639	1.33	1.024	1.105

Source: IMF staff calculations.

Note: y-o-y = year-over-year.

t statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Annex Figure 1.1. Diagram Mapping NPLs to CARs

Source: IMF staff calculations.

Note: Bolded texts indicate information from bank's balance sheet.

authorities, using a common approach across all countries may obviate some important country- or individual bank-specific factors. For Armenia, the NPL model is estimated at an aggregate level due to better coverage of quarterly aggregate NPL data. For Tajikistan, the model is estimated at an aggregate level due to the lack of historical NPL data bank-by-bank. Due to forecast uncertainty, the credit stress test was conducted up to 2021, but assessing full credit losses stemming from the COVID-19 crisis may require evaluation horizons longer than that. The NPL model may be subject to structural breaks. The relationship between NPLs and growth may deviate from its historical pattern, in case large shocks hit the economy or new policy measures are implemented.

Stress tests are further assessing foreign exchange risk, given still high levels of dollarization and significant FX depreciation pressures from the COVID shock across the region. We evaluate resilience of banking systems to a direct solvency risk, resulting from banks' net open positions in foreign currency and those in local currency that are indexed to exchange rates; an indirect solvency risk, resulting from the impact of foreign exchange positions taken by borrowers on their creditworthiness and ability to repay, and thereby on financial institutions; and a foreign exchange liquidity risk, resulting from liquidity mismatches in foreign currency. The shock scenarios use more adverse assumptions on exchange rate depreciation compared to those employed in the NPL model, including depreciations as large as those experienced during the 2014-15 oil price shock, as well as a 2 standard deviations FX shock over the last 15 years. Furthermore, the indirect FX risk is assessed by assuming higher elasticities of NPLs to exchange rate shocks (that is, half or more FX loans become NPLs) than what the NPL model implies, and thus results will imply different impact on NPLs and CARs relative to the historical behavior.

The impact of a confidence crisis is further assessed through funding and market liquidity risk scenarios. The liquidity risk scenarios chosen can also be viewed as reverse stress tests, where tests are used to determine a set of scenarios that would cause an increasing part of the system to run short of liquidity.

Scenario 1: Liquidity stress tests assume withdrawal of domestic demand deposits and other liabilities is assumed to be 15 and 10 percent per month respectively. This shock is at the lower bound of the magnitude of deposit runs assumed in IMF FSAPs.¹⁶ It can be viewed as domestic vulnerabilities that could materialize within each country.

Scenario 2: We further assess the foreign exchange liquidity risk by assuming 25 percent run-off rates on FX deposits, and 35 percent run-off rates on other FX liabilities (for example, foreign credit lines). This shock is in line with historical episodes in the region (that is, Kyrgyz Republic had a deposit run of about 36 percent in April 2010, which included large non-resident corporate dollar withdrawals). However, due to data limitations on the maturity structure of assets and liabilities, this latter exercise does not capture maturity mismatches in U.S. dollar positions (which are presumably higher than in domestic currency positions, in particular in the short term).

Interest rate risks from repricing of sovereign bonds are further assessed in Armenia, Kazakhstan, and Kyrgyz Republic. Interest rates are assumed to increase by 2 and 5 percentage points, respectively, similar to what some countries such as Armenia and Kazakhstan experienced during the 2014-15 shock. The total government bond portfolio of each bank is assessed for repricing impacts. Losses will be made from repricing of sovereign bonds in case those government bonds are sold and marked to market. Due to lack of supervisory data, interest rate risk analysis was not undertaken for the other CCA countries.

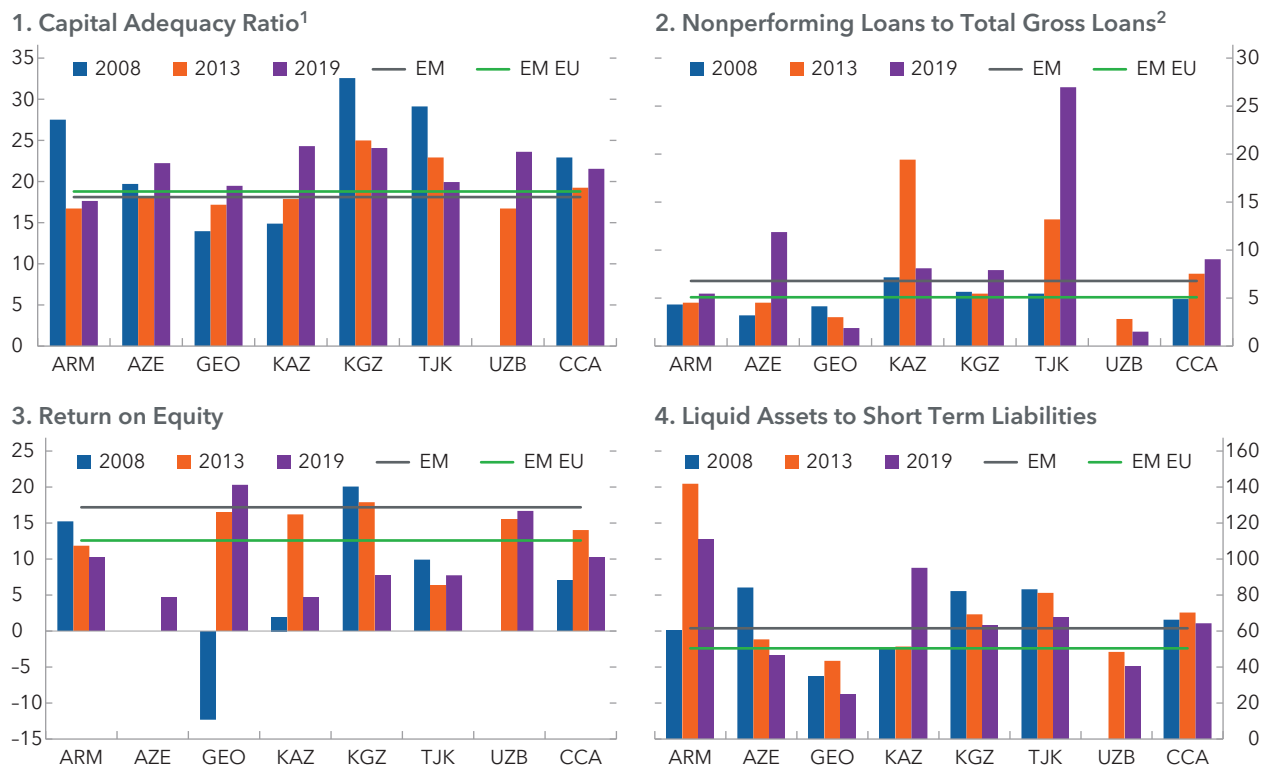
Stress test results need to be interpreted carefully as certain risk factors could not be quantified and taken into account. In particular, the stress tests did not incorporate risks from domestic and cross-border interbank linkages, due to lack of data. Also, they did not factor in extraordinary policy measures implemented during COVID-19 crisis (although the above analyses discuss some likely effects of these measures), which may delay or in part smooth out some of the impact of the COVID crisis on banking systems.

¹⁶ IMF FSAPs often assume a run-off rate of 10-50 percent (up to 80 percent for nonresident deposits).

Annex 2. Pre-COVID Financial Soundness Indicators

While pre-COVID banking soundness indicators were stronger than in 2014–15, high legacy NPL levels continued to weigh on CCA banking systems (Annex Figures 2.1 and 2.2). Private equity raising and increased profitability helped banks strengthen capital and liquidity buffers prior to the COVID shock. Their CARs ranged from 17 to 24 percent, exceeding regulatory requirements in each country and in other EM or EMEU economies. Liquid assets to short-term liabilities also exceeded those in comparator economies. Yet, NPL ratios were still at least twice the level in the average EM, and profitability indicators were still lower than in the average EM or EMEU economy.

Annex Figure 2.1. CCA Countries: Selected Financial Stability Indicators prior to Stress Episodes (Percent)



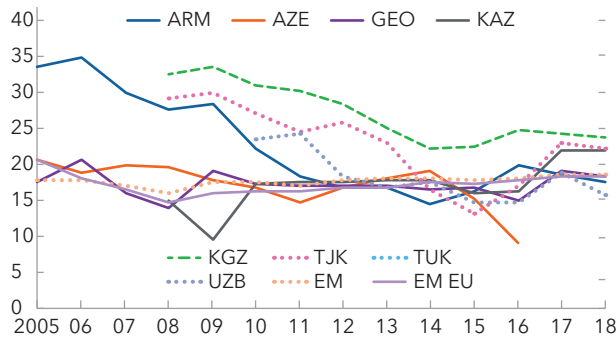
Sources: IMF Financial Soundness Indicators database; and IMF staff calculations.

¹Total regulatory capital to risk-weighted assets.

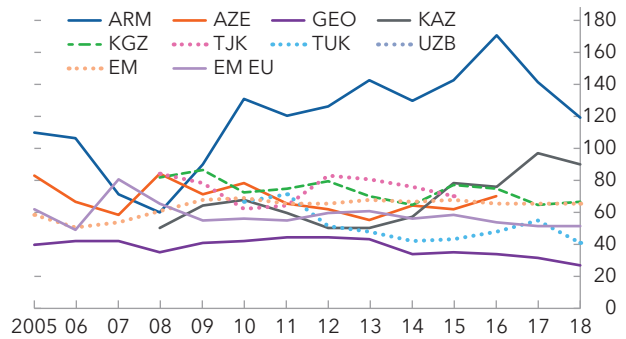
²NPL is defined as the amount of loans overdue for a certain period (typically, 30–90 days, depending on the type of loans). NPL definitions, however, are different across countries and therefore they are not directly comparable.

Annex Figure 2.2. Banks' Fundamentals (Capital, Liquidity, Profitability) and Financial Conditions in CCA Countries

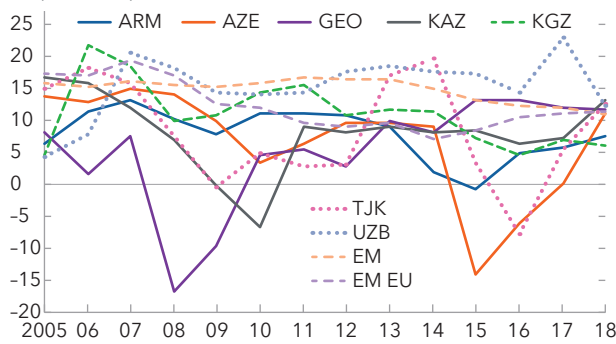
1. Capital Adequacy Ratio (Percent)



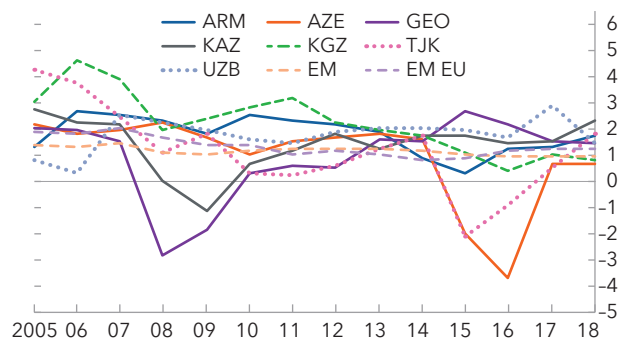
2. Liquid Assets to Short-term Liabilities (Percent)



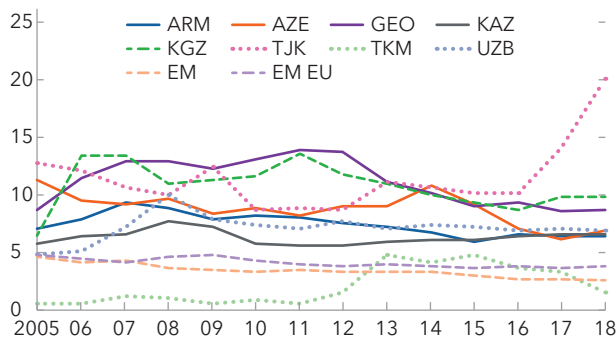
3. Return on Equity (Percent)



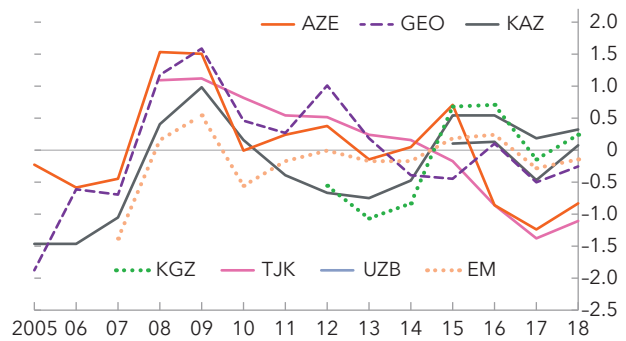
4. Return on Assets (Percent)



5. Net Interest Margin, 2005-18 (Percent)



6. Financial Conditions Indices (Standard deviations from mean)



Sources: Authorities; and IMF staff calculations.

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