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How to De-Dollarize Financial Systems in the Caucasus and Central Asia?

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Middle East and Central Asia

How to De-Dollarize Financial Systems in the Caucasus and Central Asia?[1]

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Abstract

Dollarization rates in the Caucasus and Central Asia (CCA) region are among the highest in the world, with adverse consequences for macroeconomic stability, monetary policy transmission, and financial sector development. Using dynamic panel data models, we find that foreign exchange 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. Although there is no unique formula for success, empirical studies and cross-country experiences suggest that credible monetary and exchange rate frameworks, low and stable inflation, and deep domestic financial markets are essential ingredients of any de-dollarization strategy. In implementation, policymakers need to consider proper sequencing of policies, effective communication as well as risks from potential financial disintermediation and instability, and/or capital flight.

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I. INTRODUCTION

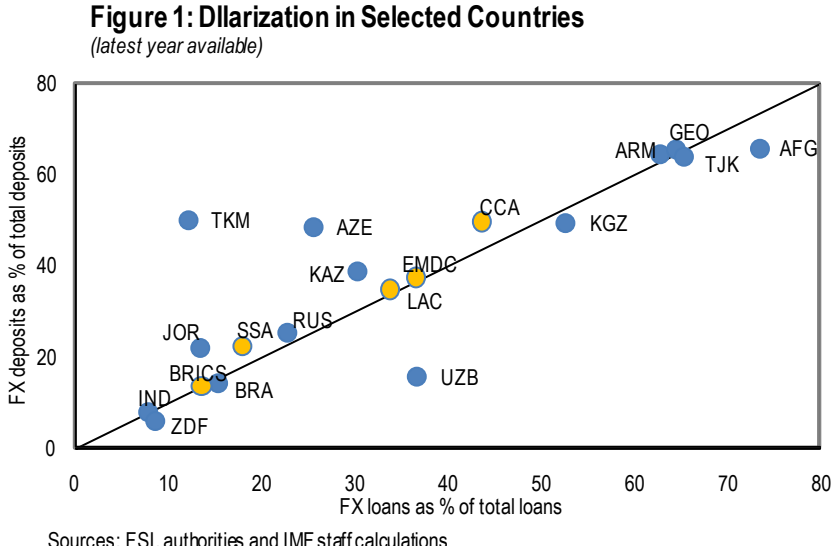
Financial dollarization is measured as the ratio of foreign exchange (FX) deposits and loans to total deposits and loans. Dollarization is generally associated with unstable and high inflation, exchange rate volatility, and undisciplined monetary policy. In dollarized economies, residents accumulate foreign currency assets in order to protect local-currency purchasing power, while lenders limit exposure to currency mismatches by lending in foreign currency. Highly dollarized financial systems can complicate the management of macroeconomic policy by weakening standard monetary transmission mechanisms and deepening the impact of the exchange rate channel on the inflation rate. These effects may be exacerbated in managed exchange rate regimes, which are common in many Caucasus and Central Asia (CCA) countries.[2] Dollarization can also increase the likelihood of balance sheet and liquidity risks, threatening the solvency of households, firms, and financial intermediaries subject to currency mismatches.

Financial dollarization in the CCA is very high compared with many other developing and emerging market economies (Figure 1). Despite reliably strong economic growth in the past two decades since the dissolution of the Soviet Union, as well as progress in macroeconomic stabilization, dollarization remains persistent in CCA countries. Although dollarization in the region has declined since 2000, this trend reversed temporarily in the aftermath of the global financial crisis; deposit dollarization increased sharply, while loan dollarization rose moderately. More recently, FX deposits and loans have also picked up due to the valuation effects of currency depreciations in a number of countries. Deposit dollarization stood at 46 percent on average in 2013Q4 (the last period in the sample), while loan dollarization was slightly lower at 40 percent.

The persistence of high dollarization levels in the CCA may be attributed to asymmetric exchange rate policies, inadequate prudential regulations, financial stability concerns, and idiosyncratic economic factors. CCA countries, especially oil importers, depend greatly on Russia, a key trading partner and source of remittances. Oil exporters are less dependent on Russia but remain exposed to commodity price volatility. Most CCA countries maintain pegged or managed exchange rate regimes, in contrast to many of their peers who have allowed greater exchange rate flexibility and, in some cases, have moved to inflation targeting. Though progress has been made, financial systems generally remain underdeveloped compared with those in many emerging markets. Considered together, these factors may incentive residents to hedge risk by holding foreign currency deposits.

[2] CCA countries are Armenia, Azerbaijan, Georgia, Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan.

Figure 1: Dollarization in Selected Countries
(Latest year Available)



Financial dollarization complicates the management of macroeconomic policy and increases financial risks. A highly dollarized financial system can limit the effectiveness of monetary policy and increase the likelihood of balance sheet and liquidity risks to the extent that currency mismatches exist. These effects may be exacerbated in managed exchange rate regimes, which are common in many CCA countries. Dollarization can also adversely affect the real economy, leading to lower growth and higher output volatility.

Despite its importance, only a few studies in the literature have covered the determinants of both deposit and loan dollarization. Rennhack and Nozaki (2006) find that allowing for more exchange rate flexibility and less bias against currency depreciation can reduce deposit dollarization in Latin American countries. More recently, Mwase and Kumah (2015) find that the size and variance of inflation and depreciation are important determinants of deposit dollarization in low-income countries. García-Escriban and Sosa (2011) study the deposit and credit de-dollarization experience of a group of Latin American countries (Bolivia, Paraguay, Peru, and Uruguay) and find that the introduction of prudential measures that create incentives to internalize the risks of dollarization, the development of a capital market in local currency, and successful de-dollarization of deposits have all contributed to a decline in credit dollarization in these countries. Kokenyne and others (2010) highlight the role of exchange rate volatility and macroeconomic stabilization in explaining FX loans for 21 countries and FX deposits for 32 countries from Latin America, Emerging Europe, and Africa.

To the best of our knowledge, this is the first comprehensive paper to shed light on the determinants of both FX deposits and loans with a special focus on CCA economies. The literature on the experience of Latin American and Emerging European countries is more developed than that on the CCA. Among the few relevant studies on the CCA in the literature, De Nicolo and others (2005) cover many countries in addition to the CCA and focus only on the causes and consequences of dollarized bank deposits. Honohan (2007) examines short-run variations in deposit dollarization and the effects of exchange rate

changes using a sample that includes several, but not all, CCA countries. Luca and Petrova (2008) focus on the drivers of credit dollarization only in their sample of 21 transition countries, which includes five CCA economies. Neanidis and Savva (2009) study short-run variations in deposit and loan dollarization in a number of transition economies, including Armenia, Georgia, and the Kyrgyz Republic.

Specifically, this paper aims at (i) explaining the determinants of the particularly high and persistent rates of dollarization in the CCA; (ii) differentiating between the drivers of deposit and loan dollarization in the CCA; and (ii) using successful de-dollarization country experiences along with our empirical results to suggest a menu of macroeconomic and financial measures that can reduce dollarization in the region.

The main findings of the paper suggest that although FX deposits and loans in the CCA and other regions of the world are affected by some similar factors, the CCA countries have their own unique set of determinants of dollarization. Specifically, we find that in the CCA, as in other regions of the world, frequent depreciations and high volatility of exchange rates are associated with a rise in FX deposits, while high inflation increases banks' lending in foreign currency. Other findings suggest that FX deposits and loans show strong persistence, and weak financial development exacerbates financial dollarization. But in contrast to experiences elsewhere, inflation volatility increases both FX deposits and loans in the CCA, while higher inflation per se only affects FX loans. Moreover, the asymmetric exchange rate policies in the CCA induce depositors to hold a higher share of FX deposits to preserve their purchasing power. Lastly, high levels of FX deposits encourage banks to lend to domestic borrowers in foreign currency to maintain matched balance sheet positions.

The empirical results, as well as successful de-dollarization country experiences, suggest that the CCA countries could reduce dollarization by pursuing a targeted menu of macroeconomic and financial stability measures. Although there is no single formula for success, credible monetary and exchange rate frameworks, low and stable inflation, and deeper domestic financial markets are essential ingredients of any de-dollarization strategy. Recommendations include a gradual move toward more flexible exchange rates, measures to make the local currency more attractive and reduce the asymmetry of exchange rate policy, and enhancing financial development. When implementing de-dollarization measures, policymakers should take account of risks from potential financial disintermediation and instability as well as capital flight, while bearing in mind that transparent and effective communication is important to build public trust in the credibility of monetary policymaking.

The paper is structured as follows. Following this introduction, Section II discusses stylized facts about dollarization and its effects on macroeconomic policy. Section III analyzes the drivers of dollarization and presents the methodology and results, while Section IV proposes macroeconomic and financial measures aiming at reducing dollarization. Finally, Section V concludes.

II. DOLLARIZATION: LITERATURE REVIEW

Dollarization may affect the autonomy of monetary policy and weaken standard transmission mechanisms, potentially leading to aggregate demand effects in contrast to those in advanced economies (IMF, 2006). Ize and Yeyati (2005) argue that the interest rate channel becomes ineffective when most intermediation is in dollars. Central banks exert less control over the domestic interest rate channel when residents hold substantial assets and liabilities in foreign currency (Fischer and others, 2013). As a result, exchange rate changes become more important than interest rate changes in the conduct of monetary policy (IMF 2006 and Acosta-Ormaechea and Coble, 2011). Accordingly, price elasticities to monetary shocks are prone to be higher in dollarized countries (Yeyati, 2006).

Dollarization deepens the impact of the exchange rate channel on the inflation rate. This effect is particularly visible in managed exchange rate regimes, which are common in many CCA countries (Table 1). Ize and Yeyati (2005) and Leiderman and others (2006) argue that dollarization is associated with higher exchange rate pass-throughs, limiting the countercyclical capacity of domestic monetary policy and exacerbating the fear of floating in dollarized economies.

The theoretical literature generally associates financial dollarization with unstable and high inflation, exchange rate volatility, and undisciplined monetary policy. Rennhack and Nozaki (2006) characterize financial dollarization as a rational response to inflation uncertainty; exchange rate regimes biased against depreciation are associated with high financial dollarization levels. In dollarized economies, residents hold foreign currency assets in order to protect local-currency purchasing power, while lenders limit their exposure to currency mismatches by lending in foreign currency.

Highly dollarized financial systems may be more vulnerable to crises. Financial risks that arise with dollarization typically include credit risks that may stem from mismatches between dollar assets and liabilities in the private sector's balance sheet, solvency risks arising from potential currency mismatches in the event of large depreciations, and liquidity risks, which can lead to divergence between onshore and offshore interest rates on dollar deposits.[3] De Nicolo, Honohan, and Ize (2005) demonstrate that financial intermediaries in countries with extensive deposit dollarization are prone to higher risk, as measured by nonperforming loan ratios, deposit volatility, and "distance to default" metrics. Fischer and others (2013) argue that dollarization increases the risk of asset and liability mismatches (currency risk) or risks resulting from banks' lending in dollars to clients whose earnings are in local currency (portfolio risk). Dollarized economies are at greater risk of banking crises in the wake of exchange rate depreciations; their financial systems are more fragile, and residents are minimally benefited by the liquidity boost to domestic financial markets (Yeyati, 2006).

[3] For more details, see Kokenyne and others (2010), Erasmus and others (2009), Cayazzo and others (2006), and Yeyati (2006).

Dollarized economies are associated with higher interest rates spreads. Honohan (2007) shows that dollarized economies are subject to higher interest rates and interest rate spreads as a consequence of concerns about currency depreciation. Accordingly, price elasticities to monetary shocks are often higher in dollarized countries (Yeyati, 2006). Perhaps owing to weak policy transmission mechanisms, inflation responds more strongly to monetary shocks, and is generally higher in dollarized economies, even when controlling for the path of monetary aggregates.

Dollarization can also negatively affect the real economy. A comprehensive study by Yeyati (2006) shows that dollarization is associated with lower growth and higher output volatility, after controlling for typical macroeconomic and institutional variables and potential endogeneity problems.

Dollarization can be persistent. Ize and Yeyati (2005) argue that dollarization can be persistent, even in countries that have implemented macroeconomic stabilization policies and successfully reduced inflation, in the presence of asymmetric exchange rate policies, misguided prudential regulations, and financial stability concerns related to currency mismatches. Drawing on the experience of Liberia, Erasmus and others (2009) find that dollarization is particularly persistent in countries with a legacy of poor macroeconomic management and unstable economic conditions. Moreover, dollarization levels may remain elevated even as inflation volatility falls relative to the real exchange rate and the required share of foreign currency assets in the minimum variance portfolio declines (Rennhack, 2006); the most likely reason is the costs involved in transitioning from a dollarized to a non-dollarized economy. Rennhack (2006) also presents evidence that dollarization trends in Latin America may be more persistent than elsewhere.

The empirical literature finds that deposit and loan dollarization are often linked, but the causes and consequences are not necessarily the same. Garcia-Escribano and Sosa (2011) distinguish between the drivers of deposit dollarization and loan dollarization, showing that the causation stems from changes in deposit dollarization to changes in credit dollarization, which they believe is explained by banks' desire to maintain matched foreign currency positions. In turn, the de-dollarization of deposits contributes to loan de-dollarization. Luca and Petrova (2008) confirm that banks' currency matching of assets and liabilities—domestic loans and deposits—drives loan dollarization. Kokenyne and others (2010) study the role of exchange rate volatility in explaining FX loans for 21 countries and FX deposits for 32 countries from Latin America, Emerging Europe, and Africa. They find that exchange rate volatility has a significant impact on FX deposits only, while changes in the exchange rate are statistically significant in both asset and liability dollarization regressions.

Dollarization can be affected by a number of factors in the short term. Neanidis and Savva (2009) elaborate on the short-term determinants of financial dollarization. They find that the short-term effects of currency depreciation and expansionary monetary policy tend to have a more severe impact on deposit dollarization in highly dollarized countries. In line with previous results, short-term loan dollarization is largely driven by currency matching by banks. In the short term, an increase in the local-currency interest rate reduces deposit dollarization, while exchange rate depreciation induces residents to acquire foreign-currency

assets. Notably, they find that inflation does not affect deposit dollarization in the short term. Honohan (2007) reports that exchange rate depreciation leads to increased dollarization in the short run; however, monetary expansion actually reduces the share of dollarized deposits in the short run as local currency deposits rise mechanically due to the increase in the nominal quantity of local-currency base money. Higher dollarization is also associated with poor institutional quality and procyclical real exchange rates (Yeyati, 2006). Finally, Ize and Yeyati (1998; 2003), using a minimum variance portfolio model, show that the volatility of inflation is an important determinant of the degree of dollarization. When the expected volatility of inflation is high relative to the real exchange rate, residents increase the share of foreign currency assets in their portfolios, hedging against macroeconomic risks by acquiring assets of stable real value in terms of domestic purchasing power.

Studies of de-dollarization experiences in other regions emphasize the roles of macroeconomic stabilization measures, exchange rate flexibility, and prudential regulations. Rennhack and Nozaki (2006) examine the drivers of deposit dollarization in Latin American countries and find that allowing for more exchange rate flexibility and less bias against currency depreciation can reduce deposit dollarization. They also suggest adapting prudential regulations to ensure that costs associated with increased financial dollarization are fully internalized in financial contracts. García-Escriban and Sosa (2011) study the deposit and credit de-dollarization experience of a group of Latin American countries (Bolivia, Paraguay, Peru, and Uruguay) and find that exchange rate appreciation has been a key factor explaining deposit de-dollarization, while the introduction of prudential measures that create incentives to internalize the risks of dollarization, the development of a capital market in local currency, and successful de-dollarization of deposits have all contributed to a decline in credit dollarization in these countries. In Peru, García-Escribano (2010) and the IMF (2007) present evidence that dollarized credits and deposits have been reduced through macroeconomic stability, exchange rate flexibility, and the introduction of prudential regulations that better reflect currency risks. The important role of macroeconomic stabilization measures in reducing financial dollarization is discussed at length in Kokenyne and others (2010) for the case studies of Argentina, Pakistan, Chile, Israel, Poland, and Egypt, as well as in Erasmus and others (2009) for Liberia.

III. Empirical Analysis

A. Model and Data

Building on the models of De Nicolo and others (2005), Neanidis and Savva (2009) and Kokenyne and others (2010), among others, we investigate the drivers of deposit and loan dollarization for a number of countries over the 2001Q1–2014Q1 period:

$$fxdeposit_t = \beta_0 + \beta_1 fxdeposit_{t-1} + \beta_2 exr_t + \beta_3 exrvol_t + \beta_4 inf_t + \beta_5 infvol_t + \beta_6 credit_t + \beta_7 exrasymmetry_t + \varepsilon_t \quad (1)$$

$$fxloan_t = \beta_0 + \beta_1 fxloan_{t-1} + \beta_2 fxdeposit_t + \beta_3 exr_t + \beta_4 exrvol_t + \beta_5 inf_t + \beta_6 infvol_t + \beta_7 credit_t + \beta_8 exrasymmetry_t + \varepsilon_t \quad (2)$$

where $fxdeposit_t$ and $fxloan_t$, the dependent variables in the two specifications, are deposit and loan dollarization at time *t*. Independent variables include a lagged dependent variable to account for persistence effects; exr_t is the exchange rate, $exrvol_t$ is a measure of exchange rate volatility (the rolling standard deviation of the exchange rate over the previous four quarters), inf_t is the inflation rate, $infvol_t$ is inflation volatility (the rolling standard deviation of inflation over the previous four quarters), and $credit_t$ is a measure of financial development proxied by the ratio of credit to the private sector to GDP.[4] Finally, following Rennhack and Nozaki (2006) and Neanidis and Savva (2009), we include $exrasymmetry_t$ as a dummy variable that captures asymmetry in the exchange rate policy by taking a value of one in cases of depreciation and zero in appreciation. Data sources are IMF International Financial Statistics (IFS), IMF World Economic Outlook (WEO), Haver, and national authorities. Our sample covers the 2001Q12014Q1 period.[5]

A dynamic panel methodology is used. Based on the results of econometric specification tests (see details below), we use a dynamic panel data model to explain the drivers of financial dollarization in the CCA. Introducing a lagged dependent variable, as in the above equation, would render the least-square estimator biased and inconsistent because it will be correlated with the error term. To overcome this problem, Anderson and Hsiao (1981; 1982) suggested using lags of the RHS regressors as instruments to yield consistent estimators. Arellano and Bond (1991) further suggested using a generalized method of moments (GMM) estimator, called the Difference-GMM estimator (D-GMM), since it applies GMM on the differenced equation, which we use in our analysis. Specifically, the DGMM estimator is a linear dynamic panel-data model that includes lags of the dependent variable as covariates and contains unobserved panel-level effects, and uses the entire set of available instruments. Robust standard errors are used to deal with asymptotical efficiency. Summary statistics are presented in Table 2.

B. Empirical Results

The empirical results suggest that volatile inflation, currency depreciation, asymmetric exchange rate policies, and low financial depth drive financial dollarization in the CCA. The results, shown in Tables 3 and 4, also suggest that certain factors are unique to the CCA countries in particular; however, the CCA and other regions of the world share a common set of drivers of financial dollarization, which include:

[4] It is worth mentioning that some papers include an interest rate differential variable that measures the effect of the difference between interest rates on domestic versus foreign deposits and loans. It would have also been ideal to include a measure of the depth of the foreign exchange market such as the size of foreign exchange (or derivatives) market. We were not able to incorporate these variables due to the lack of sufficient data for a number of countries in our dataset, lack of consistency in definitions of interest rate variables across all countries, as well as the different data frequencies available for different countries.

[5] For some countries where quarterly GDP data were not available (as in Turkmenistan and Uzbekistan), we use the Denton method, described in Di Fonzo and Marini (2012), to extrapolate yearly GDP into quarterly series.

- **Frequent depreciations and high volatility of exchange rates are associated with a rise in FX deposits, but not in FX loans.** The depreciation and volatility of exchange rates tend to increase FX deposits (see Table 3). For similar results from the literature, see Honohan (2007) and Neanidis and Savva (2009). Regarding loan dollarization, the empirical results suggest that changes in the exchange rate and its volatility do not appear to affect FX loans in the CCA (see Table 3). Kokenyne and others (2010) also find that exchange rate volatility has a significant impact on liability, not asset, dollarization in their sample, which included many countries from Latin America, Emerging Europe, and Africa.

- **Financial dollarization is a persistent phenomenon.** The study finds that in the CCA, as in other regions of the world, FX deposits and loans show strong persistence, as evident from the statistically and economically significant lagged dependent variables in the regressions (see Tables 3 and 4).

- **Financial depth matters.** The study also finds that weak financial depth contributes to more FX deposits and loans. As Tables 3 and 4 show, lack of financial depth is an important driver of financial dollarization in most regions of the world as well. In many ways, financial dollarization is a response to inadequate risk sharing mechanisms—such as long-term bond markets and hedging instruments—in the domestic currency. Luca and Petrova (2008) show that a developed forward foreign exchange market is associated with lower levels of dollarization. In the former Soviet Union, dollarization was the product of high inflation and the lack of alternative savings instruments after the liberalization of foreign exchange regimes (Sahay and Végh, 1995). Nonetheless, Yeyati (2006) does not find evidence that highly dollarized economies achieve visible gains in financial depth when they adopt dollarized financial intermediation. That is, while weak financial depth promotes dollarization, dollarized financial systems are not necessarily any deeper.

The empirical results also suggest that there are some unique factors that affect financial dollarization in the CCA countries, but not in other regions. These include:

- **Dollarized deposits induce dollarization of loans.** High levels of FX deposits encourage banks to lend to domestic borrowers in foreign currency to maintain matched balance sheet positions, in effect transferring the burden of exchange rate risk to depositors. Neanidis and Savva (2009) find that short-term loan dollarization is largely driven by currency matching by banks.

- **Inflation volatility, not just inflation, matters.** In contrast to regions elsewhere, the empirical results in the CCA suggest that inflation volatility increases both FX deposits and loans, while higher inflation, per se, only affects FX loans (see Tables 3 and 4). This result is unique for the CCA countries, as inflation volatility has a statistically significant impact on financial dollarization in the CCA, but not in other regions. The IMF (2014) provides a similar finding for the case of deposit dollarization in Kazakhstan. Higher inflation, per se, does not seem to affect FX deposits in any region, but affects FX loans

in the CCA as well as in the full sample, developing and emerging Asia and emerging and developing economies. The IMF (2015) also finds that higher inflation only affects FX loans and not deposits in the case of Azerbaijan.

- **An asymmetric exchange rate policy decreases confidence in the domestic currency and induces more FX deposits.** The asymmetric nature of exchange rate policy in some CCA countries, where the central bank allows for depreciation but resists appreciation of the domestic currency by using capital controls and/or intervening in the foreign exchange market, induces depositors to hold a higher share of FX deposits to preserve their purchasing power. This is another unique result for the CCA countries; this factor does not seem to influence FX deposits in any other region of the world (see Table 3). In a time-series study on Kazakhstan, the IMF (2014) also reports asymmetric exchange rate policy as one of the contributors to deposit dollarization in the country.

C. Robustness Checks

The empirical results hold under a number of robustness checks. Specifically, we try different econometric techniques and different sample periods, and account for possible outliers. Tables 5 and 6 present robustness results for the FX deposits and FX loans regressions, respectively.

The Difference-GMM model, reported in Tables 3 and 4 earlier, is our preferred model. We use different econometric techniques for robustness, including OLS, static, and dynamic panel data methods. Based on the results of many econometric tests, including the Hausman test and the Sargan test of over-identifying restrictions, we find that the D-GMM model is the most appropriate in both the FX deposits and FX loans regressions. For example, for the Sargan test for the FX deposit regression, 98 instruments were used to estimate eight parameters, so we have a total of 90 over-identifying restrictions. As reported in Table 3, the null hypothesis that the instruments in the DGMM equation are valid is not rejected at the 5 percent significance (95 percent confidence) level, while it is rejected in the case of the SGMM.

Accounting for outliers does not change the results. We re-run the D-GMM model on a trimmed sample after cutting the top and bottom 5 percent of observations of the dependent variables, to control for potential outliers. The results are very similar to those of the D-GMM model, in both the FX deposits and loans regressions.

Splitting the sample into two periods—before and after the global financial crisis (GFC)—does not change the essence of the results. Most of the results from these two regressions are comparable to the baseline D-GMM regression, although those for the post-GFC period are somewhat closer to the full sample than the pre-GFC results. For the determinants of deposit dollarization, the persistence of FX deposits plays an important role both before and after the GFC, although the absolute value of the coefficient is larger before the GFC rather than after. On exchange rate issues, changes in the exchange rate seem to be more important before the GFC, while exchange rate volatility is more important after the GFC. The results also show that higher inflation does not affect FX deposits, neither before

nor after the GFC, while inflation volatility only becomes an issue after the GFC. Finally, deeper financial systems seem to reduce deposit dollarization only after the GFC. For the determinants of loan dollarization, results from the pre- and post-GFC periods are broadly the same. Lagged FX loans, FX deposits, and weak financial depth all contribute to more loan dollarization, both before and after the GFC. Inflation and inflation volatility, however, only seem to affect loan dollarization in the post-GFC sample.

Baseline results are especially relevant in the case of CCA countries with fixed exchange rate regimes. We split the sample into fixed versus flexible exchange rate regimes, and in the case of the FX deposit regression, find that the persistence and inflation volatility show the same effect, while exchange rate depreciations and the asymmetric nature of exchange rate policy tend to matter only in the case of fixed exchange rate regimes. For the FX loan regression, inflation and financial development seem to matter only in the case of fixed exchange rate regimes, while FX deposits and lagged FX loans are important drivers of loan dollarization in both regimes.

IV. Conclusion and Policy Recommendations

Empirical results in this paper indicate that the CCA and other regions of the world share a number of common drivers of dollarization. These include frequent depreciations and high volatility of exchange rates as drivers of FX deposits, while high inflation increases FX banks' lending. Both FX deposits and loans show strong persistence, and weak financial systems exacerbate financial dollarization.

In contrast to regions elsewhere, inflation volatility in the CCA increases both FX deposits and loans, while higher inflation, per se, only affects FX loans. Results also indicate that the asymmetric nature of exchange rate policies in some CCA countries induces depositors to hold a higher share of FX deposits to preserve their purchasing power. Finally, high levels of FX deposits encourage banks to lend to domestic borrowers in foreign currency to maintain matched balance sheet positions.

In light of these results, and building on successful de-dollarization initiatives in Latin America and Emerging Europe, a menu of policies aimed at macroeconomic stabilization, with a complement of prudential regulations is essential for the CCA countries.

Although there is no single formula for success, de-dollarization is a process that is largely endogenous to monetary policy and the degree of development of the financial system. From a macroeconomic perspective, although there is no unique formula for success, credible monetary and exchange rate frameworks, low and stable inflation, and deeper domestic financial markets are essential ingredients of any de-dollarization strategy. An inflation-targeting regime with flexible exchange rates and the absence of fiscal dominance would provide the best framework for market-driven financial de-dollarization (Kokenyne and others, 2010). Flexible exchange rate regimes that imply two-way risks contribute to lower dollarization levels. Broadly, regulations should make domestic agents internalize the risks of dollar intermediation, and authorities should actively promote the local currency (Ize

and Yeyati, 2005). Dollarization should eventually decline in response to confidence-building and market-based policies that address the underlying problems that cause residents to seek out foreign-currency assets as a hedge against domestic macroeconomic instability or uncertainty. Monetary authorities can also decrease interest rate volatility by supporting domestic liquidity in the financial system and developing forward FX markets that allow residents to adequately hedge exposures.

CCA countries need further deepening of their financial systems to counter FX dollarization. Introduction of local currency–denominated securities with credible indexation systems, development of markets for instruments to hedge currency risks, enhancement of non-banking institutions and capital markets, improvement of credit information systems, strengthening of supervision, removal of administrative controls on interest rates, and introduction of unbiased taxation on income earned from FX deposits, bonds, or other financial transactions versus local currency taxes are all measures that can help discourage dollarization. As Garcia-Escribano and Sosa (2011) and Garcia-Escribano (2010) show, loan de-dollarization is facilitated by measures that foster capital markets, particularly long-term local-currency bond issuance. Luca and Petrova (2008) emphasize that developing forward and futures FX markets encourages de-dollarization by offering residents more sophisticated hedging mechanisms in the domestic currency. Kokenyne and others (2010) recommend that authorities actively manage public debt, create domestic bond markets, and promote alternatives to dollar-denominated assets, as well as hedging instruments for currency risk.

CCA policymakers should be aware that successful de-dollarization takes time, and therefore proper sequencing of policies is important. A study by the IMF (2006) suggests that a credible and successful macroeconomic policy of disinflation is likely to reduce dollarization over time. In this context, proper sequencing of policies is essential. For example, countries with less flexible exchange rate regimes can start by gradually widening the exchange rate bands, managing liquidity more efficiently, and improving the monetary transmission mechanism through more effective policy rates. Generally, policies that target the de-dollarization of deposits contribute to de-dollarization of loans (Garcia-Escribano and Sosa, 2011).

Effective communication by CCA central banks will be critical. More transparent and effective communication by central bank officials is also important for building public trust in the credibility of monetary policymaking. Ize and Yeyati (2005) note that de-dollarization is very closely linked to improving monetary credibility, arguing that reforms should build the institutional capacity of the central bank to pursue independent monetary policy. Establishing credibility may entail switching monetary regimes and introducing an explicit price stability mandate. A monetary policy framework rooted in credible communication of future actions can help enhance the attractiveness of the domestic currency through the expectations channel.

Increasing the attractiveness of the domestic currency is essential. Over the short term, CCA countries should focus on measures that make the local currency more attractive and reduce the asymmetry of exchange rate policy. Cayazzo and others (2006), Rennhack and

Nozaki (2006), and García-Escribano and Sosa (2011) summarize some de-dollarization examples of successful countries in Latin American and Emerging Europe. Successful initiatives and prudential regulations in these countries include holding reserve requirements for FX deposits in local currency, imposing higher reserve requirements on FX deposits, and remunerating the reserve requirement on local currency deposits at a higher rate than for FX deposits. Some Latin American countries required banks to carry routine evaluations of currency risks, or, alternatively, to set up reserves as a percentage of foreign currency credit that has not been evaluated. Liquidity requirements have also been regulated, requiring banks to hold liquid assets of certain percentages on their short-term liabilities, with higher requirements for foreign currency than for domestic currency liabilities. Other measures include raising insurance premiums on FX deposits, limiting FX lending to un-hedged borrowers, requesting credit bureaus to provide currency-specific information on all debt, and requiring banks to conduct routine evaluations of currency risks.

It is important to encourage market-based de-dollarization as opposed to forced de-dollarization. In an unstable macroeconomic environment, policy measures that force de-dollarization may lead to capital flight, financial disintermediation, and banking sector instability (Kokenyne and others, 2010). De-dollarization measures that have failed in the past include the forced conversion of foreign currency deposits and the suspension of access to foreign currency deposits. Authorities should use caution in introducing interest rate or capital controls, policies that place limits on foreign currency borrowing or lending, and requirements to use local currency in domestic transactions. Furthermore, the regulatory burden associated with the de-dollarization process may lead to disintermediation or potentially more risky intermediation (Ize and Yeyati, 2005). Policymakers should thus be attuned to opportunities for regulatory arbitrage.

Finally, implementation challenges exist. When implementing de-dollarization measures, policymakers need to account for risks from potential financial disintermediation and instability, and/or capital flight. De-dollarization policies also face the difficult task of changing ingrained behaviors; in dollarized economies, the public becomes used to dealing in foreign currency and may resist the costs of switching to the domestic currency. Finally, because of the persistence of dollarization, de-dollarization may proceed very gradually, and policymakers may need to sustain reform momentum over many years.

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Tables

Table 1: Exchange Rate and Monetary Frameworks in the CCA

	Monetary Policy Framework			
Exchange Rate Arrangement	**U.S. dollar or euro anchor**	**Monetary target**	**Inflation targeting**	**Other**
Conventional peg	Comoros, South Sudan, TKM, Venezuela			
Stabilized arrangement	KAZ, Macedonia, Vietnam[1]	Bangladesh[1], Congo[1], TJK[1]		Angola[1], AZE[1]
Crawl-like arrangement	Croatia, Jamaica	China[1], UZB[1]	ARM, Dominican Rep.[1]	Belarus
Other managed arrangement		Nigeria, Rwanda	Czech Rep.	KGZ, Russia
Floating			Brazil, GEO, Romania, South Africa, Turkey	India
Free-floating			Chile, Mexico, Poland	

[1]These countries maintain a de facto exchange rate anchor to the U.S. dollar.

Sources: IMF Annual Report on Exchange Arrangements & Exchange Restrictions; IMF country reports.

Table 2: Summary Statistics for Regression Variables in the CCA

	Obs	Mean	Std. Dev	Min	Max
Log(fxloan)	364	3.574621	1.061646	-1.60944	4.753715
Log(fxdeposit)	339	3.93807	0.425402	2.661841	4.466441
Log(exr)	392	2.915796	2.573393	-0.24296	7.709832
Exrvol	370	7.824148	23.99622	0	235.9098
Exrasymmetry	396	0.090909	0.923295	-1	1
Inf	409	0.085955	0.075303	-0.06521	0.617309
Infvol	391	2.549398	2.673644	0.207859	21.60189
Log(credit)	323	1.316759	2.215232	-4.87544	4.076545

Table 3: Regression Estimates of the Drivers of Deposit Dollarization

	CCA	All	EUR	LAC	DEVEMASIA	EMDE
L.lfxdeposit	0.599	0.426	0.184	0.289	0.525	0.429
	(9.20)***	(7.01)***	(6.14)***	(3.15)***	(3.83)***	(7.33)***
lexr	0.194	0.162	-0.051	-0.336	0.535	0.161
	(4.12)***	(2.45)**	(0.93)	(1.25)	(1.92)*	(2.43)**
exrvol	0.002	-0.000	0.000	0.001	0.023	-0.000
	(2.07)**	(0.81)	(0.55)	(1.70)*	(0.39)	(0.85)
exr_dum	0.012	-0.004	-0.006	-0.038	0.005	-0.004
	(2.22)**	(0.84)	(1.18)	(2.22)**	(0.54)	(0.85)
inf	0.145	0.072	-0.068	0.779	0.648	0.075
	(1.44)	(0.61)	(0.49)	(0.80)	(0.93)	(0.63)
infvol	0.014	0.000	-0.006	-0.044	-0.009	0.000
	(5.51)***	(0.02)	(1.96)*	(2.05)**	(0.51)	(0.07)
lcredit	-0.119	-0.063	-0.234	-0.037	0.230	-0.064
	(5.49)***	(2.46)**	(12.44)***	(0.24)	(1.35)	(2.45)**
_cons	1.158	1.606	2.642	3.314	-0.630	1.604
	(4.17)***	(5.98)***	(19.86)***	(1.99)**	(0.64)	(6.10)***
N	255	886	278	83	55	882

* $p<0.1$; ** $p<0.05$; *** $p<0.01$. Z-statistics are in parenthesis.

Table 4: Regression Estimates of the Drivers of Loan Dollarization

	CCA	All	EUR	LAC	DEVEMASIA	EMDE
L.lfxloan	0.397	1.070	0.998	0.815	0.546	0.767
	(4.80)***	(14.28)***	(22.89)***	(6.84)***	(5.78)***	(30.28)***
lfxdeposit	0.327	-0.014	0.001	-0.006	-0.108	0.011
	(4.65)***	(0.46)	(1.57)	(0.14)	(0.52)	(0.47)
lexr	0.043	0.144	-0.026	0.073	0.182	-0.008
	(0.70)	(1.78)*	(1.34)	(1.18)	(1.80)*	(0.07)
exrvol	0.001	-0.000	-0.000	0.000	0.007	-0.000
	(0.91)	(1.68)*	(1.54)	(0.83)	(2.09)**	(1.33)
exr_dum	-0.003	-0.003	0.022	-0.001	0.011	0.002
	(0.55)	(0.39)	(3.80)***	(0.18)	(4.74)***	(0.46)
inf	0.495	0.289	0.086	-0.653	0.488	0.285
	(4.50)***	(2.01)**	(1.39)	(1.32)	(2.71)***	(1.82)*
infvol	0.008	0.002	-0.000	0.007	-0.003	0.005
	(2.68)***	(0.57)	(0.31)	(0.53)	(1.10)	(0.85)
lcredit	-0.153	-0.070	-0.018	0.104	-0.085	-0.101
	(5.22)***	(2.07)**	(2.20)**	(2.52)**	(1.17)	(1.84)*
_cons	0.959	-0.409	0.071	-0.092	2.085	0.987
	(2.56)**	(1.09)	(0.49)	(0.13)	(1.34)	(2.50)**
N	255	620	89	29	31	616

* $p<0.1$; ** $p<0.05$; *** $p<0.01$. Z-statistics are in parenthesis.

Table 5: Robustness Checks on Determinants of Deposit Dollarization

	OLS	OLS	FE	RE	DGMM	SGMM	Trimmed	Pre-GFC	Post-GFC	FixedER	Flexible ER
L.lfxdep	0.846	0.786	0.846	0.992	0.599	0.972	0.583	0.916	0.547	0.690	0.681
	(16.57)***	(12.67)***	(25.78)***	(57.12)***	(9.20)***	(67.07)***	(8.75)***	(6.34)***	(6.49)***	(11.34)***	(8.03)***
lexr	0.047	0.046	0.047	0.001	0.194	-0.000	0.237	0.490	0.201	0.179	-0.016
	(1.24)	(0.97)	(1.72)*	(0.46)	(4.12)***	(0.07)	(4.43)***	(2.67)***	(1.32)	(3.98)***	(0.16)
exrvol	0.001	0.000	0.001	-0.001	0.002	-0.001	0.002	0.001	0.003	0.002	0.002
	(0.47)	(0.23)	(0.74)	(1.03)	(2.07)**	(1.24)	(2.43)**	(0.75)	(2.28)**	(1.64)	(1.19)
exr_d	0.022	0.017	0.022	0.016	0.012	0.018	0.014	0.014	0.008	0.025	0.012
	(4.13)***	(3.17)***	(4.25)***	(3.23)***	(2.22)**	(5.03)***	(2.62)***	(1.80)*	(1.73)*	(3.25)***	(1.61)
inf	0.266	0.359	0.266	0.197	0.145	0.193	0.138	0.227	0.081	0.045	0.111
	(3.86)***	(2.43)**	(3.01)***	(2.29)**	(1.44)	(3.13)***	(1.26)	(0.73)	(0.75)	(0.31)	(0.72)
infvol	0.007	0.005	0.007	0.005	0.014	0.005	0.014	-0.004	0.014	0.006	0.014
	(3.03)***	(1.67)*	(3.24)***	(2.25)**	(5.51)***	(3.52)***	(5.47)***	(0.40)	(3.63)***	(1.66)*	(4.00)***
lcredit	-0.012	0.017	-0.012	-0.003	-0.119	-0.004	-0.113	0.048	-0.189	-0.093	-0.040
	(1.34)	(0.91)	(1.47)	(1.21)	(5.49)***	(1.86)*	(4.57)***	(1.22)	(2.52)**	(5.05)***	(1.46)
_cons	0.028	0.162	0.453	-0.000	1.158	0.084	1.164	-0.760	1.416	0.970	1.269
	(0.08)	(0.39)	(3.18)***	(0.00)	(4.17)***	(1.32)	(4.18)***	(1.35)	(2.46)**	(3.97)***	(2.48)**
Ctryd	Y	Y									
Timed	N	Y									
R^2	0.97	0.98	0.79	0.96							
Hausman			30.26***								
Sargan					97.68	176.86**					
# instr					98	145					
N	263	263	263	263	255	263	217	75	174	106	149

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table 6: Robustness Checks on Determinants of Loan Dollarization

	OLS	OLS	FE	RE	DGMM	SGMM	Trimmed	Pre-GFC	Post-GFC	FixedERR	Flexible-ERR
L.lfxloa	0.812	0.806	0.812	0.997	0.397	0.957	0.437	0.526	0.423	0.452	0.430
	(9.95)***	(17.49)***	(24.92)***	(111.08)***	(4.80)***	(48.24)***	(7.58)***	(4.85)***	(3.82)***	(6.85)***	(3.87)***
lfxdep	0.272	0.272	0.272	0.061	0.327	0.107	0.360	0.197	0.331	0.344	0.249
	(2.31)*	(3.45)***	(5.64)***	(2.95)***	(4.65)***	(2.82)***	(5.86)***	(2.78)***	(3.42)***	(4.96)***	(2.91)***
lexr	-0.042	-0.029	-0.042	0.002	0.043	0.009	-0.064	0.002	0.096	0.040	-0.100
	(0.90)	(0.49)	(1.31)	(0.70)	(0.70)	(1.39)	(1.26)	(0.02)	(1.19)	(0.79)	(0.80)
exrvol	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001
	(1.40)	(0.31)	(0.82)	(1.75)*	(0.91)	(1.00)	(1.40)	(0.64)	(1.11)	(1.38)	(0.38)
exr_d	0.008	0.004	0.008	0.011	-0.003	0.010	0.003	0.007	-0.008	0.012	-0.010
	(0.81)	(0.36)	(1.21)	(1.83)*	(0.55)	(1.50)	(0.47)	(1.27)	(0.91)	(1.59)	(1.24)
inf	0.394	0.384	0.394	0.322	0.495	0.305	0.318	0.138	0.484	0.341	0.206
	(2.74)**	(2.48)**	(3.79)***	(3.21)***	(4.50)***	(2.46)**	(3.13)***	(0.64)	(3.35)***	(2.34)**	(1.17)
infvol	-0.003	-0.006	-0.003	-0.004	0.008	0.002	0.006	-0.005	0.007	-0.000	0.003
	(1.17)	(1.44)	(1.35)	(1.47)	(2.68)***	(0.50)	(2.39)**	(0.71)	(1.67)*	(0.09)	(0.79)
lcredit	-0.005	0.010	-0.005	-0.001	-0.153	-0.015	-0.159	-0.091	-0.259	-0.180	-0.010
	(0.32)	(0.47)	(0.47)	(0.38)	(5.22)***	(1.74)*	(5.75)***	(2.92)***	(4.60)***	(6.76)***	(0.30)
_cons	-0.353	-0.308	-0.299	-0.274	0.959	-0.321	1.013	1.158	0.838	0.835	1.396
	(1.33)	(1.29)	(1.80)*	(3.12)***	(2.56)**	(2.13)**	(3.53)***	(2.63)***	(1.74)*	(2.72)***	(2.01)**
Ctryd	Y	Y									
Timed	N	Y									
R^2	0.99	0.99	0.87	0.99							
Hausman			39.13***								
Sargan					89.76						
# instr					97	144					
N	263	263	263	263	255	263	219	75	174	107	148

* $p<0.1$; ** $p<0.05$; *** $p<0.01$