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Reducing Dollarization in the Caucasus and Central Asia

What Could Help Make Further Progress

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Sharashidze, Nathalie Reyes

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WORKING PAPER

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Middle East and Central Asia Department

**Reducing Dollarization in the Caucasus and Central Asia
What Could Help Make Further Progress**

Prepared by Selim Cakir, Maria Atamanchuk, Mazin Al Riyami, Nia Sharashidze, Nathalie Reyes.

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ABSTRACT: Declining but still high dollarization rates in the Caucasus and Central Asia (CCA) region affect macroeconomic stability, monetary policy transmission, and financial sector development. Although several studies have investigated the dynamics of dollarization in the CCA, the relative roles of macrofinancial policies and financial market development in the de-dollarization process have not yet been assessed empirically. This paper takes stock of de-dollarization efforts and explores the short-term drivers of financial de-dollarization in the CCA region. It highlights that there remains significant scope to further reduce dollarization through continued progress in strengthening macroeconomic policy frameworks and in developing markets and institutions.

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|-----------------------------|---|
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WORKING PAPERS

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¹ We are grateful for insightful comments and suggestions from Nicolas Blancher.

Contents

| | |
|--|-----------|
| Introduction | 6 |
| Stylized facts | 8 |
| De-dollarization policies in the region | 15 |
| Empirical Approach | 16 |
| Methodology | 16 |
| Impulse Responses | 18 |
| Forecast Error Variance Decomposition..... | 23 |
| Conclusion | 26 |
| References | 28 |
| Annex I. Surveys | 31 |
| Annex II. Impulse Response Functions | 33 |
| BOXES | |
| Box 1. What is a Natural Level of Dollarization? | 10 |
| FIGURES | |
| Figure 1. Dollarization of Deposits and Credits in the CCA | 8 |
| Figure 2. Dollarization of Deposits and Credits in other EMDEs | 9 |
| Figure 3. Change in Dollarization 2010-2021 (At Constant Exchange Rates) | 10 |
| Figure 4. Gross FX Debt and NIIP | 11 |
| Figure 5. Financial Depth and Dollarization | 12 |
| Figure 6. Evolution of the REER and Dollarization | 14 |
| Figure 7. Survey of De-dollarization Measures | 15 |
| Figure 8. Response of Deposit Dollarization to a Shock to Differential Reserve Requirement | 19 |
| Figure 9. Response of Credit Dollarization to a Shock to Differential Reserve Requirement | 20 |
| Figure 10. Response of Credit Dollarization to Introduction of Prudential Measures | 21 |
| Figure 11. Response of Deposit Dollarization to an Exchange Rate Shock | 22 |
| Figure 12. Response of Deposit Dollarization to Shock to Spread Between Local and Foreign Currency | 23 |
| Figure A1a. Response of Deposit Dollarization to a Shock to Differential Reserve Requirement | 33 |
| Figure A1b. Response of Credit Dollarization to a Shock to Differential Reserve Requirement | 33 |
| Figure A1c. Response of Deposit Dollarization to a Shock to Introduction of Various Prudential Measures (Captured by a Dummy in the Analysis) | 34 |

| | |
|--|----|
| Figure A1d. Response of Credit Dollarization to a Shock to Introduction of Various Prudential Measures (Captured by a Dummy in the Analysis) | 34 |
| Figure A1e. Response of Credit Dollarization to an Exchange Rate Shock | 35 |
| Figure A1f. Response of Deposit Dollarization to Issuance of Local Currency Long-term Bonds | 35 |
| Figure A1g. Response of Credit Dollarization to Issuance of Local Currency Long-term Bonds | 36 |
| Figure A1h. Responses of financial dollarization to change in spread between local and foreign currency deposit rates | 36 |
| Figure A1i. Response of Deposit Dollarization to an Exchange Rate Volatility Shock | 37 |
| Figure A1j. Response of Credit Dollarization to an Exchange Rate Volatility Shock | 37 |
| Figure A1k. Response of Credit Dollarization to a Shock in Deposit Dollarization | 38 |

TABLES

| | |
|---|----|
| Table 1: Definition of Variables in VAR | 18 |
| Table 2. Variance Decomposition of Changes in Deposit Dollarization | 24 |
| Table 3. Variance Decomposition of Changes in Credit Dollarization | 25 |
| Table A1. Qualitative Survey | 31 |
| Table A2. Quantitative Data | 32 |

Introduction

Dollarization often has roots in weak economic fundamentals. Dollarization is defined as the use of foreign currency as a unit of account, medium of exchange, and store of value. Weak economic fundamentals, high and volatile inflation, nominal exchange rate volatility, and weak monetary policy framework are among the reasons that cause high levels of dollarization. On the other hand, dollarization weakens monetary policy's effectiveness and undermines the monetary policy framework, creating a vicious cycle. Many countries are searching for ways to reduce dollarization and learn from successful country examples. The literature suggests that dollarization is often a reflection of past severe economic and political turmoil and a reaction to macroeconomic instability. Investors try to minimize the variance of expected returns, which depend on the volatility of inflation and the real exchange rate (Yeyati, 2006).

Dollarization can pose major challenges for policymakers. The high level of dollarization raises questions concerning the design, implementation, and effectiveness of monetary, fiscal, and exchange rate policies. The interest rate channel becomes ineffective when most intermediation is in dollars and exchange rate pass through to inflation increases (Ize and Yeyati, 2005). Dollarization reduces the monetary authorities' control over domestic liquidity both by increasing the component over which little direct influence can be exerted and by rendering money demand less stable (Berg and Borenzstein, 2000). It increases the vulnerability of financial systems to solvency and liquidity risks as dollarization affects the capacity of the central banks to act as a lender of last resort, and currency mismatches in the corporate sector could lead to a rise in non-performing loans (Gulde, Hoelscher, et al., 2004). In addition, dollarization exposes the balance sheets of the public sector to exchange rate risks. Balance sheet mismatches in highly dollarized economies tend to make countries less tolerant to large exchange rate fluctuations because of its contractionary impact on aggregate output, hence the "fear of floating" (Calvo and Reinhart, 2002). Dollarization displays irreversibility (hysteresis), meaning, dollarization ratios do not decline even after the local currencies have been successfully stabilized and financial markets have deepened due to switching costs and long-lasting memories (Ize and Yeyati, 1998).

Existing studies show that monetary policy and exchange rate credibility are essential to reduce dollarization (Yeyati, 2006) and dollarization is associated with weak economic institutions (De Nicola et al. 2005). Reinhart, Rogoff and Savastano (2003) argue that market based successful de-dollarization experiences followed successful disinflation programs and in countries where domestic financial system offered assets with alternative forms of indexation (Israel) or very high real interest rates (Poland). Non-market based de-dollarization i.e. forced conversions failed to reduce dollarization on a sustained basis in several Latin American countries in the 1980's. Successful market-friendly de-dollarization processes in 2000s in Bolivia, Paraguay, Peru and Uruguay were supported by the appreciation trend for deposit de-dollarization. In addition, active management of reserve requirement differentials and other prudential measures, extension of domestic yield curve and deposit de-dollarization facilitated credit de-dollarization in these countries (García-Escribano and Sosa, 2010). Yeyati (2021) points out that the countries that formulated a comprehensive agenda of de-dollarization policies have managed, to varying degrees, to attack the phenomenon successfully. These policies include macroeconomic measures (such as inflation targeting without exchange rate anchors or fiscal dominance of the central bank), microeconomic measures (such as differential reserves requirements, limits on dollar lending, or the development of competitive savings instruments in pesos), and sand-on-the-wheels

measures to discourage real dollarization (such as legal tender restrictions, mandatory price denomination in the local currency, or the widening of the dollar purchase and sale spread).

The CCA region has a high level of dollarization, although it has been declining rapidly over the past few years on account of prudent macroeconomic policies. Dollarization in the region, stems from a history of extreme instability, hyperinflation, and large exchange rate depreciation, mostly in the nineties, leading households to prefer holding dollars as a safe store of value. Ben Naceur et al (2015) find that foreign exchange (FX) deposits and loans in the CCA are mainly driven by volatile inflation and exchange rates, low financial depth, and asymmetric exchange rate policies biased toward depreciation. The countries in the region have come a long way in achieving macroeconomic stability over the last decade. This progress is owed to the respective central banks and governments who have demonstrated the ability to maintain fiscal discipline and continue the reforms that are transforming their economies.

This paper takes stock of dollarization levels and de-dollarization policies in the CCA region. We conducted a qualitative survey with country teams about macroprudential and administrative measures to reduce dollarization in the region. Most countries in the region have an official de-dollarization policy in place. All countries apply higher reserve requirement ratios and additional capital requirements for FX denominated liabilities vs domestic currency liabilities. All countries have introduced macroprudential and administrative measures to reflect better and evaluate the risks associated with foreign currency assets. An outright ban on FX lending to certain segments, such as mortgages, is observed in different forms in several countries whereas Georgia introduced a floor on FX loans. Measures such as differentiated loan-to-value and payment-to-income ratios are less common and more recent.

Following the introduction of open foreign exchange position limits, the gap between loan and deposit dollarization has declined considerably since 2010. In Kazakhstan, Azerbaijan, and Georgia credit dollarization has declined significantly more than deposit dollarization partly as a result of administrative measures. Countries in the region have made important progress in developing their capital markets over the last decade. All the countries in the region issue long-term government securities in local currency, Uzbekistan being the latest one. Still, local currency debt accounts for a small share of total public debt in the region. Similarly, negative net international investment position in several countries in the region remain above 70 percent of GDP, exacerbating the contractionary impact of foreign exchange depreciations through balance-sheet impact.

At the empirical level, the absence of data on the stock of foreign currency circulating in the economy has emerged as a serious hindrance. Consequently, most of the time, empirical studies can only investigate the importance of dollarization (foreign currency as a store of value- so called financial dollarization) but not necessarily currency substitution (foreign currency as a medium of exchange). This paper is no exception and attempts to analyze the drivers of financial dollarization defined as the ratio of foreign exchange deposits and loans to total deposits and loans.

The empirical analysis in this paper explores short-term drivers of financial de-dollarization in the CCA. A standard recursive VAR is used to examine the role of different factors such as macro-variables, prudential measures, and the development of financial capital markets on both credit and deposit de-dollarization in the CCA. We employ innovation accounting techniques, i.e., impulse response functions and forecast error variance decompositions, to identify the dynamic responses of changes in deposit and credit dollarization to

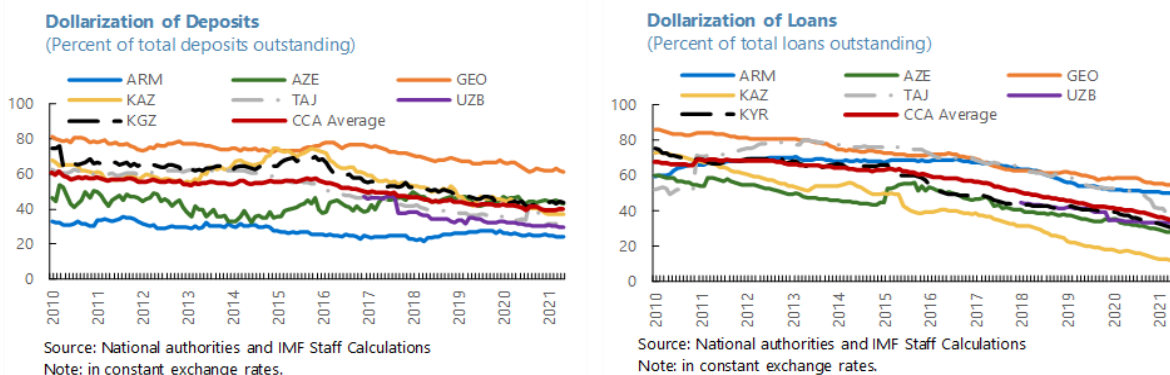
various shocks and quantify the relative importance of each shock in financial dollarization levels. Our results suggest that (i) increasing the spread between reserve requirement ratios on foreign currency and local currency have contributed to deposit and credit de-dollarization in several countries; (ii) various prudential measures have contributed to deposit de-dollarization in several countries (iii) deposit dollarization increases in some countries in response to a shock change in the spread between local and foreign currency (iv) the impact of an exchange rate appreciation shock on deposit de-dollarization is immediate and significant in some countries; (v) countries' concerted efforts to extend the yield curve and develop the domestic debt market have not been associated with sufficient results in de-dollarization; (vi) the effects of exchange rate volatility and inflation on financial dollarization are mixed; and (vii) deposit dollarization is driving credit dollarization.

The structure of the paper is as following. Section II presents the stylized facts. Section III documents survey results regarding the authorities' de-dollarization policies. Section IV describes the empirical approach and contains results. Section V concludes.

Stylized facts

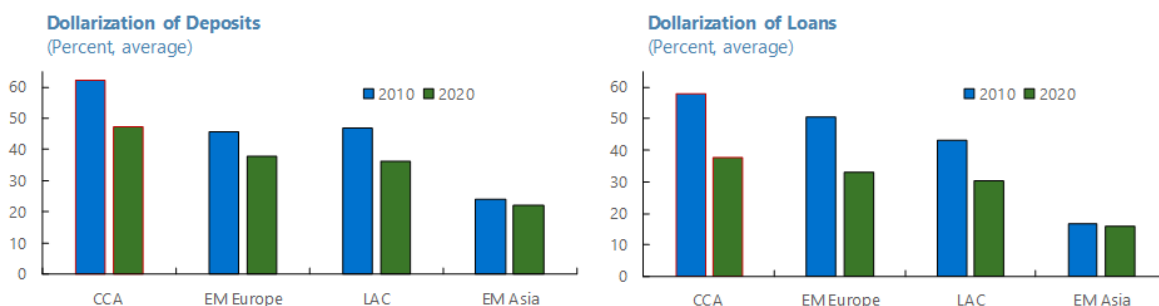
The CCA region historically had a high level of dollarization but has been declining over the last decade. Prudent macroeconomic policies, de-dollarization policies, macroprudential measures, and switch to floating exchange rate regimes contributed to this gradual decline. The share of FX deposits in total deposits was on average 60 percent (measured at the constant exchange rate) across the CCA a decade ago and deposit dollarization rates varied significantly among countries, from 32 percent in Armenia to above 80 percent in Georgia. Deposit dollarization in the region declined to 40 percent in 2021. De-dollarization of deposits gained pace in Kazakhstan and Kyrgyz Republic following exchange rate adjustments after the 2014 economic crisis. Georgia still has the highest dollarization rate in the region at above 60 percent. Credit de-dollarization in the region has been even more pronounced. The share of FX loans in total loans has declined from 67 percent in 2010 to 34 percent in 2021. Kazakhstan stands out with the fastest rate of credit de-dollarization from 73 percent of all credit in 2010 to 13 percent in 2021. Figure 1 shows the de-dollarization trend in deposits and credits in CCA countries during 2010-2021 in constant exchange rates.

Figure 1. Dollarization of Deposits and Credits in the CCA



Deposit dollarization in the region declined, and a similar trend is observed in other emerging market economies (EMDEs). Even if CCA experienced the largest decline compared to 2010, other EMDEs followed the same trend¹(Figure 2). Dollarization of deposits decreased by 11 percent in Latin American Countries (LAC), 8 percent in Emerging (EM) Europe and 2 percent in EM Asia, while dollarization of loans decreased by 18 percent in EM Europe, 13 percent in LAC and slightly 1 percent in EM Asia². This reduction in deposit dollarization is in line with the findings of Yeyati (2021), which shows that out of 21 EMDEs, 16 countries reduced dollarization of term deposits with the average reduction of close to 20 percentage points between 1999-2018.

Figure 2. Dollarization of Deposits and Credits in other EMDEs



Source: IMF Financial Soundness Indicators and IMF staff calculations.

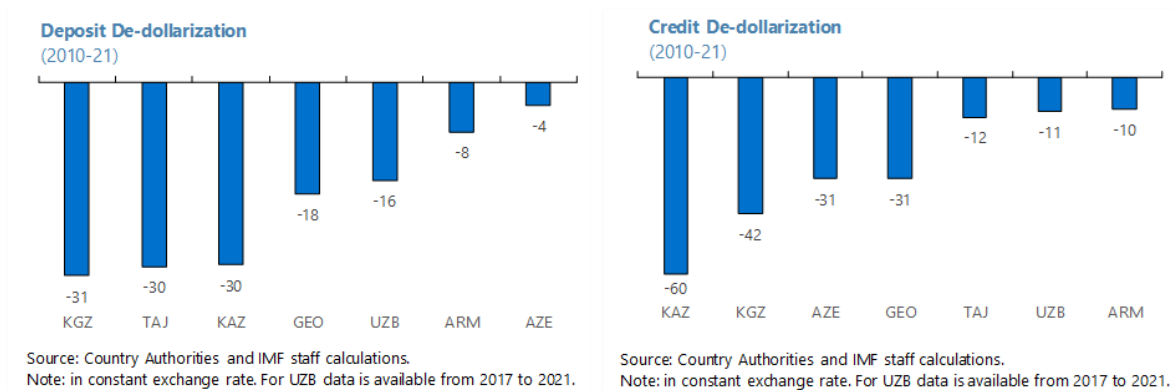
Note: 1/ The sample of CCA countries includes Armenia, Georgia, Kazakhstan and the Kyrgyz Republic.

2/ The exchange rate used for the conversion of deposits and loans denominated in foreign currency into the unit of account is the exchange dosing rate at the date of the financial statement position.

As expected, the de-dollarization speed of deposits and credit differs (Figure 3). While the two empirical measures of dollarization are often closely correlated, we observe that de-dollarization in credit is considerably higher than deposits in the region. This is particularly the case for Kazakhstan, Azerbaijan and Georgia, where credit dollarization has declined significantly more than deposit dollarization. In Armenia, and Uzbekistan deposit de-dollarization outpaced credit de-dollarization, implying that there is room for macroprudential measures to reduce credit dollarization to the level of deposit dollarization. Credit dollarization declined by 32 percentage points on average in the region. Regulatory factors, such as restrictions on foreign currency lending, clearly play a role in this differentiation as well as supply and demand factors.

¹ In constant exchange rates. The CCA regional averages include data for Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz Republic, and Tajikistan because of data limitations.

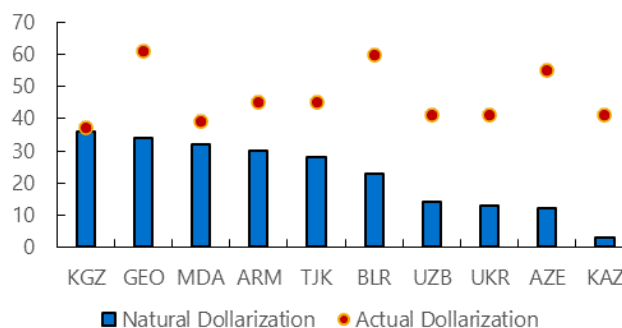
² Sample of countries included in the regional average: EM Europe (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, North Macedonia, Montenegro, Poland, Romania and Turkey), LAC (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago and Uruguay) and EM Asia (Brunei Darussalam, Cambodia, Fiji, Indonesia, Malaysia, Papua New Guinea, Philippines, Tonga and Vietnam).

Figure 3. Change in Dollarization 2010-2021 (At Constant Exchange Rates)**Box 1. What is a Natural Level of Dollarization?**

A natural level of dollarization is defined such as its benefits outweigh its costs. On the one hand, dollarization supports financial deepening especially in countries with a low level of capital market development and persistently high inflation. On the other hand, dollarization poses various drawbacks for policymakers as outlined in the introduction of this paper, including a higher risk on the private and public balance sheets due to unhedged currency risk exposure.

Gondo et al. (2020) estimated a natural level of dollarization in the CCA, following the model in (Ize and Levy Yeyati, 2003). They define a dollarization benchmark level for deposits that depend on the relative volatility of the real ExR and inflation. Natural rates of dollarization vary across the CCA, with countries dependent on remittances having higher natural rates of dollarization. For example, Kyrgyz Republic and Tajikistan have inflows in 2020 equivalent to 31 percent and 26 percent of GDP, respectively. Remittances are an important source of foreign exchange and have an impact on natural level of dollarization (Gondo, Aidorova and Singh, 2020) and households who receive remittances are more likely to hold foreign currency for diversifying their portfolio (OECD, 2007; and Brown and Stix, 2015).

Estimates for the natural rate of dollarization range from 3.0 percent for Kazakhstan to 36.6 percent for Kyrgyz Republic in 2019.

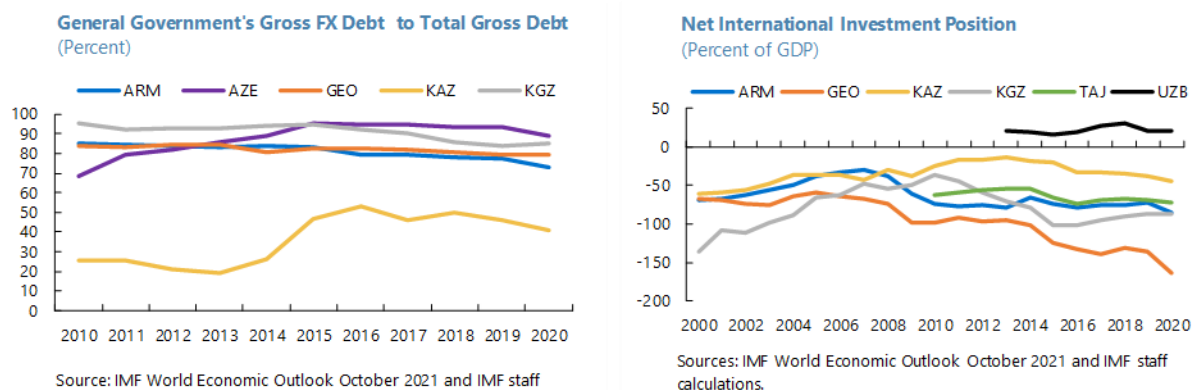
Natural Rate of Dollarization (Percent, 2019)

Source: Gondo et al (2020), Impact of Remittances on Natural Rate of Dollarization-Trends in Caucasus and Central Asia. IMF Working Papers.

Note: the dollarization benchmark level for deposits depend on the relative volatility of the real ExR and inflation.

The original sin, i.e., the inability of the countries to borrow in their own currency, is present in the CCA region, and the share of public debt in foreign currency remains extremely high. For some countries such as Kyrgyz Republic, Azerbaijan, Georgia and Armenia it remains above 70 percent. Gradual de-dollarization of public debt is expected to go in tandem with the decline in deposit dollarization. As countries develop their local currency bond markets and these markets gain depth over time, one would expect a more visible decline in public debt dollarization in the coming years.

Figure 4. Gross FX Debt and NIIP



Despite their increasing share over time in public borrowing, domestic currency denominated bond issuances currently account only for a small fraction of public debt. Countries in the region have intensified their efforts to develop domestic capital markets. Georgia, Kazakhstan, Armenia, and Azerbaijan started issuing long-term bonds about a decade ago. Currently, almost all countries in the region issue long-term securities. Uzbekistan is the latest that has issued long-term local currency bonds. The bond markets are still nascent and lack sufficient level of development. Hence the markets do not seem to be at a stage of development that can materially impact the level of dollarization. Most CCA countries lack availability of floating rate or inflation indexed bonds that could allow the investor to partially hedge against the foreign currency volatility without actually holding the foreign currency. Pillar II and pillar III pension systems play an important role in increasing domestic savings in local currency. For example, following pillar II pension reform introduction in Georgia in early 2019, the Pension Fund has accumulated sizable funds and is getting ready to invest in lari denominated bonds gradually. Issuance of long-term local currency bonds also facilitates the development of derivative markets over time and allows banks to hedge their on-balance sheet foreign exchange positions. For example, several emerging market country regulators in Europe and Latin America introduced bans on mortgages in foreign exchange. The development of derivative instruments enabled banks in these countries to comply with such regulations without reducing their overall lending by hedging their foreign exchange positions with derivative transactions. Similarly, other emerging market countries introduced indexed instruments in local currency to divert savings away from foreign exchange.

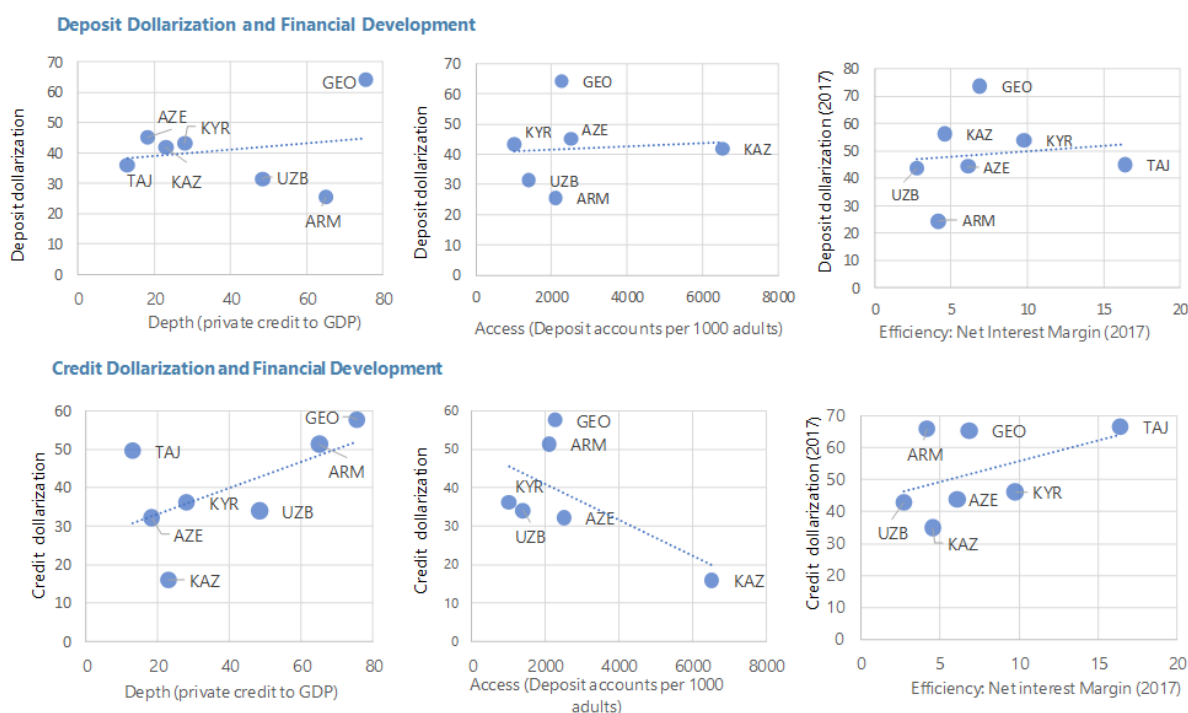
When balance sheets are highly dollarized, economic agents prefer hard currency to maintain the real value of their consumption in the face of macroeconomic uncertainty. The existence of balance sheet mismatches in highly dollarized economies tends to reinforce the contractionary effect of exchange rate depreciation, thus also explaining the persistence of dollarization (Ize and Levy Yeyati, 2005). Georgia,

Armenia, Kyrgyz Republic and Tajikistan have a negative net international investment position above 70 percent of GDP, exacerbating the contractionary impact of foreign exchange depreciation through balance-sheet impact.

Countries in the region have made significant strides in financial development over the past decades, including through financial deepening, improvements in financial inclusion, and banking sector efficiency. Financial development has, in turn, supported higher economic growth in the region. In theory, one could expect a negative impact of deposit dollarization on financial depth as it may reflect the fact that a share of foreign currency deposits is eventually transferred overseas, rather than retained in the domestic economy as private credit, thus contributing to a shallower domestic financial sector. However, the picture for the region seems consistent with findings of several authors (e.g., Eichengreen and Hausmann, 1999; De Nicolo et al, 2005; and Levy Yeyati, 2006) who have also raised the possibility that, in providing financial solutions to economic agents in less-than-optimal policy environments, dollarization can support greater financial development (Figure 5).

Dollarization is often associated with having a negative impact on financial efficiency. In other words, net interest margins are expected to be positively related to levels of dollarization, suggesting a negative effect on financial efficiency. However, this does not seem to be the case for all the countries in the region. We see countries with high dollarization rates with relatively lower net interest margin. Similarly, looking at the charts, it is difficult to make an association between financial dollarization and access to finance (Figure 5).

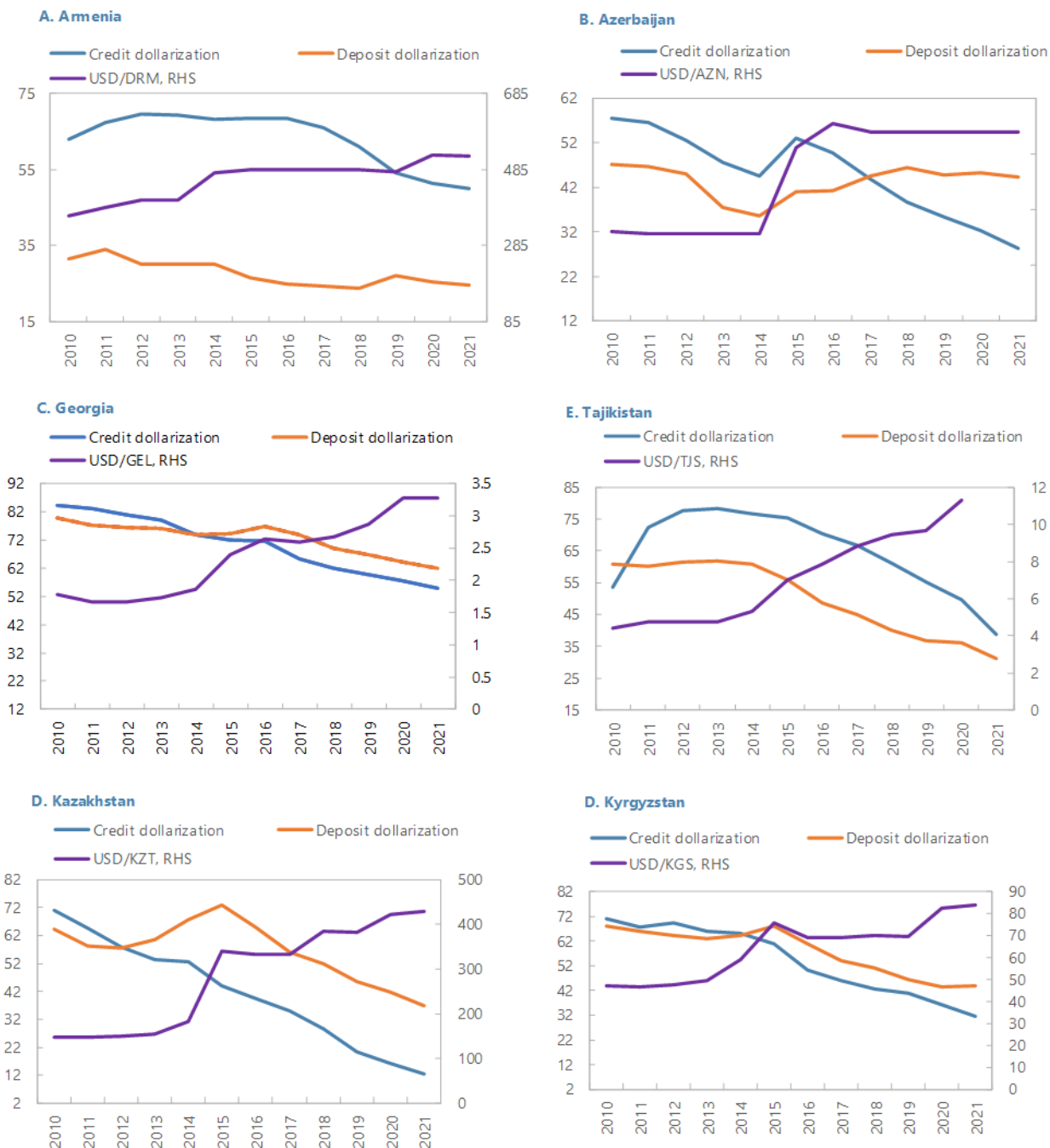
Figure 5. Financial Depth and Dollarization



Source: Country Authorities and IMF staff calculations

Countries in the region have been trying to de-dollarize their economies against the backdrop of depreciation pressures (Figure 6). Exchange rate appreciation has been an important factor in de-dollarization in other emerging market economies, particularly in Latin America. However, several countries in the CCA region managed to reduce dollarization in an environment when their currencies were depreciating which clearly is a difficult task. Another observation is that following sharp devaluations in 2014-15, supported by increased exchange rate flexibility and tighter monetary policies, we observe a significant increase in the pace of de-dollarization.

Figure 6. Evolution of the REER and Dollarization



Source: Haver Analytics, National Authorities and IMF staff calculations

1/Negative slope means appreciation of the local currency

De-dollarization policies in the region

We conducted a qualitative survey with country authorities and desks at the IMF looking into de-dollarization policies including introduced by the authorities in the region. In particular, the survey took stock of macroprudential and administrative measures such as additional capital requirements for unhedged FX exposures, open currency position limit, bans on FX lending and other measures (Figure 7) (for survey details, see Annex I). We have received responses for Armenia, Azerbaijan, Georgia, Kazakhstan, Tajikistan, Uzbekistan, and Kyrgyz Republic.

Most of the countries in the region have an official de-dollarization policy in place. To mitigate the risks associated with foreign currency assets, the authorities have introduced macroprudential and administrative measures. For example, all countries, even the countries that do not have a de-dollarization policy in place, apply higher reserve requirement ratios for bank liabilities in foreign exchange relative to domestic currency. In Azerbaijan reserve requirement differential is 0.5 percent, on the other extreme in Georgia it is close to 20 percent.

Figure 7. Survey of De-dollarization Measures

| | ARM | AZE | GEO | KAZ | TAJ | UZB | KGZ |
|---|-----|-----|-----|-----|-----|-----|-----|
| Is there a dedollarization policy in place? | √ | x | √ | √ | √ | x | √ |
| Microprudential measures | | | | | | | |
| Price incentives/risk mitigation | √ | √ | √ | √ | √ | √ | √ |
| Additional capital requirements for unhedged FX exposures; | √ | x | √ | √ | √ | x | x |
| Additional/separate liquidity requirements for FX liabilities; | √ | x | √ | √ | x | √ | x |
| Open currency position limit. | √ | √ | √ | √ | √ | √ | √ |
| Administrative measures | | | | | | | |
| Bans on FX lending | √ | √ | √ | x | √ | √ | √ |
| Stricter Debt-Service-to-Income & Loan-to-Value limits for FX loans; | x | x | √ | x | x | x | x |
| Nonfinancial sector (e.g. ban on payments, contracts, ads in FX); | √ | x | √ | x | x | √ | √ |
| Did the authorities put sustained efforts to create the conditions for long-term domestic capital market development? | √ | x | √ | √ | x | √ | √ |
| Did the authorities introduce any other de-dollarization measures? | √ | √ | √ | √ | √ | √ | √ |

Source: Country Authorities.

Other findings of the surveys are as follows:

- In Tajikistan and Azerbaijan deposit insurance premium for FX deposits is higher than those for local currency deposits. Armenia has introduced differentiated deposit guarantee contribution system, according to which the banks that attract FX deposits with higher interest rates than the average in the market, should pay more contributions to the Deposit Guarantee Fund. Kazakhstan has higher deposit insurance coverage for tenge-denominated deposits.
- Applying additional capital requirements for unhedged FX borrowers is another common measure. For example, in Armenia risk weights of FX denominated exposures are 50 percent higher compared to local currency exposures of the same category for unhedged borrowers. Georgia applies additional risk weighting ranging from 40 percent to 100 percent depending on the bank-specific dollarization ratio for loans to unhedged borrowers. In 2016, Kazakhstan doubled risk-weight for capital

requirement to 200 percent for unhedged borrowers. Tajikistan, in 2018, increased risk weights for FX loans from 100% to 150%.

- Georgia, Armenia, and Kazakhstan have higher liquidity coverage ratios for FX obligations. In Uzbekistan, levels are same for both for FX and local currency obligations but banks must hold LCRs for FX and local currency separately.
- The limit for the overall net foreign exchange position is applied almost in all countries in the region. The limits range from 10 percent in to 25 percent of bank's own capital.
- Outright ban on FX lending to certain segments, such as mortgages is observed in different forms in several countries. Georgia has a minimum loan size limit of 200,000 lari (about \$70,000) for FX borrowing. In Kazakhstan, there was a ban in 2016 on granting mortgage loans in foreign currency to individuals without income in the given currency, but the current regulation only sets a higher risk weight (200%) to such FX loans. Tajikistan restricted extension of FX mortgage loans to FX unhedged borrowers in 2017. In Uzbekistan and Kyrgyz Republic, mortgage and consumer loans in foreign currency to individual borrowers are prohibited. Azerbaijan also banned mortgages in FX whereas Armenia banned consumer loans in FX. Such prohibitions are aimed at protecting borrowers that are not able to hedge their FX risk. But they also have a side benefit of reducing the political pressure on central banks in case of exchange rate depreciation.
- Measures such as differentiated loan-to-value and payment-to-income ratios are less common and more recent. Georgia has 85 percent loan to value limit for local currency loans and 70 percent limit for FX loans. Payment-to-income limit is stricter for unhedged loans. Similar instruments have been approved by National Bank of Tajikistan in 2021, however, they are not in effect for now.

All these measures support the region's de-dollarization efforts. It is a long-term effort, but the policies are in the right direction.

Empirical Approach

Methodology

This section describes the methodology to examine country specific drivers of short-term fluctuations in both deposit and credit dollarization in the CCA region. We follow the empirical approach in Garcia et al. (2010) by using a standard recursive VAR to ascertain the important interrelationships among main variables of interest that could affect lenders and borrowers' decision to lend or borrow in foreign currency. Variables include macro-variables, prudential measures, development of financial capital markets and financial dollarization (Table 1).

We impose restrictions in a sequential fashion (Cholesky decomposition) on the standard IRFs to draw orthogonalized impulse response functions (OIRFs) that correspond to independent shocks. The variables in our VAR model are structured in decreasing order of alleged exogeneity. The identification scheme assumes that shocks may affect a subgroup of variables instantaneously, whereas another subgroup of variables are

affected with time lags. The adopted causal ordering scheme limits the interaction of equations containing policy variables, giving them primacy over macro variables and others³.

The selected ordering for identification follows the approach in Garcia et al. (2010): (i) introduction of prudential measures; (ii) issuance of public bonds in local currency; (iii) macroeconomic variables; (iv) the change in deposit dollarization ratio over t and $t-1$; and (v) the change in credit dollarization ratio over t and $t-1$. We modify the VAR specification by introducing a new variable to capture the interest rate channel which is defined as the first difference of the spread between interest rates on foreign currency deposits and domestic currency deposits (in percent).

The model is estimated using monthly data from January 2010 to May 2021 for all countries. The data are stationary and residuals in VAR system are normal. Granger causality tests, block-exogeneity, and information criteria tests were done in pursuit of a parsimonious model.⁴ In the spirit of preserving the system's symmetry, all equations in country VAR models are estimated with the same lag. Furthermore, given the varying degree of lag lengths suggested by different information criteria, including data limitations and considerations relating to erosion of degrees of freedom, the VAR was estimated with three lags (and six lags in an alternative specification to check robustness).⁵

³ The ordering assumes that shocks to the policy variables affect all other variables contemporaneously, which is equivalent to assuming that the authorities only observe non-policy variables with a lag. In an alternative identification strategy, with macroeconomic variables higher in ordering than prudential measures, the inferences from the IRFs were not very different. We suspect the magnitude of the contemporaneous correlation coefficients of the residuals may be low, hence diminishing the relative importance of the ordering.

⁴ In some circumstances when formal tests indicated that one lag length is sufficient for the VAR specification, we opted for three lags instead to mitigate against the possibility of omitting the important effects of longer lags.

⁵ The findings were not markedly different.

Table 1: Definition of Variables in VAR

| Prudential Measures | |
|---|---|
| ΔRR_t dt | First difference of the spread between required RR rate on foreign currency deposits to the rate on domestic currency deposits (in percent). Dummy equal to 1 (for three months) after introduction of prudential measures (other than changes in reserve requirements); zero otherwise. |
| Development of Domestic Capital Markets | |
| D_t^{5-10} | Dummy equal to 1 if medium-to-long term bonds (5 years or longer, depending on the country) were issued in that month; zero otherwise. |
| Macro-Variables | |
| $inflation_t$ e_t s_t $\Delta dprate_t$ | Monthly percentage change of the CPI. Monthly percentage change of the nominal exchange rate. Standard deviation of daily percentage change of the nominal exchange rate over past 90 days. First difference of the spread between rates on foreign currency deposits and domestic currency deposits (in percent). |
| Financial Dollarization | |
| ΔDL_t ΔCL_t | Change over t and t-1 of the deposit dollarization ratio. Change over t and t-1 of the credit dollarization ratio |
| Note: Deposit and credit dollarization is computed at constant exchange rates, i.e. by dividing FX deposit/credit (the end of month stock) by the same day exchange rate and then multiplying it by the exchange rate as of May 31, 2021. FX deposits/credit have to be counted in local currency terms to be able to calculate total deposits/credit. Deposit/credit dollarization is a ratio of FX denominated deposit/credit to total deposit/credit, multiplied by 100. | |

We employ innovation accounting techniques, i.e., impulse response functions and forecast error variance decompositions, to identify the dynamic responses of changes in deposit and credit dollarization to various shocks, as well as to quantify the relative importance of each shock in financial dollarization levels. These two standard VAR tools are helpful in uncovering the interrelationships among the variables and in capturing the dynamics and feedback effects on credit and deposit dollarization.

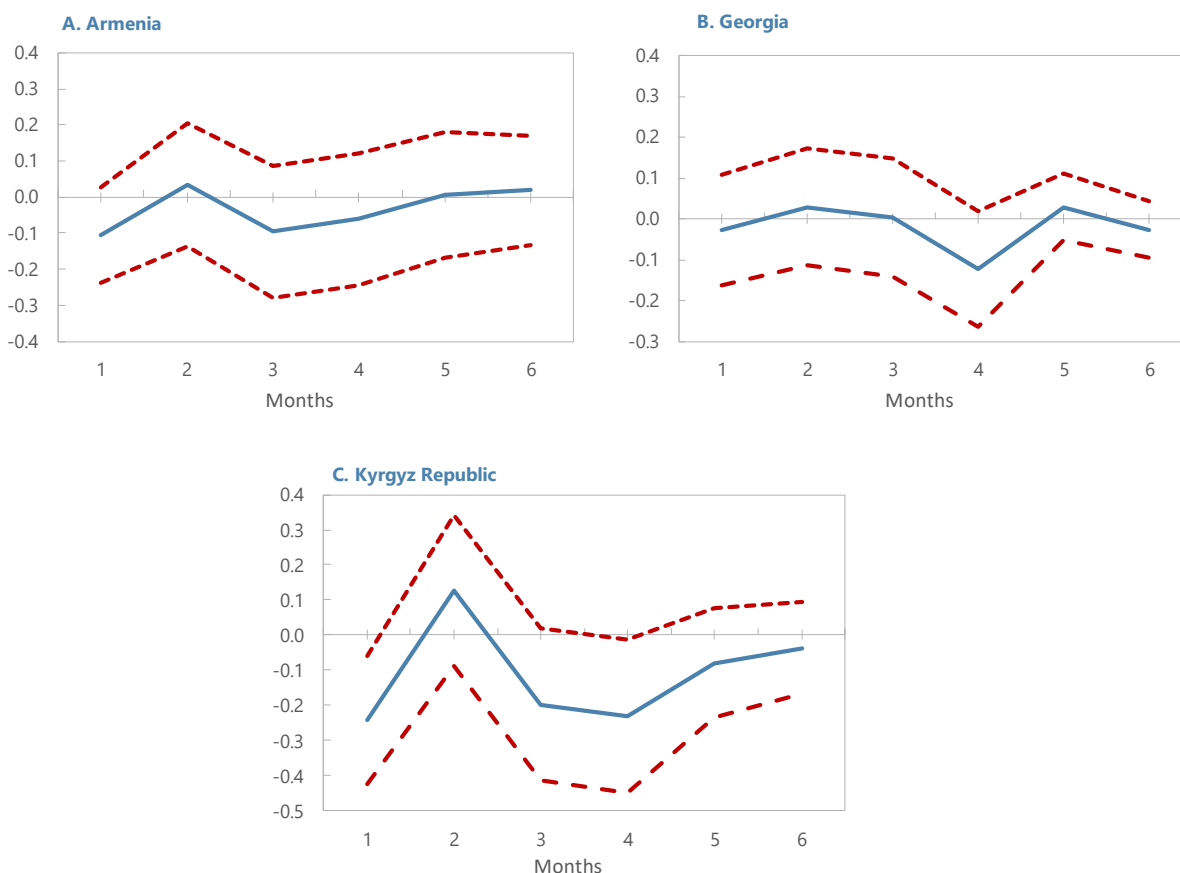
Impulse Responses

This section presents impulse response functions of various variables in our analysis on deposit and credit dollarization.

First, an active management of reserve requirement differential produces mixed responses on financial de-dollarization depending on the country. Increasing the spread between reserve requirement ratios on foreign currency and local currency deposits seems to have contributed to deposit de-dollarization in Armenia, Georgia and Kyrgyz Republic and credit de-dollarization in Georgia and Kyrgyz Republic (Figure 8 and 9). For these countries, the impact of the change in reserve requirement on financial dollarization is immediate, however not highly significant. Moreover, while deposit dollarization responds for a few months only, the long-term effects of

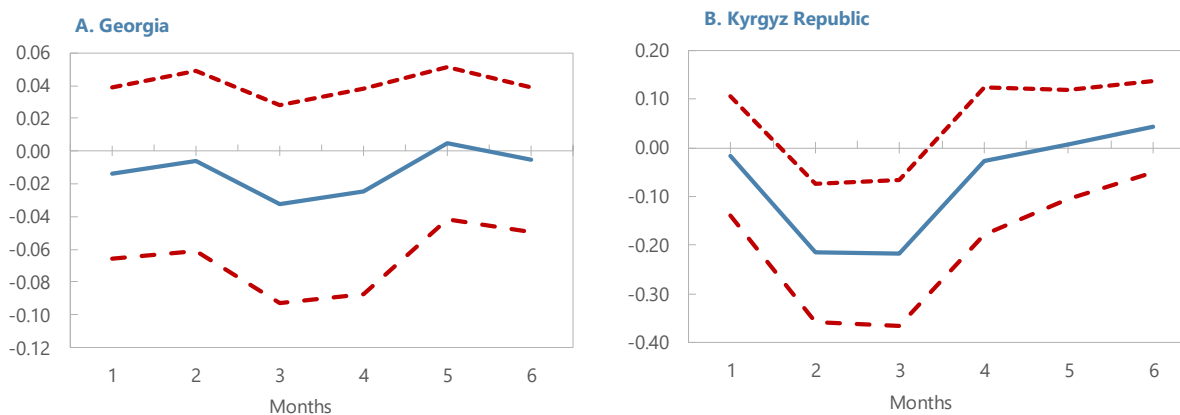
the shocks might be long-lasting in nature on a cumulative basis⁶. Impulse response functions for other CCA countries with less intuitive results could be found in Annex II, Figure A1a and A1b.

Figure 8. Response of Deposit Dollarization to a Shock to Differential Reserve Requirement



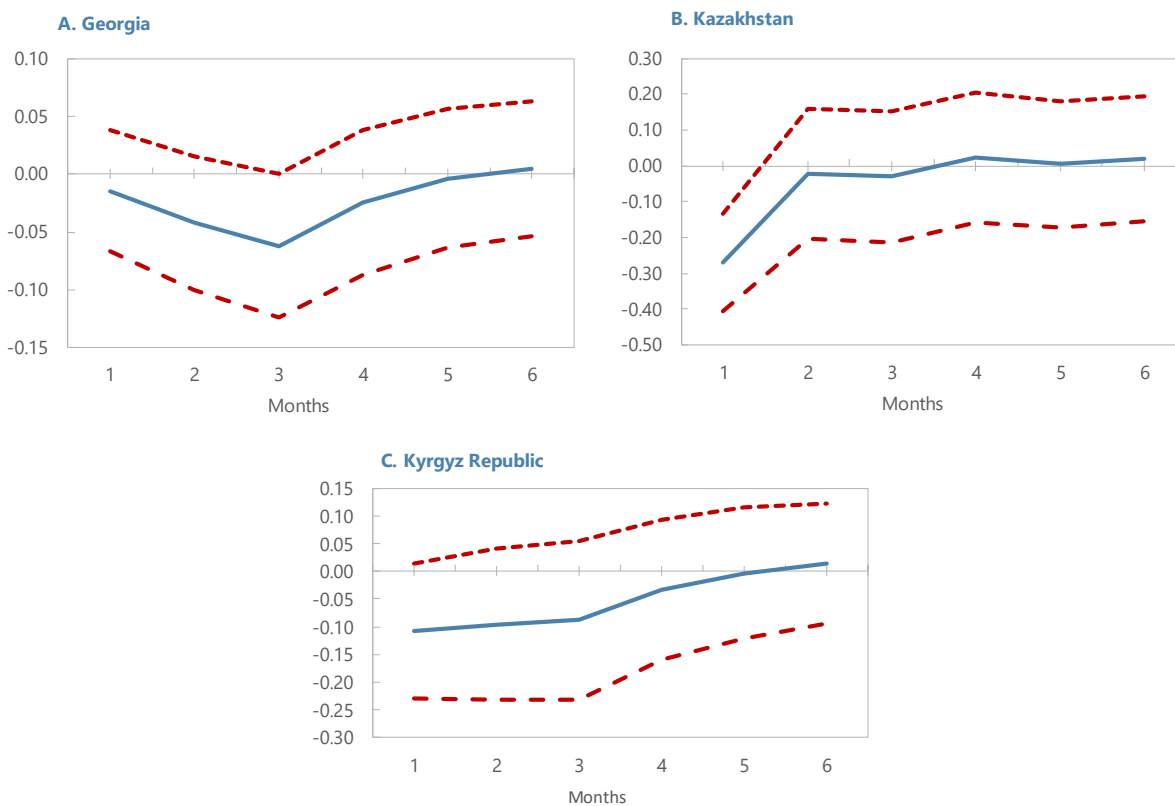
Source: National Authorities, and authors calculation.
1/One standard deviation shock +/- 2 s.e.

⁶ The short-lived effects of shocks on de-dollarization are not to be misinterpreted as dollarization ratios revert back to pre-shock levels, but rather as de-dollarization slows down. The impulse response functions at the levels (as opposed to first differences) indicate that the impact of changes to reserve requirements on dollarization are of a permanent nature, i.e. financial dollarization converges to new long run levels.

Figure 9. Response of Credit Dollarization to a Shock to Differential Reserve Requirement

Source: National Authorities, and authors calculation.
 1/One standard deviation shock +/- 2 s.e.

Second, introduction of various prudential measures (other than changes in reserve requirements) has also fostered financial de-dollarization efforts in the CCA region. These prudential measures that were modeled by a dummy in our analysis included discouraging bank lending in foreign currency to unhedged borrowers, raising provisions on foreign currency denominated loans, introducing differentiated capital risk weights on foreign currency loans, tightening capital requirements against foreign exchange positions, and discouraging the use of foreign currency as a means of payment (for narrative on country specific measures, see Figure 10, survey results). The impact was immediate and significant on credit de-dollarization for Georgia, Kazakhstan and Kyrgyzstan, with effects lasting for a few months (Figure 10). However, no such effect was established on deposit dollarization possibly due the nature of these measures mainly affecting loans (for details on impulse response functions, see Annex II, Figures A1c and A1d).

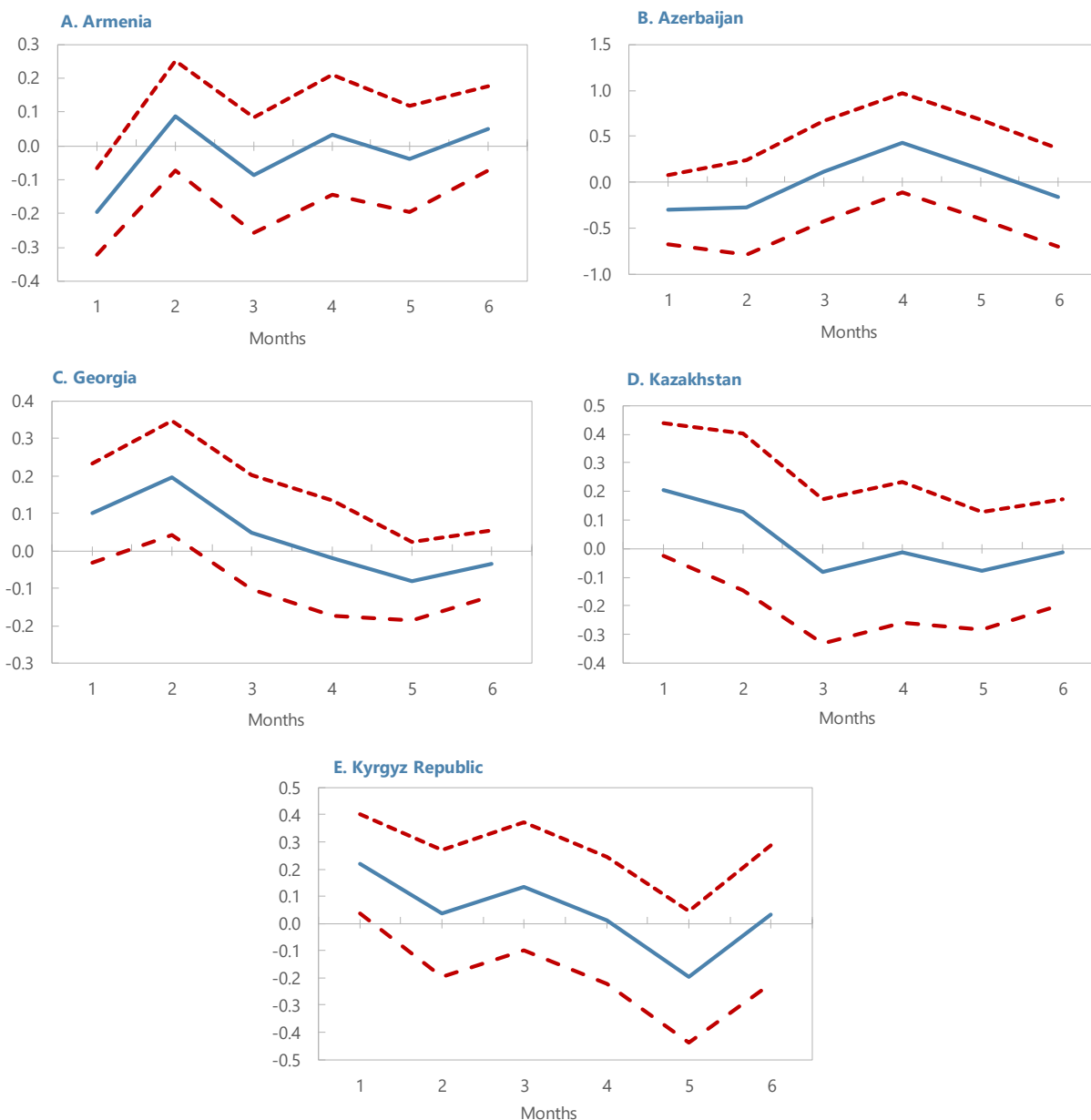
Figure 10. Response of Credit Dollarization to Introduction of Prudential Measures

Source: National Authorities, and authors calculation.

1/One standard deviation shock +/- 2 s.e.

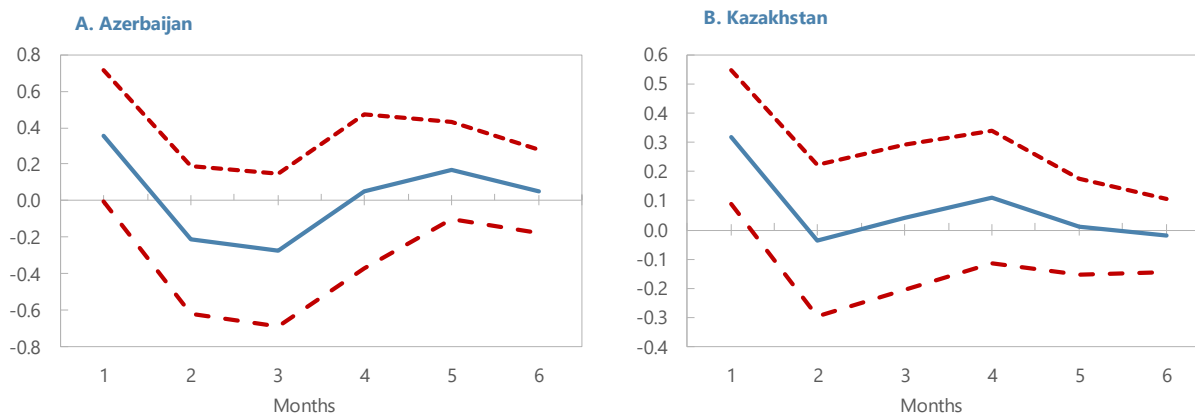
Third, the impact of an exchange rate appreciation shock on deposit de-dollarization is immediate and significant in Armenia and Kazakhstan (Figure 11). Increased confidence in the domestic currency and diminished expectations for further depreciation increases agents' appetite for local currency deposits.

Figure 11. Response of Deposit Dollarization to an Exchange Rate Shock



Source: National Authorities, Haver Analytics (Financial Times), and authors calculation.
1/One standard deviation shock +/- 2 s.e.

Fourth, an interest rate channel is introduced to capture the effect of a shock to the spread between local and foreign currency deposit rates on financial dollarization in the CCA region. In Azerbaijan, deposit dollarization witnesses a significant increase at the time of shock to a change in the spread between local and foreign currency, however, the effects last for two months only. A similar outcome is produced for Kazakhstan (Figure 12), and for the rest of countries the results are in Annex II Figure A1h.

Figure 12. Response of Deposit Dollarization to Shock to Spread Between Local and Foreign Currency

Source: Author's calculation

1/One standard deviation shock +/- 2 s.e.

Fifth, countries' concerted efforts to extend the yield curve and develop the domestic debt market have not yet produced sufficient results in de-dollarization perhaps due to the relatively low level of markets development (for details, Annex II. Figure A1f and A1g). The existence of benchmarks for medium- to long-term domestic currency debt will likely facilitate bank funding and pricing of medium- to long-term loans in domestic currency when further developed in the CCA.

Sixth, the effects of exchange rate volatility on financial dollarization are mixed (Annex II Figure A1i and A1j). Our analysis does not show that countries with more flexible exchange rate regime experience different de-dollarization episodes. Furthermore, we find that financial dollarization in some countries does not react significantly few months after the shock has occurred. In Kazakhstan, an exchange rate volatility shock helps bring down deposit dollarization, while in Azerbaijan it raises deposit dollarization. Similarly, for credit de-dollarization, the responses to an exchange rate volatility shock are mixed depending on country. In Kazakhstan credit dollarization is impacted instantaneously for one period only before returning to zero.⁷

Seventh, the effects of inflation on financial dollarization are also mixed and inconclusive. Higher inflation increases deposit dollarization for a few months in some countries, but the effect is not persistent and often reverses during the projected horizon. Therefore, we don't report these results.

Forecast Error Variance Decomposition

The forecast error variance decomposition for financial dollarization is presented in Table 2 and 3. The forecast errors for changes in deposit and credit dollarization are largely attributable to own innovations as well as:

- **For changes in deposit dollarization**, changes in exchange rates and changes in spreads between local and foreign currency deposit rates, on average explain 5-6 percent on a 3-6 month horizon. The contribution of shocks to inflation is roughly 3-5 percent, followed closely by local currency bond market issuance at about 3-4 percent.

⁷ The effect of exchange rate volatility on dollarization is asymmetric – it depends on whether the currency is appreciating or depreciating. Significance of forward FX and derivative markets in CCA – hedge against FX risks.

- **For changes in credit dollarization**, inflation shocks and changes in prudential regulation (including changes in reserve requirements) explain 5 and 4 percent, respectively. Changes in deposit dollarization accounts for roughly 3-6 percent of fluctuations in credit dollarization on a 3-6 month horizon.

Table 2. Variance Decomposition of Changes in Deposit Dollarization

| Horizon (months) | Armenia | Azerbaijan | Georgia | Kazakhstan | Kyrgyzstan | Average | Rank |
|---|---------|------------|---------|------------|------------|---------|------|
| <i>Contribution of shocks to prudential measure variables (in percent)</i> | | | | | | | |
| 1 | 0.01 | 1.31 | 1.40 | 0.03 | 0.17 | 0.65 | 5 |
| 3 | 1.63 | 1.84 | 1.44 | 1.08 | 0.47 | 1.57 | 7 |
| 6 | 1.74 | 1.93 | 1.65 | 1.79 | 0.51 | 2.27 | 7 |
| <i>Contribution of shocks to inflation (in percent)</i> | | | | | | | |
| 1 | 1.08 | 2.52 | 1.28 | 0.68 | 0.35 | 1.15 | 4 |
| 3 | 6.28 | 4.27 | 4.69 | 1.04 | 0.87 | 3.36 | 3 |
| 6 | 5.68 | 4.72 | 5.42 | 1.99 | 0.84 | 4.11 | 3 |
| <i>Contribution of shocks to exchange rate (in percent)</i> | | | | | | | |
| 1 | 8.73 | 1.51 | 1.66 | 2.18 | 4.01 | 3.18 | 2 |
| 3 | 8.10 | 2.22 | 7.00 | 3.00 | 5.08 | 4.73 | 2 |
| 6 | 7.83 | 6.96 | 7.58 | 3.02 | 6.44 | 6.31 | 1 |
| <i>Contribution of shocks to exchange rate volatility (in percent)</i> | | | | | | | |
| 1 | 0.16 | 1.39 | 0.49 | 0.17 | 1.58 | 0.80 | 6 |
| 3 | 0.84 | 1.25 | 3.57 | 1.96 | 3.48 | 2.35 | 5 |
| 6 | 0.86 | 1.26 | 3.36 | 2.02 | 3.17 | 2.78 | 6 |
| <i>Contribution of shocks to local currency bond market development (in percent)</i> | | | | | | | |
| 1 | 0.15 | 0.32 | 0.59 | 4.89 | 0.05 | 1.17 | 3 |
| 3 | 0.26 | 0.45 | 2.29 | 4.51 | 3.96 | 2.41 | 4 |
| 6 | 1.78 | 0.68 | 2.91 | 8.31 | 4.29 | 3.99 | 4 |
| <i>Contribution of shocks to Shock to Spread between local and Foreign Currency Deposit Rates</i> | | | | | | | |
| 1 | 0.12 | 2.73 | 1.20 | 5.19 | 12.07 | 3.72 | 1 |
| 3 | 3.58 | 4.58 | 1.38 | 4.77 | 11.40 | 4.78 | 1 |
| 6 | 3.46 | 4.71 | 1.96 | 4.91 | 12.47 | 5.59 | 2 |
| <i>Contribution of shocks to Credit dollarization (in percent)</i> | | | | | | | |
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.17 | 7 |
| 3 | 3.08 | 2.23 | 0.46 | 3.44 | 1.67 | 2.31 | 6 |
| 6 | 6.89 | 2.17 | 0.48 | 4.43 | 2.98 | 3.83 | 5 |

Table 3. Variance Decomposition of Changes in Credit Dollarization

| Horizon (months) | Armenia | Azerbaijan | Georgia | Kazakhstan | Kyrgyzstan | Average | Rank |
|--|---------|------------|---------|------------|------------|---------|------|
| <i>Contribution of shocks to prudential measure variables (in percent)</i> | | | | | | | |
| 1 | 0.02 | 0.69 | 0.23 | 8.21 | 2.35 | 2.08 | 2 |
| 3 | 0.59 | 1.14 | 4.64 | 6.58 | 4.27 | 3.37 | 2 |
| 6 | 1.73 | 1.43 | 4.01 | 6.51 | 4.13 | 3.97 | 4 |
| <i>Contribution of shocks to inflation (in percent)</i> | | | | | | | |
| 1 | 1.01 | 10.32 | 0.44 | 0.20 | 0.24 | 2.20 | 1 |
| 3 | 1.16 | 10.64 | 1.90 | 6.24 | 0.83 | 3.96 | 1 |
| 6 | 2.46 | 10.75 | 3.59 | 8.02 | 2.30 | 5.52 | 2 |
| <i>Contribution of shocks to exchange rate (in percent)</i> | | | | | | | |
| 1 | 0.01 | 1.92 | 0.11 | 0.22 | 4.19 | 1.24 | 7 |
| 3 | 3.30 | 2.13 | 0.91 | 0.91 | 9.88 | 3.35 | 3 |
| 6 | 2.93 | 2.50 | 1.35 | 1.05 | 10.78 | 4.10 | 3 |
| <i>Contribution of shocks to exchange rate volatility (in percent)</i> | | | | | | | |
| 1 | 0.31 | 1.92 | 1.74 | 4.48 | 0.14 | 1.60 | 4 |
| 3 | 1.85 | 2.13 | 1.70 | 3.60 | 0.45 | 2.12 | 7 |
| 6 | 2.29 | 2.50 | 2.08 | 3.40 | 0.92 | 2.86 | 7 |
| <i>Contribution of shocks to local currency bond market development (in percent)</i> | | | | | | | |
| 1 | 2.86 | 0.27 | 1.62 | 0.11 | 1.81 | 1.28 | 6 |
| 3 | 3.28 | 1.17 | 3.48 | 5.14 | 1.70 | 2.96 | 5 |
| 6 | 3.48 | 1.71 | 5.07 | 5.65 | 1.89 | 3.96 | 5 |
| <i>Contribution of shocks to change in spread between local & foreign currency deposit rates</i> | | | | | | | |
| 1 | 2.05 | 4.19 | 0.01 | 0.02 | 2.36 | 1.60 | 3 |
| 3 | 1.89 | 4.80 | 2.13 | 0.75 | 1.76 | 2.39 | 6 |
| 6 | 2.10 | 7.19 | 2.81 | 1.14 | 2.65 | 3.65 | 6 |
| <i>Contribution of shocks to deposit dollarization (in percent)</i> | | | | | | | |
| 1 | 1.26 | 1.19 | 0.15 | 3.79 | 1.27 | 1.44 | 5 |
| 3 | 1.22 | 1.95 | 3.37 | 7.63 | 2.15 | 3.22 | 4 |
| 6 | 4.55 | 3.23 | 16.12 | 8.92 | 2.80 | 6.94 | 1 |

Conclusion

Dollarization in the CCA region has been declining rapidly, albeit from a very high level. Average deposit and loan dollarization in the CCA is about 39 percent and 37 percent respectively (as of end-2020), decreasing from 61 and 81 percent over the past decade⁸. Countries in the region have achieved macroeconomic stability gains thanks to their efforts to maintain fiscal discipline and advance structural reforms. The gap between loan and deposit dollarization has also declined considerably since 2010. In Kazakhstan, Azerbaijan and Georgia credit dollarization has declined significantly more than deposit dollarization partly as a result of administrative measures.

All countries in the region have adopted specific de-dollarization measures. Based on a qualitative survey conducted for the purpose of our analysis, all countries apply higher reserve requirement ratios for FX denominated liabilities vs domestic currency liabilities. In Azerbaijan reserve requirement differential is 0.5 percent, while in Georgia it is close to 20 percent. To better reflect and evaluate the risks associated with foreign currency assets, all countries in the region have introduced macroprudential and administrative measures. They also apply additional capital requirements for unhedged FX borrowers and introduced limits for the overall net foreign exchange position of banks. While there is some room for further regulatory measures to mitigate risks arising from FX lending particularly in countries where credit dollarization exceeds deposit dollarization, countries like Georgia already applies almost all available regulatory tools. Even in the countries that apply most of these tools, calibration of the tools may be considered.

Our empirical analysis shows that various prudential measures, increased spreads between local and foreign currency deposits, and exchange rate appreciation play a role in de-dollarization in the region. More specifically, looking at short-term drivers of financial de-dollarization in the CCA, our results suggest that (i) increasing the spread between reserve requirement ratios on foreign currency and local currency have contributed to deposit and credit de-dollarization in several countries; (ii) various prudential measures such as discouraging bank lending in foreign currency to unhedged borrowers, raising provisions on foreign currency denominated loans, introducing differentiated capital risk weights on foreign currency loans, among others, have contributed to credit dollarization in several countries (Georgia, Kazakhstan, Kyrgyz Republic) (iii) the impact of an exchange rate appreciation shock on deposit de-dollarization is immediate and significant in Armenia and Kazakhstan; (iv) deposit dollarization increases in Azerbaijan and Kazakhstan in response to a shock change in the spread between local and foreign currency; (v) countries' concerted efforts to extend the yield curve and develop the domestic debt market have not been associated with sufficient results yet; (v) the effects of exchange rate volatility and inflation on financial dollarization are mixed. In Kazakhstan, an exchange rate volatility shock helps bring down deposit dollarization, while in Azerbaijan it raises deposit dollarization. Finally, our analysis, similar to other studies, show that deposit dollarization is driving credit dollarization, not the other way around.

International experience shows that de-dollarization is a gradual process and requires low and stable inflation for an extended period of time. To further promote de-dollarization in the CCA, the following main components of successful de-dollarization should be considered: (i) credible monetary and exchange rate

⁸ Measured in constant exchange rates.

frameworks; (ii) absence of fiscal dominance; (iii) deep domestic financial markets that can provide long-term vehicles for investing. Overall, dollarization is difficult to reverse, and it requires prolonged and sustained stabilization policy efforts. CCA countries need to make their domestic currency appealing, advance financial development (Poghosyan, forthcoming), and enhance communication by their central banks (Akepanidaworn and Cabezon, forthcoming), among other measures identified above.

References

- Akepanidaworn, Klakow, and Cabezon Ezequiel, "Monetary Frameworks and Communication in the Caucasus and Central Asia", IMF Working Paper (Forthcoming).
- Ben Naceur, Semi, Hosny, Amr and Hadjian, Gregory, 2015, "How to De-Dollarize Financial Systems in the Caucasus and Central Asia?", IMF working paper WP/15/203
- Berg, Andrew and Borenzstein, Eduardo, 2000, "The Pros and Cons of Full Dollarization", IMF working paper, WP/0050
- Brown, M. and H. Stix. 2015. "The euroization of bank deposits in Eastern Europe," Economic Policy, CEPR;CES;MSH, vol. 30(81), pages 95-139
- Calvo, Guillermo A. and Reinhart, Carmen M., 2002, "Fear of Floating", Quarterly Journal of Economics, V107 (May), 379-408
- Calvo, Guillermo A. and Vegh, Carlos A., 1992, "Currency Substitution in Developing Countries: An Introduction", IMF working paper, WP/92/40.
- De Nicolo, Gianni; Honohan, Patrick and Ize, Alain, 2005, "Dollarization of Bank Deposits: Cases and Consequences", Journal of Banking and Finance, 2005, Vol. 29, issue 7, pp: 1697-1727
- Eichengreen, Barry and Hausmann, Ricardo, 1999, "Exchange Rates and Financial Fragility", NBER working paper 7418
- García-Escribano, Mercedes and Sosa, S., 2010. "What is Driving Financial De-dollarization in Latin America?" IMF Working Paper WP/11/10
- Gayazzo, Jorge; Garcia Pascual, Antonio; Heysen, Socorro; Gutierrez, Eva, 2006, "Toward an Effective Supervision of Partially Dollarized Banking Systems", IMF working paper, WP/06/32, 48 pages.
- Gondo, Rocio; Aidarova, Altyнай, and Singh, Manmohan, 2020, "Impact of Remittances on Natural Rate of Dollarization— Trends in Caucasus and Central Asia", IMF, WP/20/185

Gulde, Anne Marie; Hoelscher, David S; Ize, Alain; Marston, Dewitt D and De Nicolo, Gianni, 2004, "Financial Stability in Dollarized Economies", IMF occasional paper # 230. Chapter II: "Implications of Dollarization for Financial Stability". Pp 4-11.

Hashimoto, Hideo at al, IMF and Bango, Zsolt at al, WB, 2021, "Guidance Note for Developing Government Local Currency Bond Markets", IMF and WB guidance note, 2021/001

Ize, Alain and Levy Yeayti, Eduardo, 2005, "Financial De-Dollarization: Is it for Real?", IMF working paper WP/05/187, 31 pages.

Ize, Alain and Levy Yeayti, Eduardo, 2003, "Financial Dollarization" Journal of International Economics, vol. 59, issue 2, pp 323-347

Ize, Alain and Levy Yeayti, Eduardo, March 1998, "Dollarization of Financial Intermediation: Cause s and Policy Implications", IMF working paper WP/98/28, 48 pages

Kokenyne, Annamaria; Ley, Jeremy and Veyrune, Romain, 2010, "De-dollarization" IMF working paper, WP/10/188

Levy Yeyati, Eduardo, 2006, "Financial Dollarization: Evaluating the Consequences", Oxford University Press, [Vol. 21, issue 45, 2006](#), pp. 62-118 (57 pages).

Levy Yeyati, Eduardo, 2021. "Financial dollarization and de-dollarization in the new millennium," Department of Economics Working Papers wp_gob_2021_02, Universidad Torcuato Di Tella.

Poghosyan Tigran, "Financial Development and Growth in the Caucasus and Central Asia", IMF Working Paper (Forthcoming).

Reinhart, Carmen M; Rogoff, Kenneth S. and Savastano, Miguel A., 2003, "Debt Intolerance," Brookings Papers on Economic Activity, 34, pp 1-74.

Rennhack, Robert and Nozaki, Misahiro 2006, "The Financial Dollarizataion in Latin America", IMF Working Paper WP/06/07

Saiyid, Mustafa, IMF and Ren, Haocong Ren, WB, 2021 FSAP mission to Georgia, Georgia: Financial Sector Assessment Program-Technical Note-Selected Issues in Banking Supervision, IMF Country Report No. 21/222

Annex I. Surveys

The paper relies on two surveys, one qualitative and one quantitative, circulated to country teams and the resident representative offices. The qualitative survey provides valuable information on macroprudential and administrative measures introduced by central banks to reduce dollarization (text table).

To better understand the de-dollarization policies introduced by the authorities in the region, the survey sought to inquire if the country had any de-dollarization policy in place, including details on the macroprudential and administrative measures and a description of the most successful introduced actions. In particular, the survey looked at measures such as additional capital requirements for unhedged FX exposures, open currency position limit, bans on FX lending, among others. The type of response was dichotomous (YES/NO), with a follow-up in case of YES, inquiring details on the measure, the date of introduction, and any other country-specific element.

Table A1. Qualitative Survey

| Questions |
|--|
| Is there a dedollarization policy in place? |
| Microprudential measures |
| Price incentives/risk mitigation |
| Additional capital requirements for unhedged FX exposures; |
| Additional/separate liquidity requirements for FX liabilities; |
| Open currency position (OCP) limit. Historical OCP positions; |
| Administrative measures |
| Bans on FX lending; |
| Stricter Debt-Service-to-Income & Loan-to-Value limits for FX loans; |
| Nonfinancial sector (e.g., ban on payments, contracts, advertisements in FX); |
| Did the authorities put sustained efforts to create the conditions for longer-term domestic capital market development? |
| Did the authorities introduce any other de-dollarization measures? |
| What has been the most successful measure? |

A second quantitative survey gathered monthly data on dollarization-related indicators from January 2010 until July 2021. Firstly, data was compiled from the IMF International Finance Statistics (IFS) and Haver (Central Banks statistics), when available, and then supplemented with the country team's responses, mainly extracted from country-specific Central Banks published reports and statistics. Daily data on EMBIG Sovereign Spreads was sourced from Bloomberg and data on local currency/US dollars exchange rate from the Financial Times.

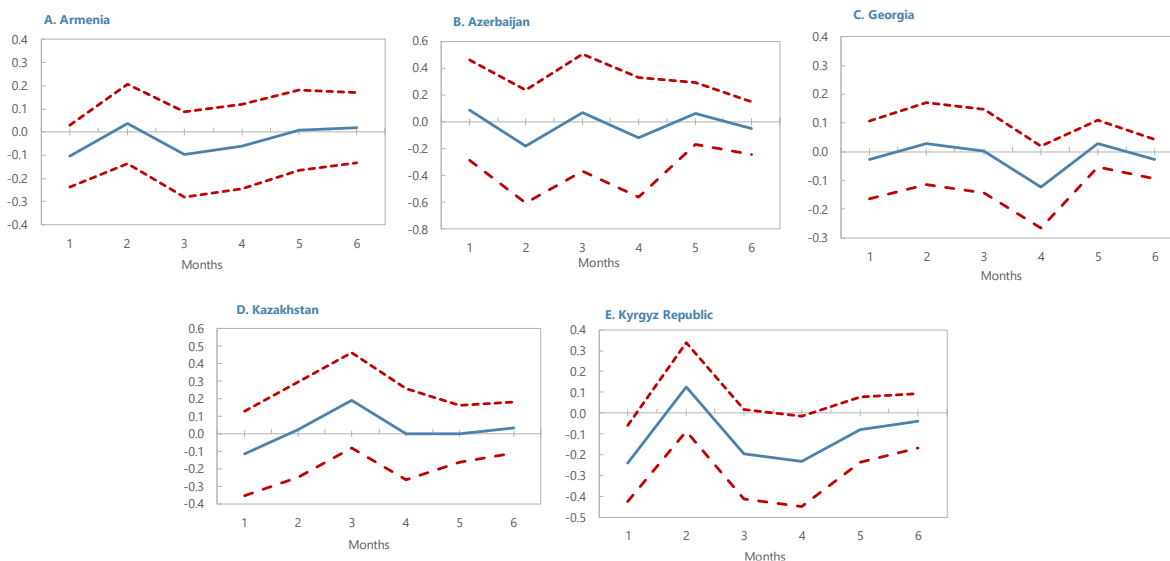
Table A2. Quantitative Data

| Indicator | Frequency | Source |
|--|-----------|---|
| Local Currency Deposit Rates | M | IMF International Finance Statistics (IFS), Haver (Central Banks statistics), and country specific Central Banks published reports and statistics (provided by country teams and resident representative offices) |
| Foreign Currency Deposit Rates | | |
| Local Currency Credit Rates | | |
| Foreign Currency Credit Rates | | |
| Five- and ten-years Local Currency Bond issuances | | |
| Reserve Requirement Ratio for local currency liabilities | | |
| Reserve Requirement Ratio for foreign currency liabilities | | |
| Local Currency Deposit Volumes | | |
| Foreign Currency Deposit Volumes | | |
| Local Currency Credit Volumes | | |
| Foreign Currency Credit Volumes | | |
| EMBIG Sovereign Spread | D | Bloomberg |
| Exchange rate | D | Financial Times |

We received responses from seven CCA countries: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz Republic, Tajikistan, Uzbekistan. Turkmenistan was excluded from the analysis given lack of reliable data.

Annex II. Impulse Response Functions

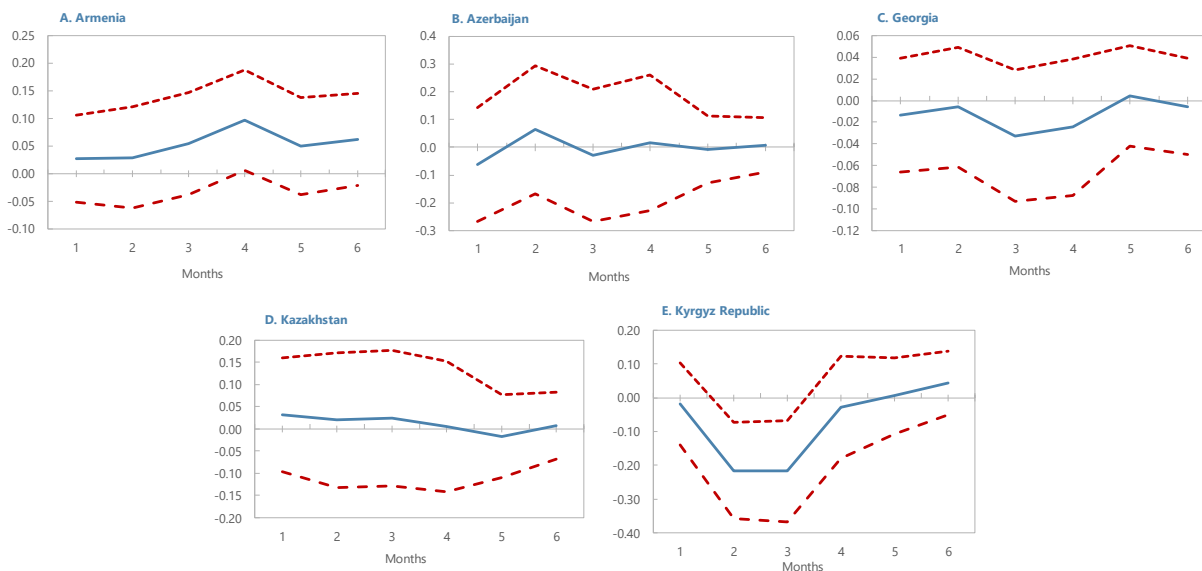
Figure A1a. Response of Deposit Dollarization to a Shock to Differential Reserve Requirement



Source: National Authorities, and authors calculation.

1/One standard deviation shock +/- 2 s.e.

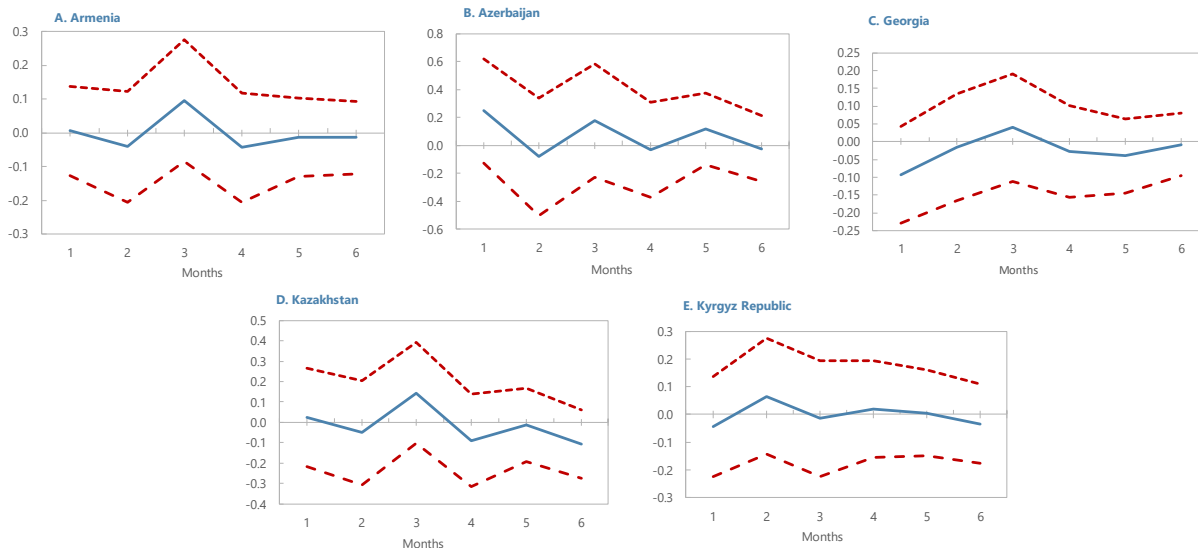
Figure A1b. Response of Credit Dollarization to a Shock to Differential Reserve Requirement



Source: National Authorities, and authors calculation.

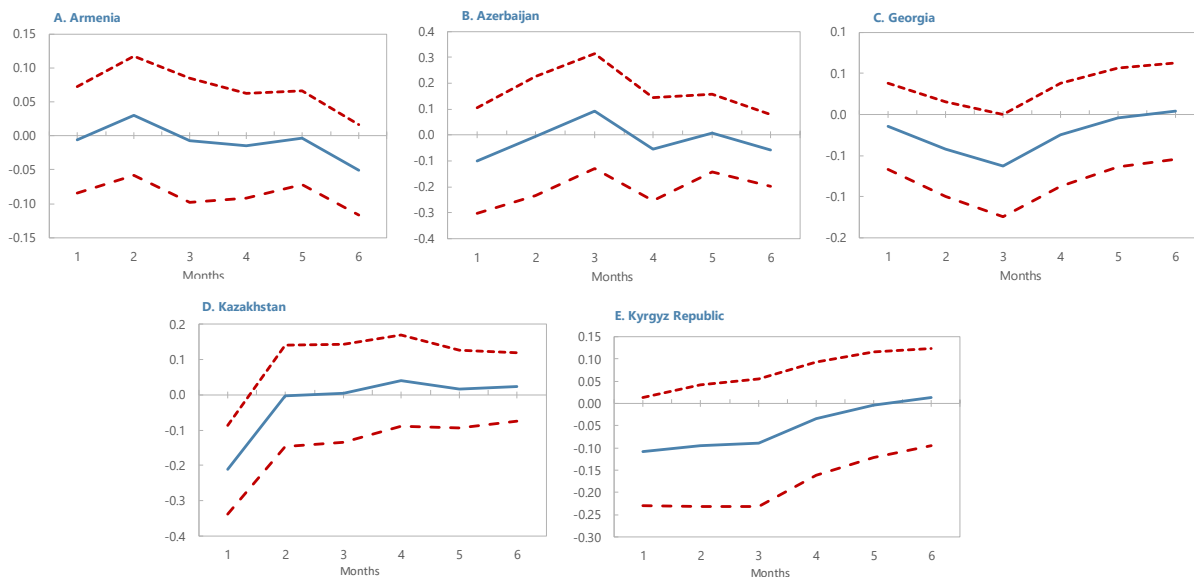
1/One standard deviation shock +/- 2 s.e.

Figure A1c. Response of Deposit Dollarization to a Shock to Introduction of Various Prudential Measures (Captured by a Dummy in the Analysis)



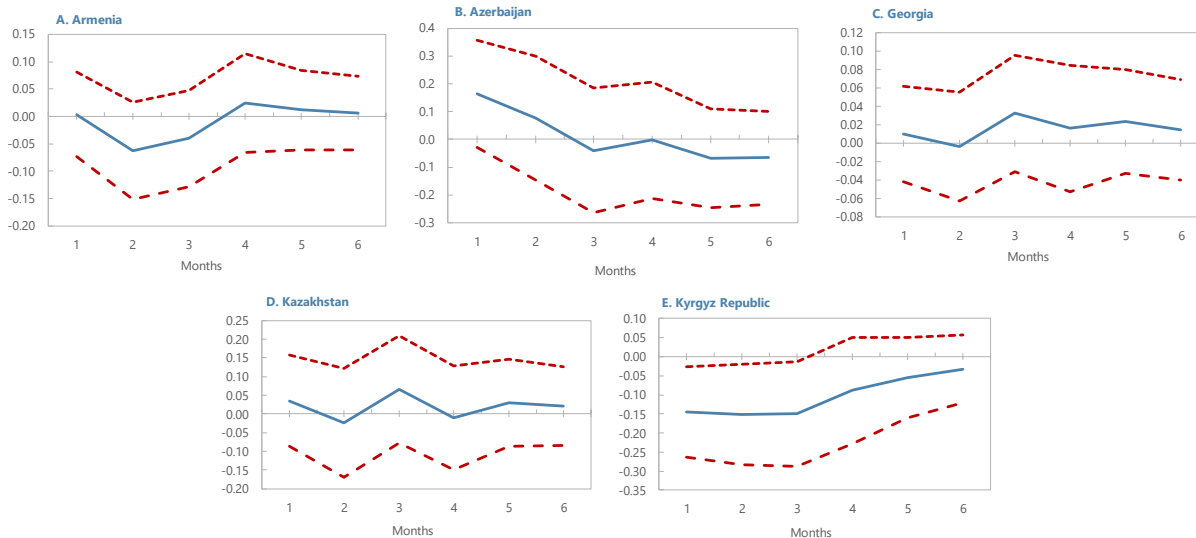
Source: National Authorities, and authors calculation.
 1/One standard deviation shock +/- 2 s.e.

Figure A1d. Response of Credit Dollarization to a Shock to Introduction of Various Prudential Measures (Captured by a Dummy in the Analysis)



Source: National Authorities, and authors calculation.
 1/One standard deviation shock +/- 2 s.e.

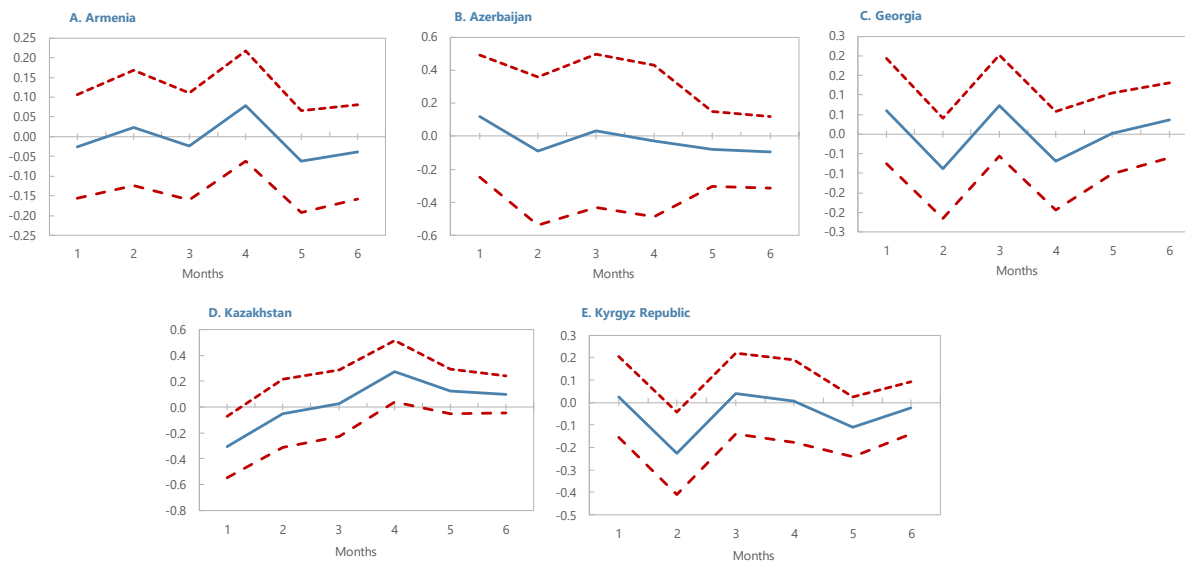
Figure A1e. Response of Credit Dollarization to an Exchange Rate Shock



Source: National Authorities, Haver Analytics (Financial Times), and authors calculation.

1/One standard deviation shock +/- 2 s.e.

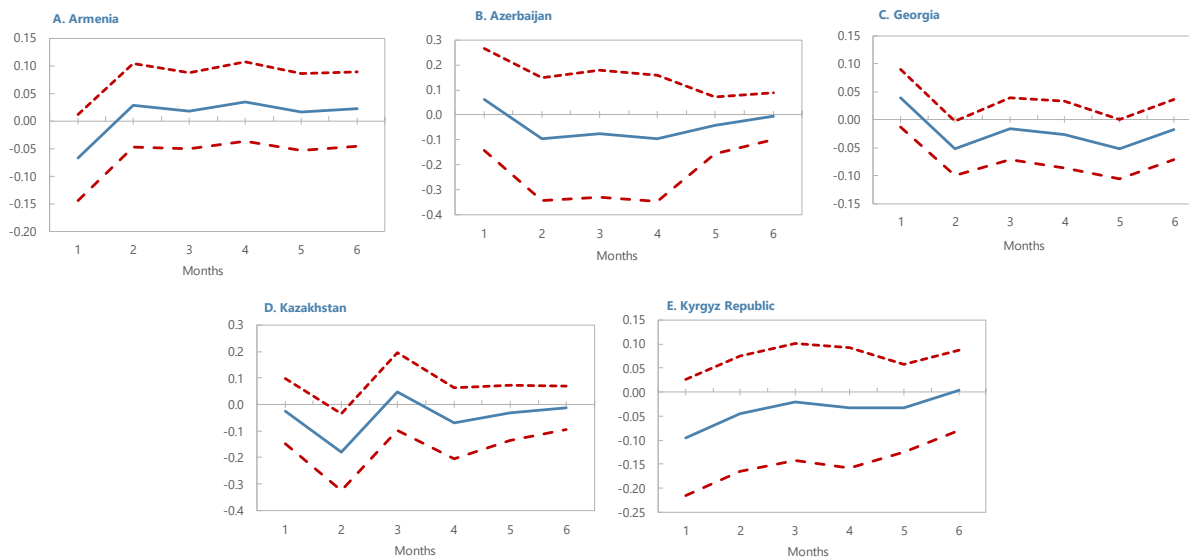
Figure A1f. Response of Deposit Dollarization to Issuance of Local Currency Long-term Bonds



Source: National Authorities, and authors calculation.

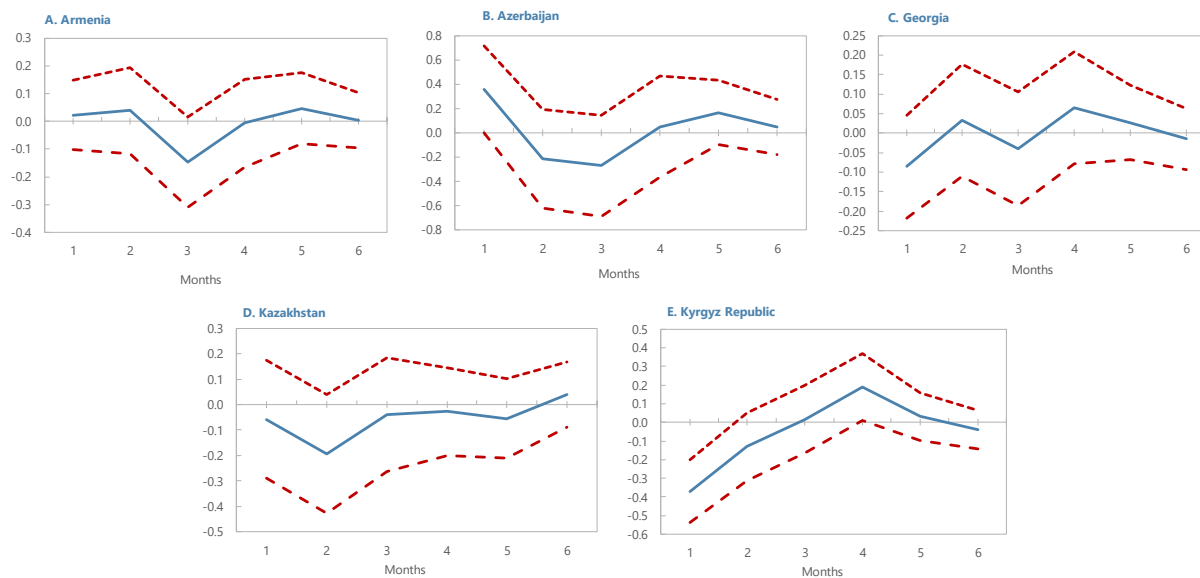
1/One standard deviation shock +/- 2 s.e.

Figure A1g. Response of Credit Dollarization to Issuance of Local Currency Long-term Bonds



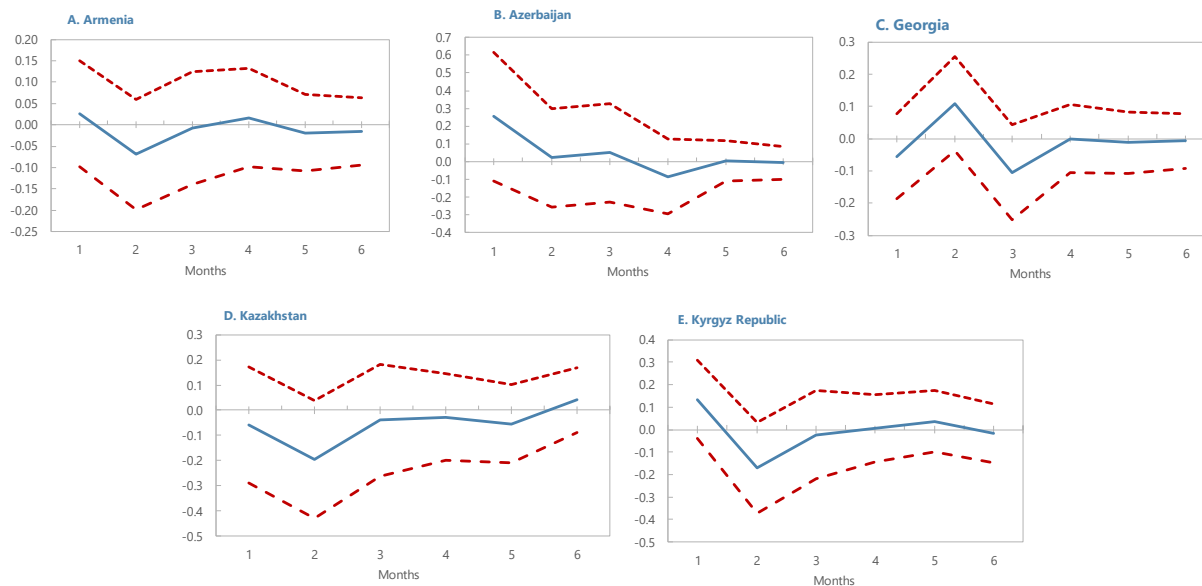
Source: National Authorities, and authors calculation.
 1/One standard deviation shock +/- 2 s.e.

Figure A1h. Responses of financial dollarization to change in spread between local and foreign currency deposit rates



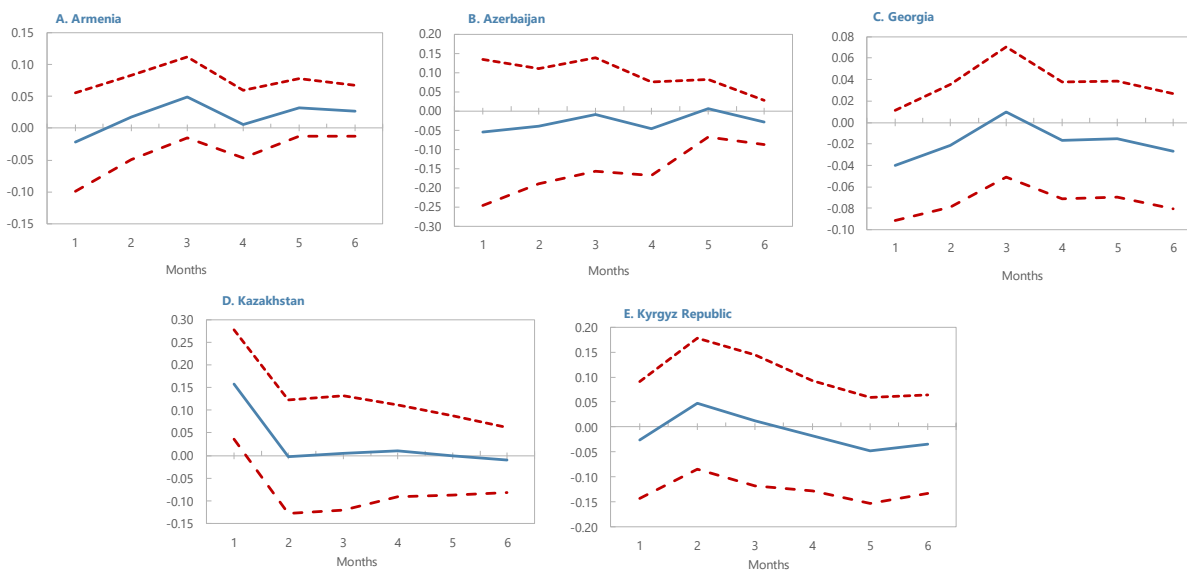
Source: National Authorities, and authors calculation.
 1/One standard deviation shock +/- 2 s.e.

Figure A1i. Response of Deposit Dollarization to an Exchange Rate Volatility Shock



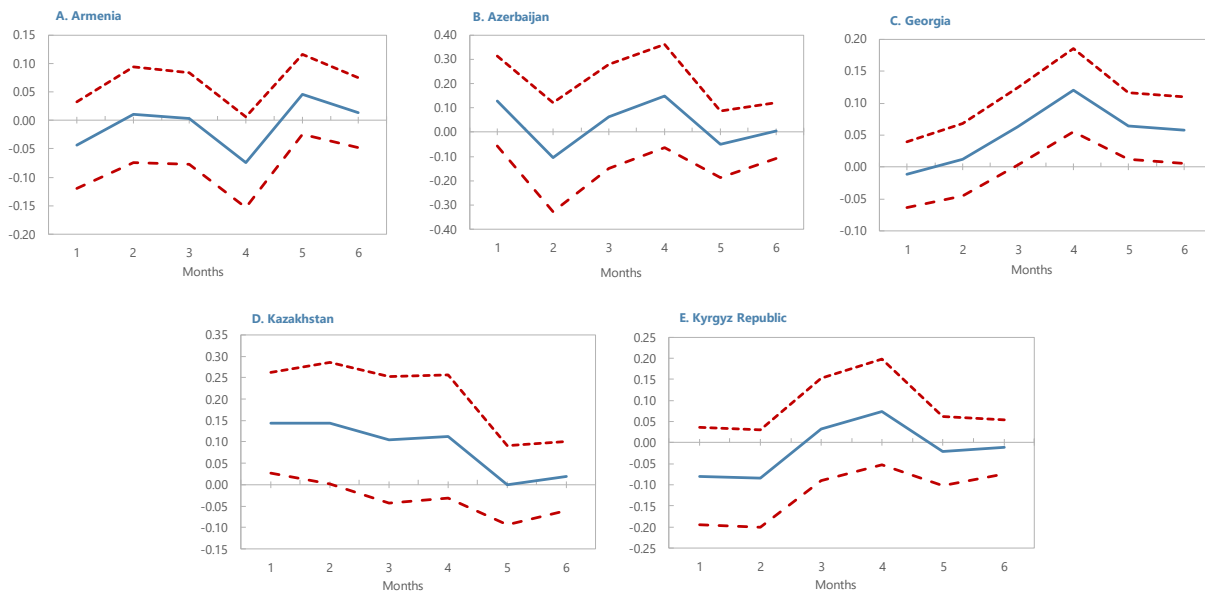
Source: National Authorities, Haver Analytics (Financial Times), and authors calculation.
 1/One standard deviation shock +/- 2 s.e.

Figure A1j. Response of Credit Dollarization to an Exchange Rate Volatility Shock



Source: National Authorities, Haver Analytics (Financial Times), and authors calculation.
 1/One standard deviation shock +/- 2 s.e.

Figure A1k. Response of Credit Dollarization to a Shock in Deposit Dollarization



Source: National Authorities, and authors calculation.

1/One standard deviation shock +/- 2 s.e.



PUBLICATIONS

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