

Financial dollarization and de-dollarization in the new millennium

Working paper

January 2021

Eduardo Levy Yeyati

Financial dollarization and de-dollarization in the new millennium

Eduardo Levy Yeyati*
January 2021

Abstract

Dollarization, in its many variants, is crucial to understanding Latin American macroeconomics, as well as that of many developing countries. This paper builds a new updated dataset on dollarization, reviews its evolution in Latin America since 2000, and summarizes the lessons learned from several de-dollarizing attempts in the region, based on a three-way taxonomy: 1) attempts that focus on the macroeconomic drivers, 2) microeconomic measures that deter investors from dollarizing their financial assets and liabilities based on market incentives or regulatory limits, and 3) regulations that affect the choice of foreign currency as a means of payment or a unit of account. The study provides examples using seven cases that may be considered paradigmatic of the different dollarization varieties: Bolivia, Peru, Uruguay, Costa Rica, El Salvador, Ecuador and Venezuela.

* Prepared for *Fondo Latinoamericano de Reservas* (Latin American Reserve Fund - FLAR). The author thanks Camilo Contreras and Joaquín Marandino for their invaluable help. This version has been translated by FLAR from the original version in Spanish.

Table of contents

Executive summary	3
I. Introduction	6
II. Definitions	7
III. Data: Dollarization since 2000	8
A. Deposit dollarization	8
B. Debt dollarization	14
IV. Theory: Determinants of Currency Substitution (RD)	25
V. Theory: Determinants of Asset Substitution (FD)	26
A. Dollarization of savings portfolios	26
B. Market failure	28
C. Legal imperfections	29
D. The role of policy	30
E. What do the data say?	31
VI. Policies: De-dollarization strategies	36
A. FD and prudential risk	36
B. De-dollarization tools	37
C. Should countries launch a head-on assault against dollarization?	38
D. De-dollarization: Taxonomy	39
VII. Cases	41
A. Bolivia	41
B. Costa Rica	43
C. Peru	45
D. Uruguay	47
E. Official dollarization	49
1. El Salvador	50
2. Ecuador	51
F. Venezuela	53
VIII. 2020: The COVID-19 pandemic as a de-dollarization test	58
IX. Conclusions	63
References	64

Executive summary

The concept of dollarization, in its many variants, is crucial to understanding Latin American macroeconomics, as well as that of many developing countries. Financial dollarization (of saving) limits borrowing capacity and explains the excess exchange rate volatility in countries without savings or capital markets in the domestic currency. Real dollarization (of transactions, prices, and wages) transfers exchange rate variations to prices, induces a fear of floating the exchange rate, and, by altering demand for money, severely reduces central banks' ability to run an autonomous monetary policy. Official dollarization (the adoption of the dollar as legal tender) eliminates foreign exchange risks along with the exchange rate, losing a crucial instrument for stabilizing the cycle in open economies.

The different kinds of "dollarization" are still an issue that directly or indirectly intervenes in regional economic and financial cycles. This paper discusses and reviews -with data- what we know about the evolution of dollarization, in its three variants, since 2000 in Latin America, and then discusses the lessons learned from the several successful and failed de-dollarization attempts in the region.

This evolution may be summarized based on two standard measures: 1) the dollarization ratio of deposits and 2) the dollar share of sovereign debt.

An analysis of the evolution of the deposit dollarization ratio -of sight deposits as a proxy for real dollarization; of term deposits as an indicator for financial dollarization- shows that in most countries -Chile, Guatemala, Honduras, Mexico, Nicaragua, and Paraguay- dollarization remained relatively stable in both the 1990s and 2000s (the first decade of the 21st century), whereas Peru and Uruguay feature slight drops, and Costa Rica recorded a small increase. Argentina and Bolivia are the two countries that show drastic falls in 2002 and 2008, respectively: in the first case, due to the compulsory conversion of dollar deposits to pesos (hereinafter "pesification") in the context of the currency board crisis; in the second, due to a successful policy mix that reduced dollarization, both real and financial.

In turn, the dollar debt to GDP ratio remained relatively stable in most of the countries studied. However, countries such as Argentina, Bolivia, Honduras, Nicaragua and Uruguay show fluctuations around a declining trend in the 2000s (in Argentina, the fall has reversed in recent years).

Why did some countries move forward while others did not? As we discuss below, each variant of the dollarization phenomenon often has multiple causes, including the volatility of the real exchange rate, the volatility of the domestic capital market, and, more generally, macroeconomic stability and policy credibility.

According to the economic theory on the subject, de-dollarization measures can be sorted according to three criteria: 1) those that attack the macroeconomic aspects that affect dollarization (e.g., inflation targets with foreign exchange flexibility), 2) microeconomic measures that, by increasing the differential costs of financial intermediation in one currency relative to the other (e.g., higher mandatory reserves requirements on banks' dollar funding) or even by placing quantitative limits on local intermediation in dollars (e.g., the prohibition of dollarized loans to debtors without income in the foreign currency), widen the interest rate differential depressing the return on dollar saving instruments and dissuade investors from dollarizing their assets, and 3) regulations that directly affect the choice of foreign currency as a means of payment or unit of account (e.g., legal limits on the use of a foreign currency for prices, wages and other contracts).

This study takes a close look at seven cases that may be considered paradigmatic of different varieties of dollarization, the de-dollarizing policy used in each case, and the problems still faced by economies in which the original drivers were attenuated or eliminated. These cases are **Bolivia**, a country that had in the past widespread financial and real dollarization; **Peru**, a dollarized economy that, unlike **Bolivia**, was financially integrated into the world and that, through several paths (monetary policy, price denomination, a favorable external context, macro stability) managed to reduce both financial and real dollarization; **Uruguay**, where, despite adopting successful stabilization and market development policies in the local currency that enabled the country to preserve access to financial markets even in times of crisis, significant results in reducing *de facto* dollarization were not achieved; **Costa Rica**, a small open Central American economy with persistent financial and real dollarization; **El Salvador**, whose experience with official dollarization serves as a mirror for many Central American economies that toy with the idea of adopting the dollar on a recurring basis; **Ecuador**, a country that frequently and unsuccessfully questions its own official dollarization; and **Venezuela**, an example of the coexistence of two kinds of dollarization, currency and financial in the context of a deep economic crisis, at a time when the country debates which regime best contributes to a much needed stabilization.

At the beginning of 2020, the COVID-19 pandemic triggered a reversal in capital flows and a flight toward the "quality" of the assets denominated in reserve currencies at the expense of finance and exchange rates in the emerging world. How was this global drop in risk appetite influenced by the COVID-19 pandemic? In particular, to what extent did the pandemic strain the demand for the local currency and the progress made in terms of the de-dollarization of the countries in the region? The results from this de-dollarization litmus have so far been positive: both the return to external debt over local debt and the peso-dollar interest rate differential, as well as the dollarization of the banking system withstood the attack. This suggests that de-dollarization processes based on consistent policy and institutional strategies have persistent effects, indicating that the policies highlighted in this work can permanently reduce dollarization.

This study comes to four main conclusions. First, dollarization can no longer be systemically seen as an economic, psychological, or theological (original sin) phenomenon, unavoidable and without consequences: the countries that committed to de-dollarizing their economies managed to recover all the functions of their local currency. Second, policies must be adjusted to the kind and extent of the dollarization, as well as to the macroeconomic, institutional and structural constraints the economy faces: there is no single-measure recipe for de-dollarization; the mix differs depending on the variety of dollarization to be dealt with. A proper characterization of the phenomenon is essential for guiding policy. Third, official dollarization, often proposed as a solution for countries discouraged by failed de-dollarization attempts -or economies frustrated with *de facto* dollarization- yields limited benefits, save for slamming the brakes on currency runs, and has important real drawbacks, as seen in the case of El Salvador or Ecuador -including the fact that official dollarization is close to impossible to revert in an orderly manner. Last, dollarization processes have important feedback mechanisms that lead us to one final general recommendation: to be successful, financial de-dollarization, including its costs, must be embraced as a state policy.

I. Introduction

The concept of dollarization, in its many variants, is crucial to understanding Latin American macroeconomics, as well as that of many developing countries. Currency substitution or **real dollarization (RD)**, that is, the use of a foreign currency as a means of payment, helps to explain the dynamics of the hyperinflation episodes in the 1970s and 1980s and how monetary policy can be adapted to a bi-currency economy (i.e., one that demands money in two or more currencies); in particular, the use dollars as a unit of account (price dollarization) explains the high pass-through of foreign exchange variations to prices that afflict economies with a history of nominal instability, and helps to clarify how to complement traditional monetary policy in its fight against inflation.

Asset substitution or **financial dollarization (FD)**, i.e., the use of dollars (or, more precisely, of assets denominated in a foreign currency) as a store of value, is essential to understanding the borrowing constraints (and, as a result, the financial fragility and the modest and volatile growth) of countries without capital markets in their own currency, which are forced to dollarize their liabilities and, consequently, are less tolerant of high levels of indebtedness and more exposed to fluctuations in the global financial cycle. Last, **de jure or official dollarization (OD)** raises the question of the pros and cons of having a national currency in countries haunted by nominal instability and exchange rate pressure (countries such as Venezuela and, to a lesser extent, Guatemala, Nicaragua and Argentina come to mind for various reasons).

The distinction between these varieties of dollarization -and the confusion associated with such a polysemic term- warrants the scope of this study- and the breadth of its title. In addition, there is the need for an updated empirical characterization of the evolution and the status of the situation of *de facto* dollarization, which, far from disappearing thanks to improvements in the management of macroeconomic policy, is still an issue that directly or indirectly intervenes in regional economic and financial cycles. Last but not least, much has been done and much has been learned about dollarization since the late 90s when, based on the then mainstream bipolar view, OD was recommended as a viable exchange rate alternative for emerging economies.¹ This study, while focusing on FD in Latin America, aims more generally to cover the empirical evolution and the policy lessons from the management of dollarization in each of its three versions.

¹ See Fischer (2001).

The paper is arranged around the following questions:

- What are the varieties of *de facto* dollarization?
- What do we know about its causes and dynamics?
- What are the main policy strategies to contain and reverse dollarization?
- How has dollarization evolved in Latin America and around the world, according to its measurements?
- What does the impact of the COVID-19 crisis tell us about the resilience of the de-dollarizing advances in the region?

II. Definitions

The term **dollarization** has been used to indicate a varied set of related phenomena. While official (or *de jure*) **dollarization (OD)** refers to the case where the foreign currency is granted (generally exclusive) legal tender status, **unofficial (or *de facto*) dollarization** is used to indicate the use of a foreign currency alongside the national currency.

In turn, a distinction is generally made between two kinds of *de facto* dollarization: **real dollarization (RD)** (the use of the foreign currency as a means of payment or unit of account) and **financial dollarization (FD)** (or savings dollarization: the use of the foreign currency as a store of value). This distinction is not merely rhetorical because, as we will see, the substitutions of currencies and of assets are phenomena with quite distinct origins and consequences. Particularly, one would expect the difference between nominal interest rates in pesos in the foreign currency to increase currency substitution to the extent that, as the relative opportunity cost of local currency liquidity increases, the relative demand for nominal balances denominated in that currency falls. Thus, for example, high inflation, insofar as it is accompanied by a proportional increase in nominal interest rates, should encourage currency substitution but not the substitution of interest-bearing assets, such as term deposits, the composition of which depends on, among other things, the *real* risk and return relative to other options.

FD has an empirical correlation with residents of a country holding financial assets and liabilities denominated in foreign currencies (including nonbanking assets such as commercial papers or sovereign debt).² While the term is descriptive in nature, this definition more explicitly recognizes the general equilibrium character of

² Since the late 1990s when the term was coined (Ize and Levy Yeyati, 1998), asset substitution has been at the center of the literature on FD, both in terms of the reasons behind saving in a foreign currency, as well as the macro-financial aspects associated with the dollarization of liabilities as a source of exposure to currency and refinancing risks in the event of capital outflows and real depreciation.

the foreign currency bias: insofar as the currency composition of liabilities is systemically related to that of assets, the dollarization of financial savings leads to the dollarization of debts and of the financial system as a whole. On the other hand, since a positive real interest rate differential in dollars versus pesos encourages the dollarization of deposits but discourages the dollarization of loans, in an equilibrium in which -as in most countries- the banks' currency position (the difference between assets and liabilities in a given currency) is limited by regulation, FD does not simply reflect a currency mismatch and requires taking into account risk considerations and market imperfections.

III. Data: Dollarization since 2000

The hypotheses introduced in the preceding sections, and the measures that emerge therefrom, began to be systematically tested in Latin America in the 2000s, after a succession of financial stress episodes in the 90s, stemming from foreign exchange issues, resulted in recessions, systemic crises and the weakening of the governments in place. Thus, Mexico was the first to develop its domestic capital market based on local institutional investors and on a continued effort to rebuild its reserve stock and reduce dollarized external debt by issuing domestic peso debt in the years of capital inflows after the Tequila crisis, and was followed by Brazil, Peru and Uruguay in adopting de-dollarization as a state policy, again, after currency crises that led to episodes of financial stress. Bolivia, at the time a HIPC (a beneficiary of the Heavily Indebted Poor Country initiative) and not financially integrated into the world, also did its part by attacking the use of dollars in current transactions.

Many of these efforts have yielded results; some, as in the case of Bolivia, have been unexpectedly positive. Below, we review some relevant patterns that emerge from the new dataset that accompanies this study.

A. Deposit dollarization

In what follows, we denote as *dollarized* a country that had a deposit dollarization ratio of at least 10% in 2000. Offshore financial centers, whose dollarization is due to extranational factors, are excluded.³ Out of our 105-country sample (excluding offshore financial centers), a total of 76 were dollarized in 2000. Fifty-three of

³ The IMF lists the following offshore funding centers (<https://www.imf.org/external/np/mae/oshore/2000/eng/back.htm>): Guernsey, Hong Kong, Ireland, Isle of Man, Jersey, Luxembourg, Singapore, Switzerland, Andorra, Bahrain, Barbados, Bermuda, Gibraltar, Macau, Malta, Monaco, Anguilla, Antigua and Barbuda, Aruba, Bahamas, Belize, British Virgin Islands, Cayman Islands, Cook Islands, Costa Rica, Cyprus, Dominica, Grenada, Lebanon, Liechtenstein, Marshall Islands, Mauritius, Montserrat, Nauru, Netherlands Antilles, Niue, Panama, Palau, Samoa, Seychelles, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Turks and Caicos Islands, and Vanuatu.

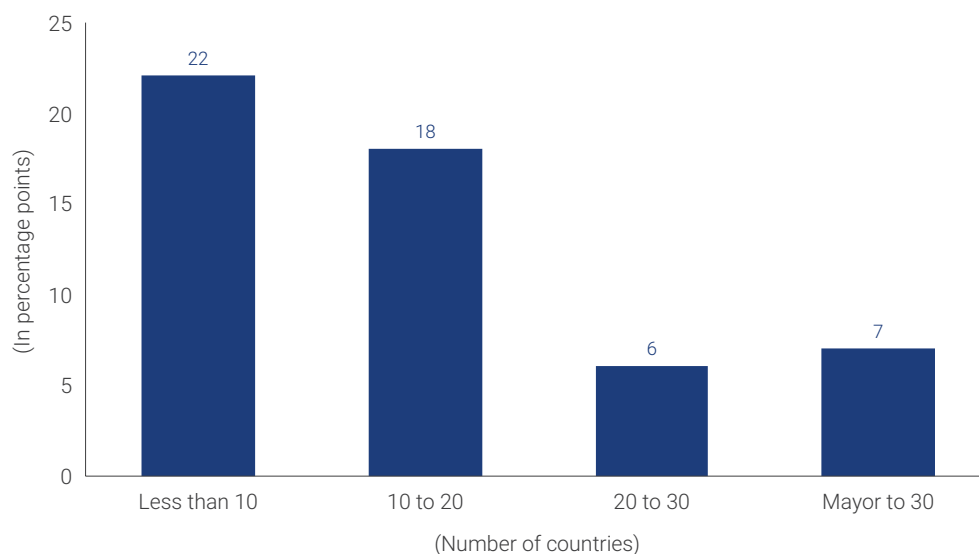
these countries reduced their deposit dollarization, although most of them did so moderately (Figure 1). The two countries that achieved the greatest de-dollarization are, predictably, two of the initially most dollarized in Latin America: Bolivia with 79.7 percentage points and Argentina with 38.3 (Figure 2).

It is important to differentiate deposit dollarization by the type of deposit because, as already stated, they reflect different phenomena: the dollarization of demand deposits is related to currency substitution, while the dollarization of term deposits better captures financial dollarization.

Over the past two decades, most countries reduced their percentage of **term deposits** denominated in foreign currencies: 16 countries out of a sample of 21 with data for the period 1999 to 2018 (Figure 3). In turn, average dollarization fell from 55.6% to 37.4% over the same time period. In Latin America, Argentina, Bolivia, Peru and Uruguay stand out for their de-dollarization of term deposits since the turn of the century (Figure 4).

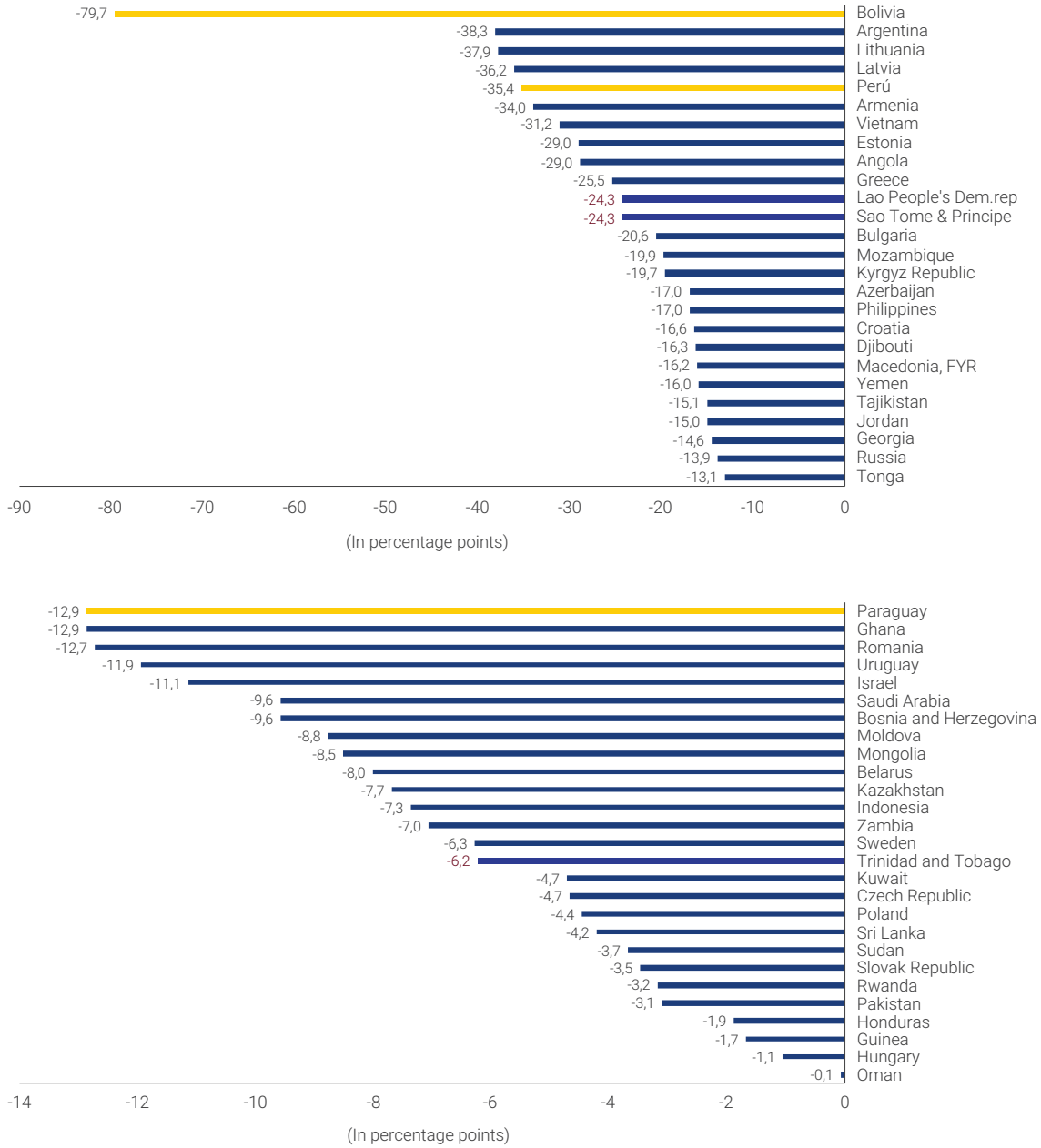
Regarding **demand deposits**, dollarization decreased in 11 of the 21 countries between 1999 and 2018 (Figure 3). The average dollarization percentage decreased slightly from 38.2% to 33.9%. The developments in Latin America are consistent with this global trend: in most countries, the de-dollarization of term deposits has been greater than that of demand deposits (Figure 4). Bolivia and Peru stand out, featuring reductions of 65.4 and 28.1 percentage points, respectively.

Figure 1. Number of dollarized countries that have reduced deposit dollarization since 2000



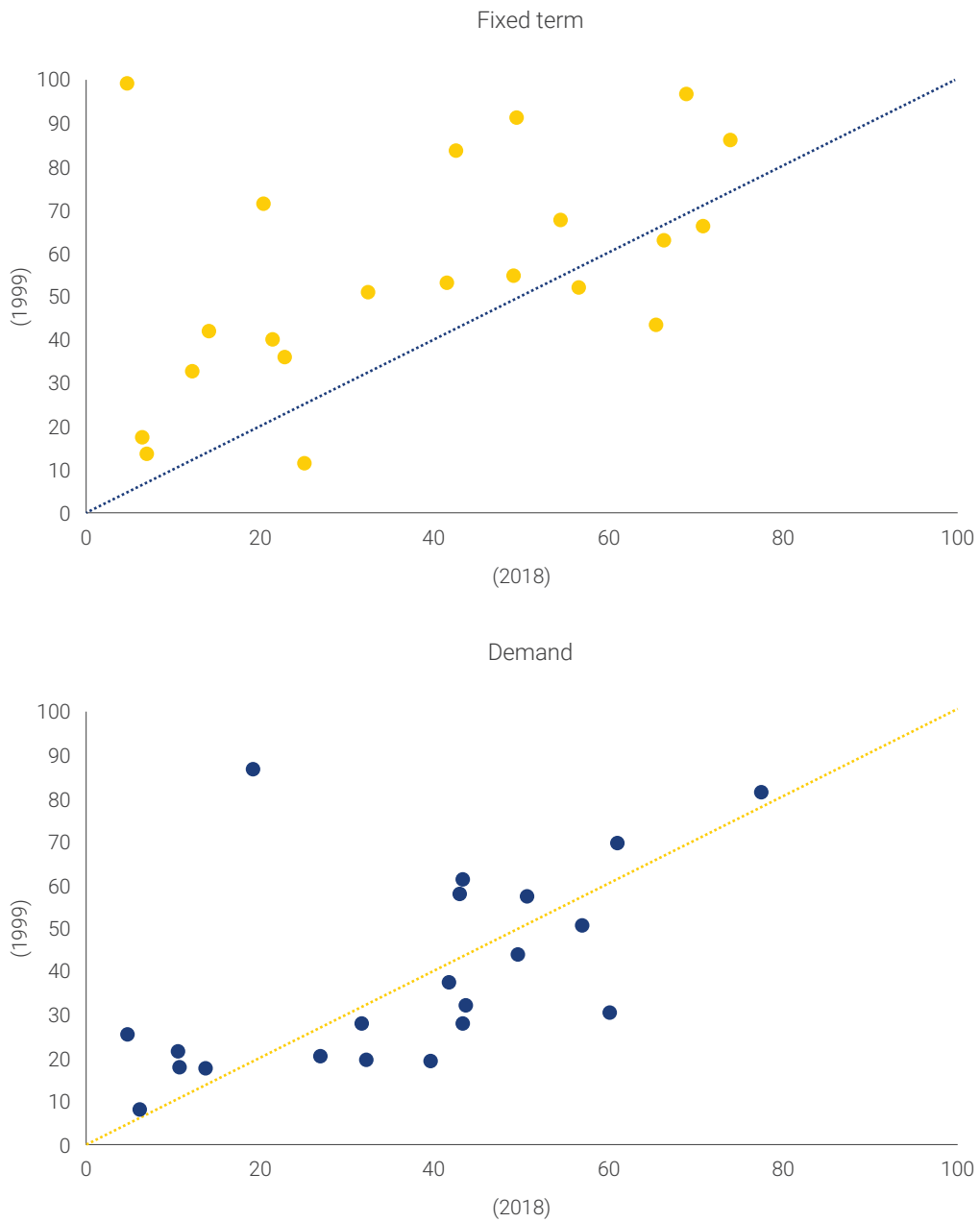
Source: own calculations based on data from each country.

Figure 2. De-dollarization of total deposits since 2000 by dollarized country



Source: own calculations based on data from each country.

Figure 3. Deposit dollarization by kind of deposit globally (1999-2018)



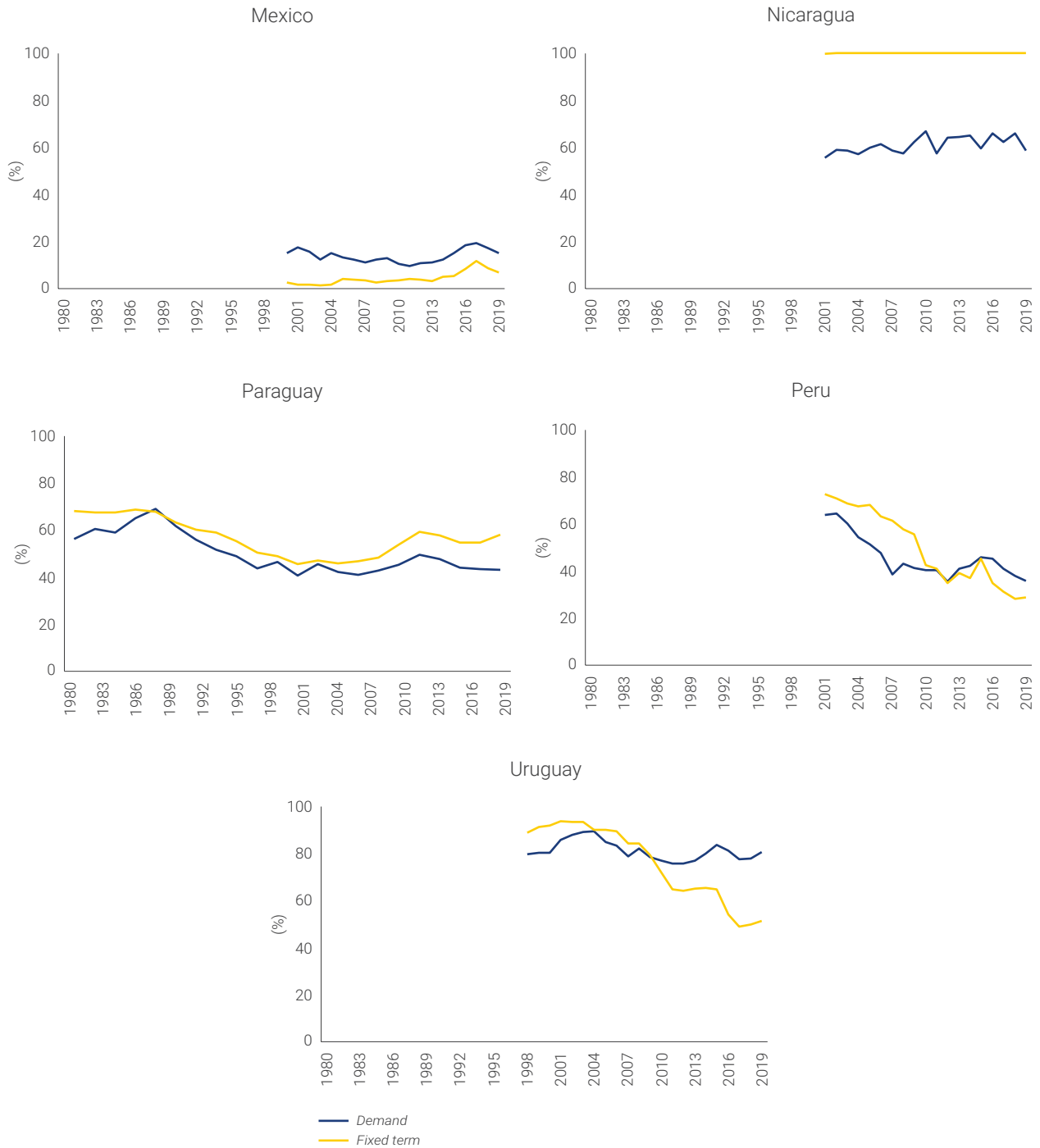
Source: own calculations based on data from each country.

Figure 4. Evolution of the deposit dollarization ratio by kind of deposit in Latin America



Source: own calculations based on data from each country.

Figure 4. Evolution of the deposit dollarization ratio by kind of deposit in Latin America



Source: own calculations based on data from each country.

B. Debt dollarization

For analytical purposes, we assume that external debt (issued under foreign jurisdiction) is entirely denominated in the foreign currency (the availability of public and private debt data by currency is scarce and would excessively reduce the sample size). Figure 5 and Figure 6 show the evolution of public and private external debt, which was on the rise in most countries over the past two decades.

As in the description of deposit dollarization, the following analysis defines a *dollarized country* as one whose share of external public debt to total public debt (EPD/TPD ratio) is greater than or equal to 10% in 2000.

From a sample of 88 countries (as before, excluding offshore financial centers), all but Iran had an EPD/TPD ratio in excess of 10% in 2000. Of these, 63 reduced this ratio, and most achieved decreases of less than 30 percentage points (Figure 7). The Latin American country that achieved the greatest reduction was Peru, with a drop of 49.1 percentage points (Figure 8).

In Latin America, since 2000, all countries (except Mexico, Nicaragua, and Paraguay) have reduced the share of external public debt or public debt in foreign currency (FC) in their total public debt. Chile (-70 p.p.), Peru (-49 p.p.) and Uruguay (-38 p.p.) stand out. Measured in relation to the size of the economy, external public debt or public debt in FC also fell in most countries since 2000, with Ecuador (-44 p.p.) and Nicaragua (-43 p.p.) standing out. The exceptions in this case were Argentina, Venezuela, El Salvador and Mexico.

One aspect of the dollarization of public debt implicit in models that emphasize the presence of implied guarantees is the potential correlation with external private debt. Just as the presence of a significant stock of bank reserves may be interpreted as a guarantee in the event that a capital outflow creates a systemic balance sheet effect -and thus could encourage private dollarization-, public debt de-dollarization, for a given stock of reserves, could crowd in private dollarization. Furthermore, in the absence of a dollarized sovereign bonds from a given country, private investors may be inclined towards private bonds from the same country as a proxy, thereby inducing the dollarization of private borrowing. A preliminary look at the data for the past two decades does not confirm this presumption: no negative correlation can be seen between public and private debt, as this hypothesis would indicate (Figure 10).

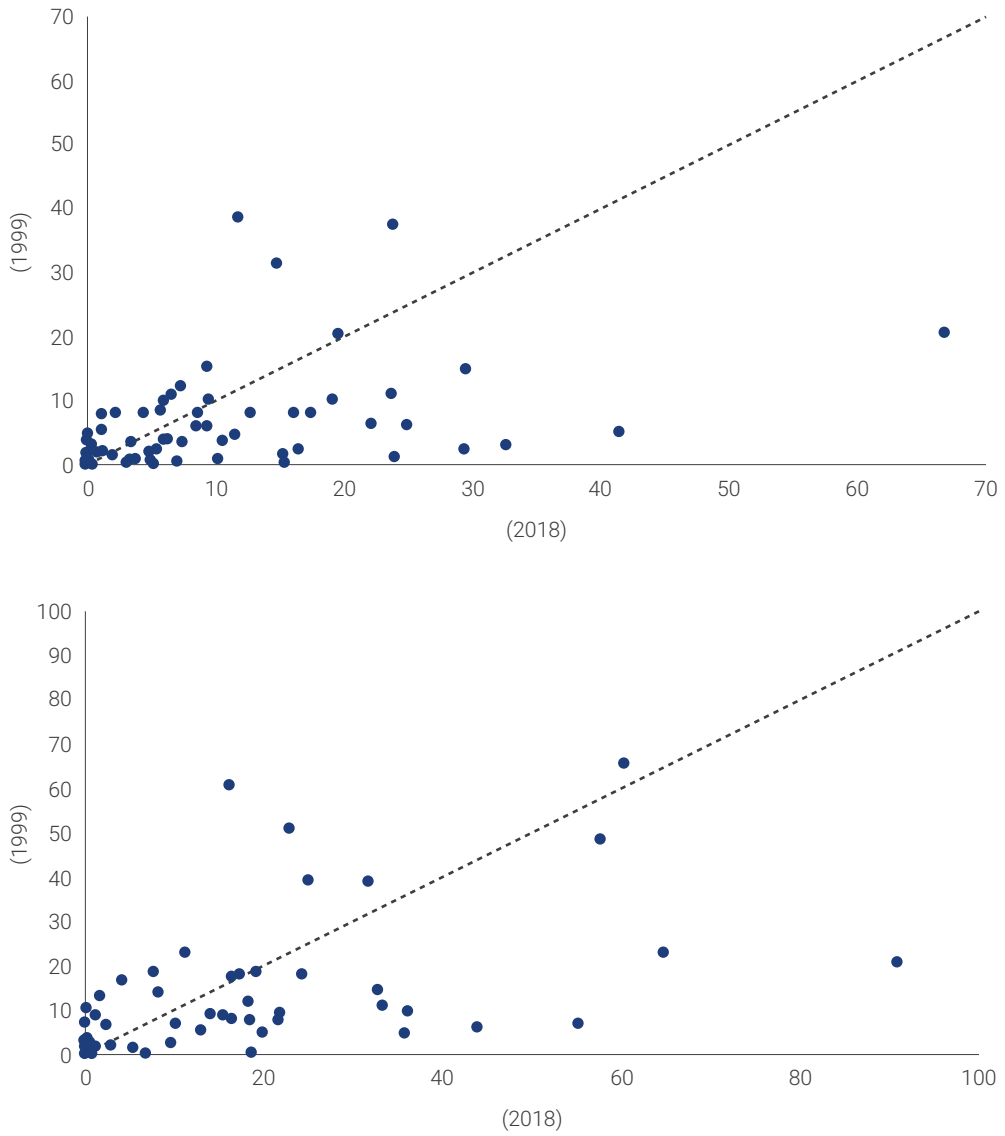
Another item to point out is that despite the heterogeneity in the cases, the data reveals a positive correlation between domestic (deposit) and external (debt) de-dollarization (Figure 11). This pattern, which is in line with a previously mentioned premise (that successful de-dollarization strategies often involved state policies aimed at reducing exchange rate exposure *on all fronts*), also reflects the fact that some of the causes of FD are intimately

linked: for example, because of the presence of a corner equilibrium associated with cyclical depreciations and implied guarantees that fuel both domestic and external dollarization, or the illiquidity of local currency instruments that conspire against de-dollarization efforts. In relation to the latter, it is worth noting that the evidence indicates that a greater depth in domestic markets -which allows for the local currency funding of investments and expenditures- contributes to lower debt dollarization (Figure 12).

In summary, the de-dollarization plot in Latin America has varied widely. Some countries have successfully reduced their domestic and external FD (Peru, Bolivia), others have reduced one but not the other (such as Argentina for deposits or Uruguay for external debt), and others have made no progress on either front (e.g., the dollarized countries in Central America).

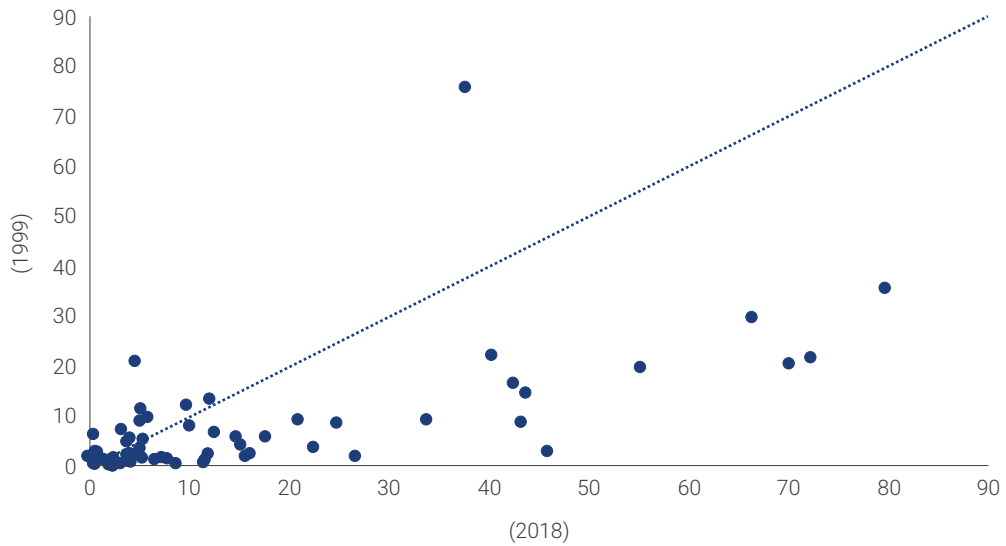
Why did some countries move forward while others were not able to do so? In principle, as we describe more in detail in the next section, the dollarization phenomenon not only has several manifestations (real and financial, domestic and external) but also has multiple causes (the relative volatility of the real exchange rate, the relative liquidity in the domestic market, policy stability and credibility). Even the international context is relevant: most of the successful experiences were able to take advantage of the appreciation associated with the commodity boom to foster savings in the local currency. In some cases, it should be noted that governments deliberately incurred the short-term cost of issuing debt in a currency prone to appreciation, a cost that paid off dearly when the cycle reversed in 2008. As with any policy with immediate costs and deferred benefits, for de-dollarization to succeed, it must be embraced as a state policy.

Figure 5. Evolution of external public debt/GDP and total public debt (1999-2018)



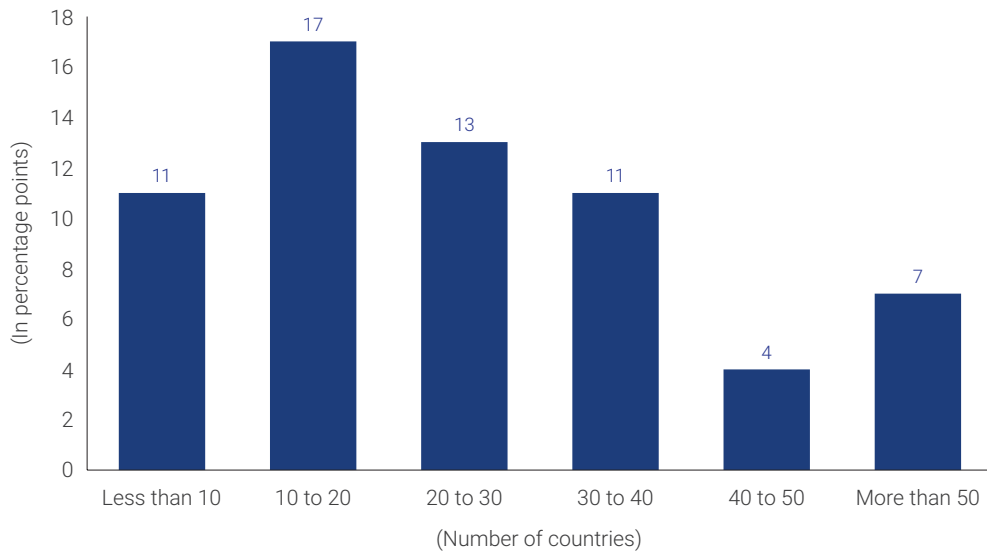
Source: World Bank and International Monetary Fund (FMI).

Figure 6. Evolution of external private debt/GDP (1999-2018)



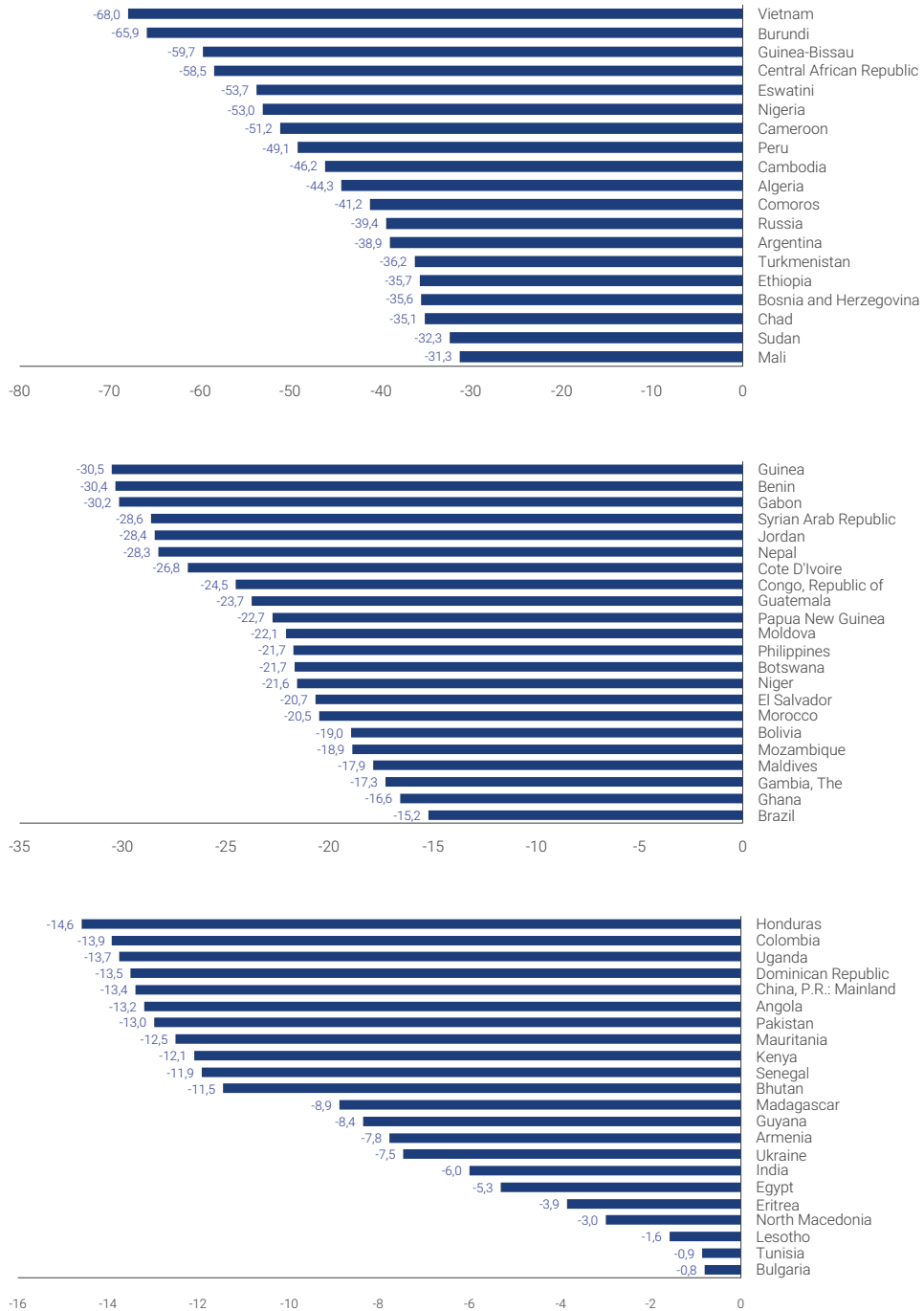
Source: World Bank and International Monetary Fund (FMI).

Figure 7. Number of dollarized countries that have reduced the EPD/TPD ratio since 2000



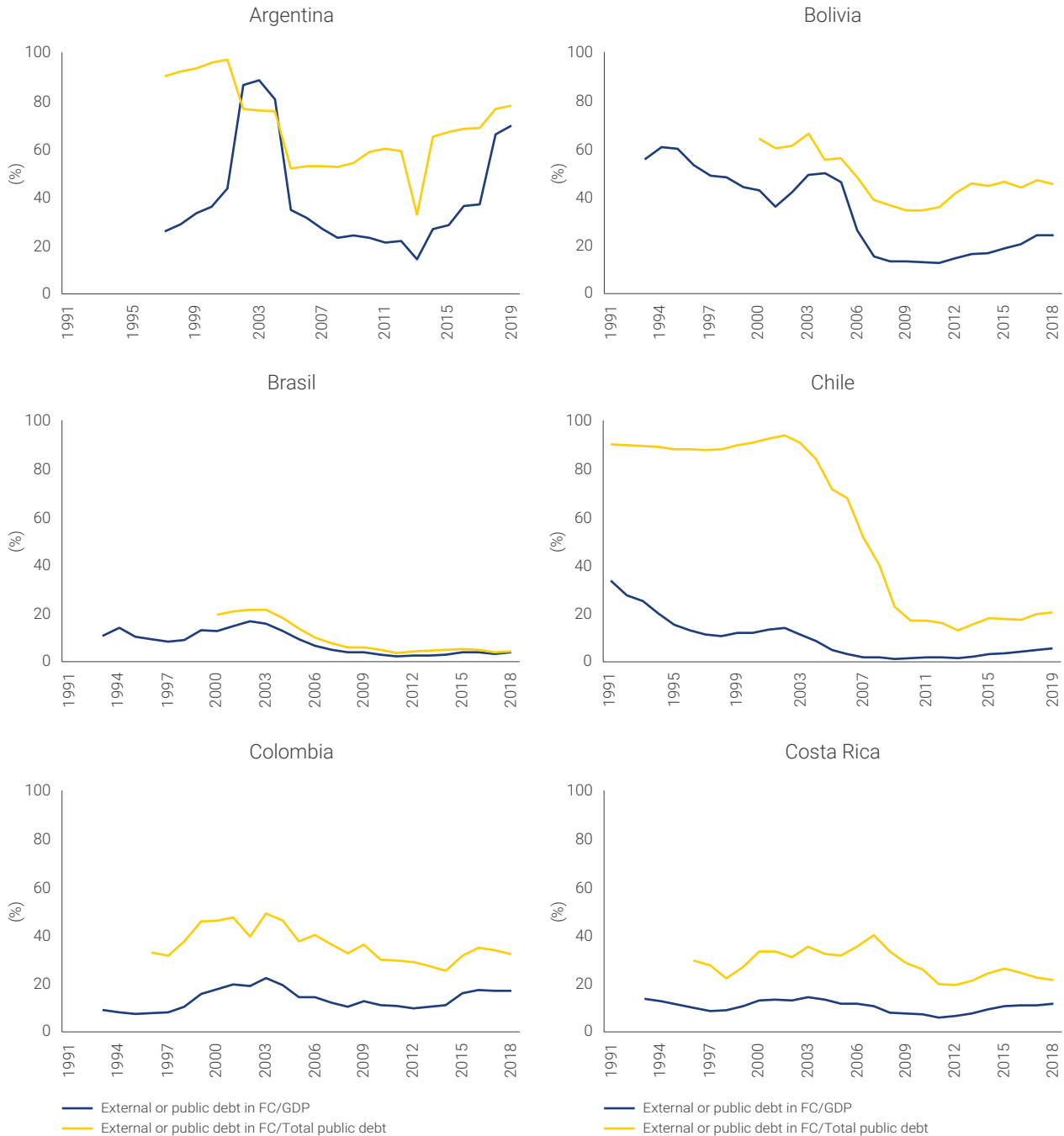
Source: World Bank and International Monetary Fund (FMI).

Figure 8. Reduction of the EPD/TPD ratio since 2000 by dollarized country (in percentage points)



Source: World Bank and International Monetary Fund (FMI).

Figure 9. Evolution of public debt in dollars or external* public debt to GDP and to total public debt in Latin America



* Debt in foreign currency for Argentina, Chile and Uruguay. External debt for the rest of the sample.

Source: Central Bank of Uruguay; World Bank; IMF; Ministry of Economy of Argentina; Ministry of Finance of Chile.

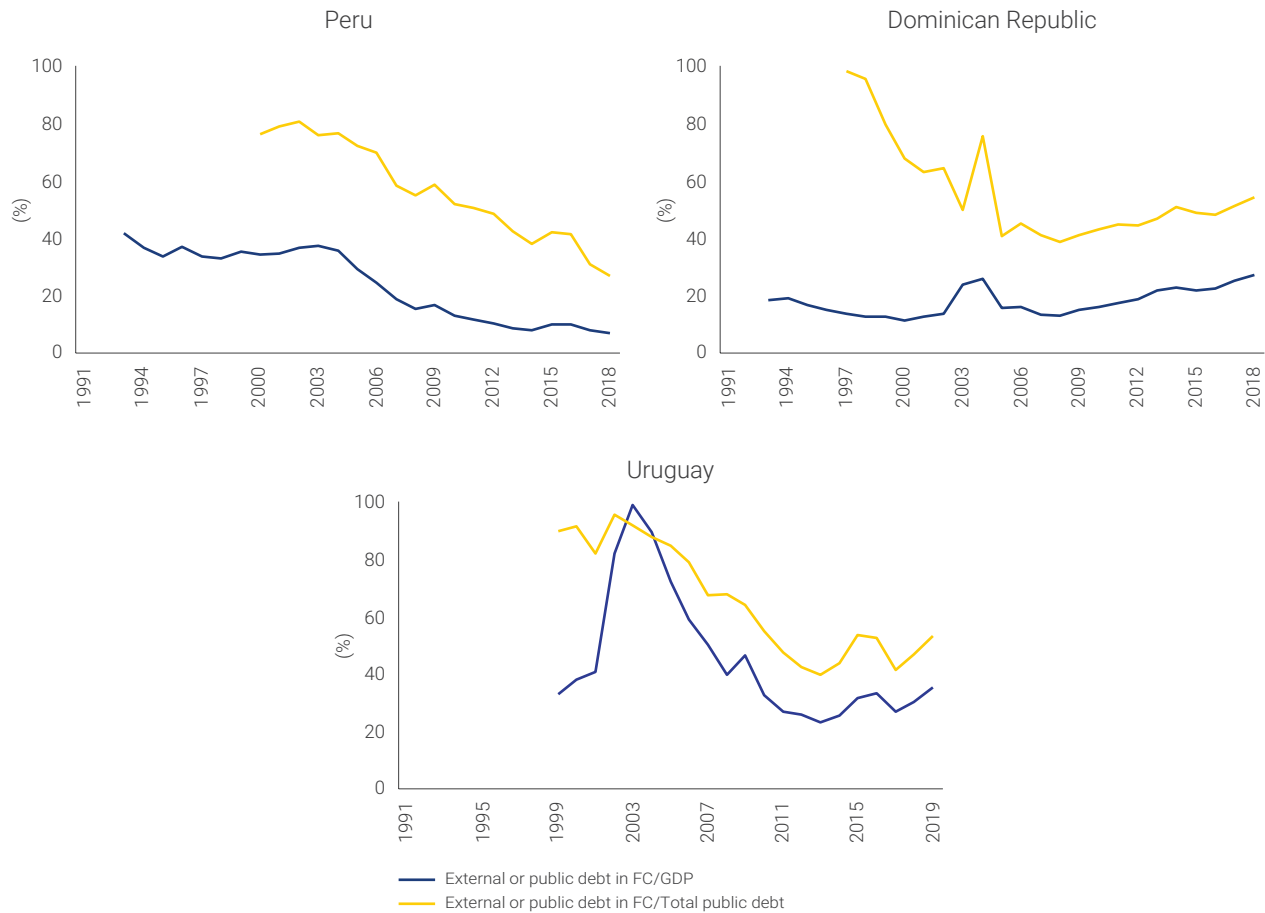
Figure 9. Evolution of public debt in dollars or external* public debt to GDP and to total public debt in Latin America



* Debt in foreign currency for Argentina, Chile and Uruguay. External debt for the rest of the sample.

Source: Central Bank of Uruguay; World Bank; IMF; Ministry of Economy of Argentina; Ministry of Finance of Chile.

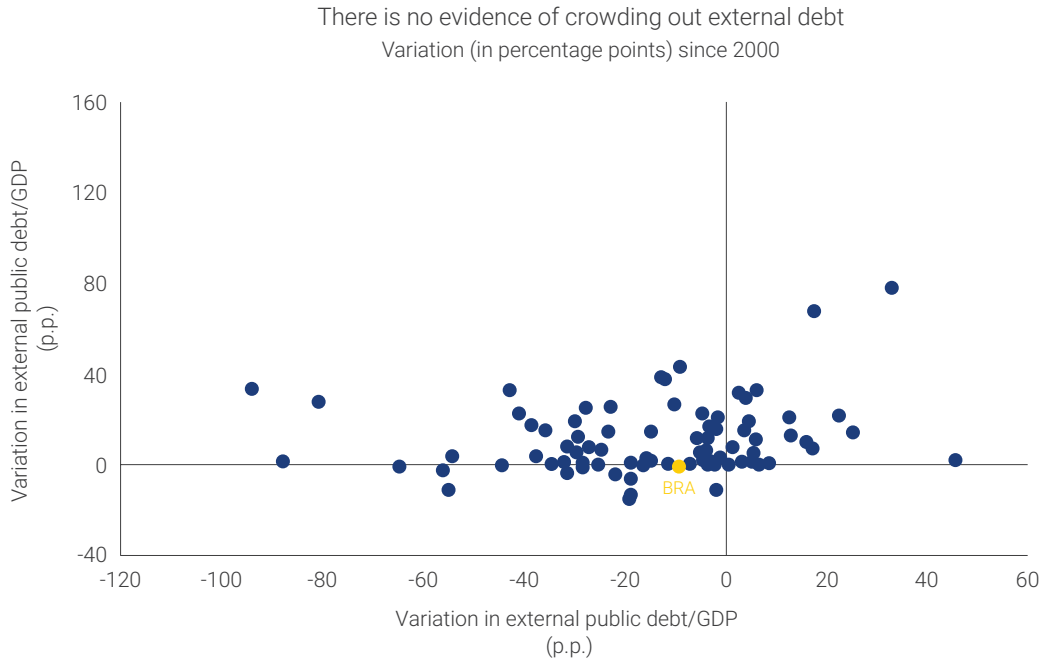
Figure 9. Evolution of public debt in dollars or external* public debt to GDP and to total public debt in Latin America



* Debt in foreign currency for Argentina, Chile and Uruguay. External debt for the rest of the sample.

Source: Central Bank of Uruguay; World Bank; IMF; Ministry of Economy of Argentina; Ministry of Finance of Chile.

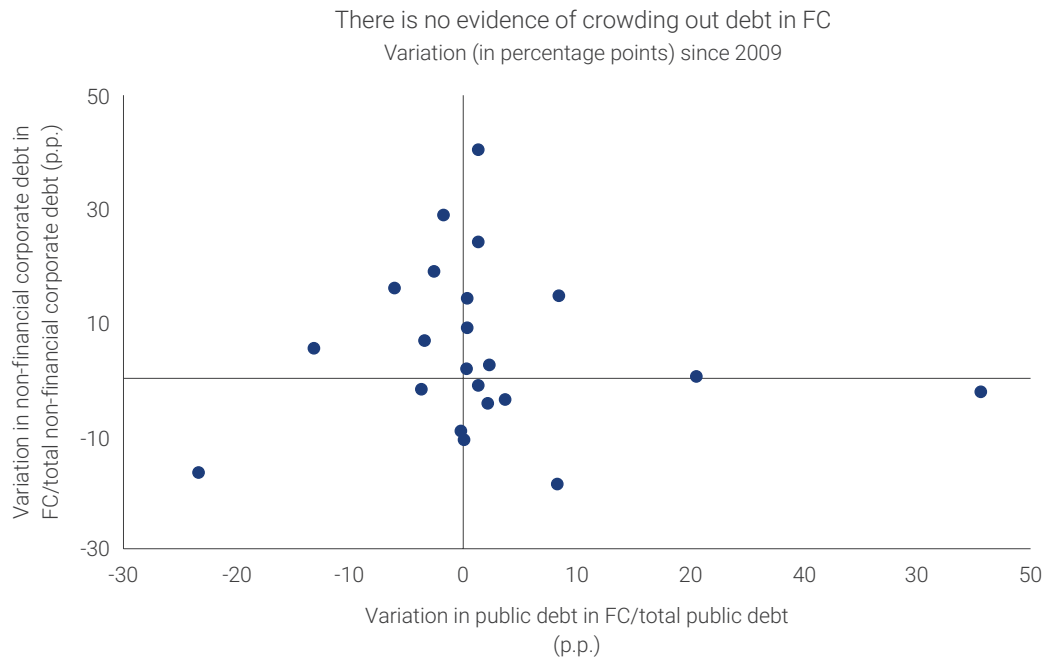
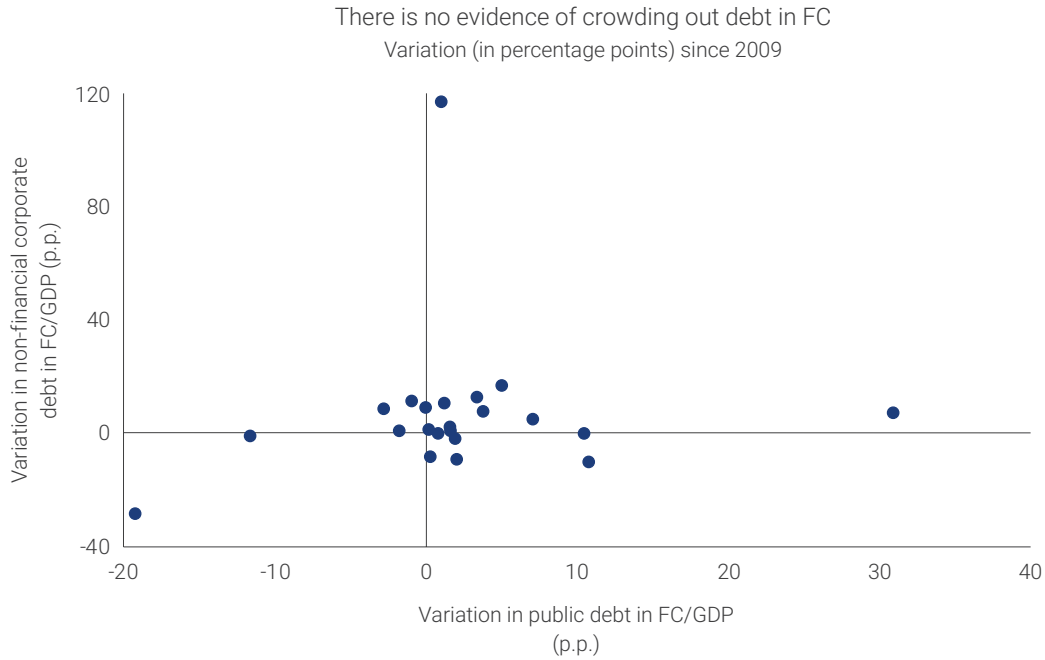
Figure 10. *Debt Crowding Out*



Sample: Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Belize, Bhutan, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Cambodia, Cameroon, China, Colombia, Costa Rica, Ivory Coast, Dominican Republic, Ecuador, Egypt, El Salvador, Fiji, Georgia, Ghana, Guatemala, Guyana, Haiti, Honduras, India, Indonesia, Jamaica, Jordan, Kazakhstan, Kenya, Kosovo, Kyrgyzstan, Laos, Liberia, Madagascar, Maldives, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Nepal, Nicaragua, Niger, Nigeria, North Macedonia, Pakistan, Papua New Guinea, Paraguay, Peru, Philippines, Romania, Russia, Rwanda, Senegal, South Africa, Sri Lanka, Sudan, Tajikistan, Tanzania, Thailand, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, Uzbekistan, Venezuela, Vietnam, Zambia, and Zimbabwe.

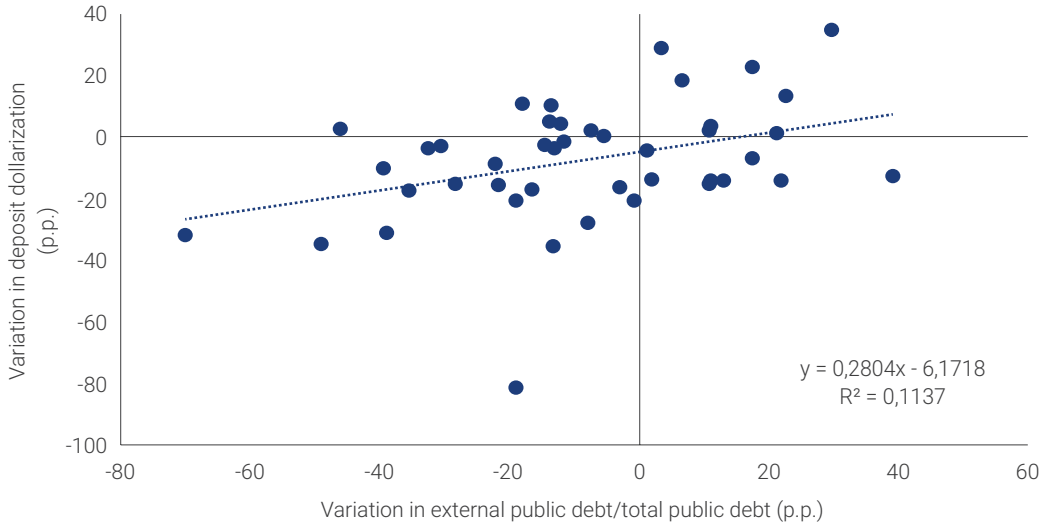
Source: World Bank and International Monetary Fund (IMF).

Figure 10. Debt Crowding Out



Sample: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hong Kong, Hungary, India, Indonesia, Israel, South Korea, Malaysia, Mexico, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand, Turkey, and Ukraine.
Source: Institute of International Finance - Global Debt Monitor Database.

Figure 11. Deposit and debt de-dollarization

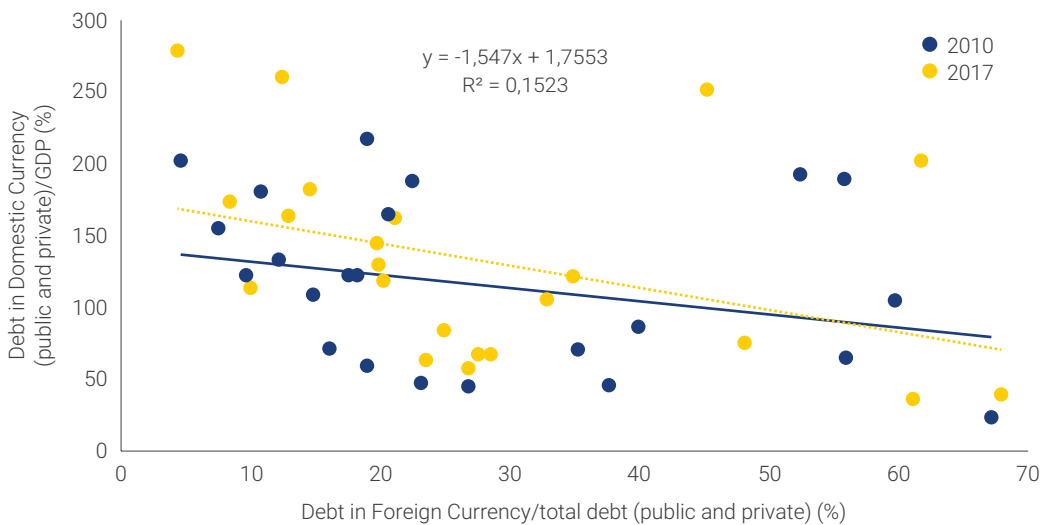


Note: Variation between 2000 and 2018. The sample includes only countries with FD deposits and dollarized public debt greater than or equal to 10% of total public debt in .

Sample: Albania, Angola, Argentina, Armenia, Azerbaijan, Bolivia, Bosnia and Herzegovina, Bulgaria, Cambodia, Costa Rica, Dominican Republic, Egypt, Georgia, Ghana, Guinea, Haiti, Honduras, Indonesia, Jamaica, Jordan, Kenya, Kyrgyzstan, Lebanon, Maldives, Moldova, Mozambique, Nicaragua, Macedonia, Pakistan, Paraguay, Peru, Philippines, Romania, Russia, Rwanda, Sri Lanka, Sudan, Tajikistan, Turkey, Uganda, Ukraine, Vietnam, and Zambia.

Fuente: World Bank, International Monetary Fund (IMF), central banks of each country.

Figure 12. Debt dollarization and local market depth



Sample: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hong Kong, Hungary, India, Indonesia, Israel, South Korea, Malaysia, Mexico, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand, Turkey, and Ukraine.

Source: Institute of International Finance - Global Debt Monitor Database.

IV. Theory: Determinants of Currency Substitution (RD)

Originally, the literature on dollarization primarily referred to the substitution of foreign currencies and its influence on the management of monetary policy. As a result, early explanations tended to emphasize the negative connection between demand for local currency (in its transactional use) and the inflation rate (including the memory of past inflation and depreciation episodes, or expectations for future ones associated with the so-called “peso problem”). As such, they are relevant to FD only to the extent that currency substitution influences the monetary composition of savings.⁴

The logic behind the relationship between inflation and currency substitution is simple and well known. A basic monetary model predicts that the relationship between nominal balances in the local and the foreign currency (c) is a function of the nominal interest rate in each currency; therefore,

$$c = f(i, i^*)$$

where i and i^* are the interest rates in pesos and dollars, respectively, and $f'_1 < 0$, $f'_2 > 0$.

In turn, assuming uncovered interest rate parity,

$$i = i^* + E(\Delta e)$$

where $E(\Delta e)$ is the expected depreciation, then,

$$c = f(i^*, E(\Delta e))$$

Therefore, to the extent that the inflation differential is ultimately reflected in the nominal exchange rate and hence in the nominal interest rate differential, an increase in expected inflation would encourage the dollarization of transactional balances.

This analysis of the dollarization phenomenon as currency substitution was questioned in the late 1990s for two reasons. First, dollarization persisted after years of low inflation rates.⁵ The second concern was essentially empirical: the persistence of dollarization was usually measured based on the evolution of the rate of dollarization of total deposits, most of which are term deposits bearing interest (i.e., they are financial assets

⁴ While there is no rigorous study of the relationship between RD and FD, the influence of the second on the first appears to be weak, given anecdotal evidence that currency substitution tends to be relatively low in those countries that exhibit high levels of FD, as wages and most goods and services remain denominated and transacted in the local currency. In contrast, as we will see in the next section, the expectation is that RD, to the extent that it increases the pass through of exchange rate changes to prices, stimulates FD.

⁵ This persistence was initially attributed to inflationary memory (memories of past inflation that induce expectations of high inflation even after years of price stability, as in Savastano, 1996) and to the cost of modifying conventions once transactions are conducted in a foreign currency (Guidotti and Rodriguez, 1992).

and not *currency*). This concern and the growing relevance of the macroprudential aspects of dollarization, in light of the currency crises of the 1990s, shaped modern dollarization theory as asset substitution.

V. Theory: Determinants of Asset Substitution (FD)

Unlike the dollarization of payments, or currency substitution, FD is immune to systematic differences in return rates if, through arbitrage, interest rates adjust to match their *real* returns *ex ante*. In that case, FD would be related to risk differentials. This risk differential may be introduced into the determination of dollarization in several ways. For the purposes of this work, these may be classified into two groups: i) a portfolio approach that explains dollarization as the result of a financial optimization problem based on the risk in and the returns to the assets denominated in each currency, and ii) a market failure approach that explains dollarization as the answer to market imperfections, sometimes boosted by institutional failures.

A. Dollarization of savings portfolios

The easiest way to introduce risk is through uncertainty in actual yields. This is the main assumption of the portfolio paradigm, which sees FD as the result of an optimal portfolio election by risk-averse creditors and debtors, who are responding to the probability distribution of real yields in each currency in a world with price risks.

According to the CAPM, agents choose the currency composition that optimizes the risk-return profile of their portfolio, measured in units of the local consumption basket. In the simplest scenario, the balance between supply and demand for loanable funds in each currency leads to uncovered interest rate parity and an allocation that emulates the minimum variance portfolio (MVP) (Ize and Levy Yeyati, 2003).⁶

In the absence of transaction costs, the model shows the key FD driver to be the *volatility of inflation relative to that of changes of the real exchange rate* -or, alternatively, the covariance of inflation and the nominal exchange rate relative to its variance, that is, the "beta" of an inflation regression against the contemporary nominal depreciation, a simple but popular measure of the exchange rate pass-through to prices. Thus, the dollar is favored if the real exchange rate, which determines the volatility of the real returns on dollar instruments, is stable relative to the inflation rate, which determines the volatility of real returns on local currency instruments. This has several normative implications. First, financial dollarization (FD) hysteresis -that is, persistent dollarization after years of low inflation rates- may be the result of exchange rate-based stabilization efforts, which stabilized inflation and, at the same time, the real exchange rate -that is, they reduced the absolute volatilities

⁶ A somewhat different outlook arises when applying a consumption capital asset pricing model (CCAPM), where dollarization is further encouraged by the typically countercyclical behavior of exchange rates.

without modifying the relative volatilities. Conversely, an inflation target policy with exchange rate flexibility would be the ideal combination to discourage FD.

Second, FD should increase with the degree of openness and with the presence of real dollarization -price fixing in dollars- since both raise the exchange rate pass-through to prices. Third, *resident* savers/depositors (alternatively, borrowers) favor the local currency more than foreigners, as instruments in the local currency better reflect their future spending (income). Fourth, real assets (e.g., deposits indexed to the local price index) should dominate assets in dollars since they minimize or eliminate the variability of real returns-as long as this indexing is contemporaneous and credible.

Fifth, a widening of the intermediation margin for dollars (for example, by introducing higher reserve requirements for bank deposits in foreign currency), to the extent that it lowers the deposit rate and raises the lending rate relative to the local currency rates, should reduce FD.

Last, this approach highlights the role played by expectations and credibility. The case of a fixed exchange rate regime is the clearest example. If the regime is fully credible, the dollarization coefficient is indeterminate since both currencies are indistinguishable. FD is then driven by other considerations, for example, the liquidity provided by each currency. However, if the regime is not entirely credible, dollarization is explained by the distribution of exchange rate changes and inflation -that is, by the way monetary and exchange rate policies are expected to be handled- in the event of a collapse of the fixed rate regime, regardless of how unlikely such a collapse may be *ex ante*. More generally, because this lack of credibility may be persistent, improvements in monetary policy that would appear to favor the use of the local currency -measures based on recently observed volatility- may not have an immediate impact on dollarization.⁷

In all cases, a distinguishing feature of portfolio models is that FD reflects an optimal response to the yield distribution resulting from a possible suboptimal policy environment. Thus, while FD is inevitable and actually a healthy outcome in very small, very open economies, in a larger and/or more closed economy it can be a pathological manifestation of poor monetary policy that adds volatility to the real value of the currency, invalidating it as a store of value. However, an erratic monetary policy may be not an accident but rather the result of past failures (Cowan and Do, 2004) and of dollarization itself. This circularity suggests that, as we will see later, de-dollarization is a long and asymptotic process in which monetary authorities should be willing to pay -literally and figuratively- the cost of these past mistakes.

⁷ Consider, for example, a Bolivian investor and an American investor deciding whether to invest in pesos bolivianos or in dollars. The first investor would look at the transfer of the volatility of the dollar/peso exchange rate to Bolivian inflation. The second would look at the same move but to U.S. inflation.

B. Market failure

In Broda and Levy Yeyati (2003), the dollarizing bias arises from a combination of two ingredients: a positive correlation between the probability of default and the real exchange rate (associated with the countercyclical nature of the exchange rate) and a fixed interest rate that is not a function of the debtor's level of dollarization (because of imperfect information on the currency balance of the bank, in the case of a deposit, or of the firm, in the case of a loan). The logic is simple: if the residual value of a bankrupted debtor is distributed among its creditors proportionally to the credits, dollar creditors obtain a higher relative return because the exchange rate is expected to be higher in default events (think, for example, of the correlation between the real exchange rate and episodes of systemic financial stress). In that case, interest rate arbitrage requires the peso creditor to obtain a better return in non-default situations, creating a positive rate interest rate differential between pesos and dollars. Since the debtor only pays his debt in full in non-default situations, from the borrower's viewpoint the effective cost of borrowing in pesos is higher than that of borrowing in dollars (because of the rate differential); as a result, borrowers prefer to borrow in dollars.

The same argument may be applied to the case of a uniform guarantee that does not distinguish between assets in pesos and those in dollars (i.e., ignores currency risk): the expected value of the guarantee (valued in pesos) is higher for the dollar investor; if the cost does not reflect this difference, the investor will prefer to dollarize. Full deposit insurance is a good illustration. Since depositors in dollars (but not pesos) receive protection against exchange rate risk in default situations at the expense of the deposit insurance agency, the value of deposit insurance is higher for dollar depositors. It follows that any insurance scheme that does not incorporate this difference in value into the premium would favor dollarization.⁸

Jeanne (2002), in turn, highlights how a *peso problem*, by raising the interest rate in pesos relative to that in dollars, may favor dollarization in the presence of another market imperfection: nonlinear settlement costs in the event of bankruptcy. In this case, the currency composition is optimally chosen to minimize the likelihood of bankruptcy. Consider a foreign exchange fixing regime with partial credibility: individuals assign a moderate probability to devaluation, say 20%, but if it materializes, they expect the local currency to collapse with, say, 100% probability. This small probability of a large devaluation increases the peso-dollar differential by 20% to the point where, in the absence of a devaluation, the rate in pesos becomes unpayable. Thus, the debtor in dollars goes bankrupt only if there is devaluation, and the debtor in pesos goes bankrupt only if there is not.

⁸ This reluctance to recognize the "currency difference" may reflect a deliberate attempt to adopt dollar-friendly policies in the belief that FD promotes financial intermediation or to improve exchange rate credibility, as in the case of the currency board limit (De la Torre et al., 2003).

To minimize the expected cost of liquidation, in equilibrium, the debtor borrows in the currency with the least probability of bankruptcy: the dollar.⁹

Another similar explanation attributes the dollarization bias to the presence of externalities, which, in turn, create the perception of implicit debtor guarantees (Burnside *et al.*, 2001). For example, the social cost of massive bankruptcies after a sharp devaluation makes the rescue of debtors ex post optimal for the government. In turn, borrowers anticipate the bailout and disregard foreign exchange risk, targeting the lower-rate currency: the dollar. The same could be said, for example, about the dollarization of mortgages: if a massive wave of foreclosures is perceived as politically costly and therefore unlikely, mortgage debtors, anticipating a bailout, dollarize their debt to take advantage of the lower rate.

These mechanisms, based on the presence of the unavoidable negative externalities of a financial crisis, are a strong argument for quantitative regulation -for example, limits on loans to debtors without genuine income in dollars- used by many countries in the 2000s.

C. Legal imperfections

Dollarization may also be the result of market imperfections, for instance, when the dollar is granted artificial attributes. The existence of more efficient offshore intermediaries *that only mediate in dollars* induces dollarization via “offshorization” and forces domestic intermediaries to raise their margins for the local currency to make up for lower dollar margins (Calvo, 2001; Ize and Powell, 2004), an aspect that may not be generalizable to the whole region but that did play a role in Ecuador's exchange rate crisis that led to official dollarization, and that could still be influencing the persistent financial dollarization in Uruguay.¹⁰ Transaction costs also have an influence in border areas where the dollar is usually the dominant intermediation currency, as in the provinces of northern Mexico, or in countries such as El Salvador where dollarized remittances account for approximately 15% of its GDP. On the external front, some observers have pointed out that emerging economies cannot take on long-term debt in the local currency (a kind of “original sin,” according to Eichengreen and Hausmann, 1999). This could be due to factors linked to liquidity and market architecture (nonlinear transaction costs, network externalities, the influence of benchmarking on asset management, shallow domestic markets) combined with the fact that, with few exceptions, the currency is determined by the jurisdiction. The “home currency bias” that

⁹ This argument may be easily extended to the case of a flexible exchange rate regime, provided that the distribution of exchange rate changes is sufficiently biased.

¹⁰ Even today, despite the opening of domestic banking to foreign banks, offshore banking benefits from milder regulation, which induces regulatory arbitration, and greater opacity, which facilitates tax evasion.

naturally arises from the FD portfolio approach provides a complementary reason: the local currency is more attractive for residents than for outsiders (Levy Yeyati, 2004), and residents' savings are insufficient.¹¹ In line with the premise of home currency bias, in the 2000s, most financially integrated countries in Latin America, to domesticize and de-dollarize their debt, adopted -as a state policy- the development of domestic financial markets which are broadly used today by sovereign and corporate issuers for long-term debts.

Last, FD is also affected by economies of scale (e.g., the size of the country or the relative depth and efficiency of local-currency versus dollar markets) and trade integration with the world economy: countries more open to trade should be more dollarized (Ize and Levy Yeyati, 2003; Luca, 2002). Because smaller countries are more likely to have more open economies, they are expected to be, on average, more dollarized. In this case, dollarization would be an optimal response to the environment: repressing it would be difficult and/or counterproductive.

D. The role of policy

In many of these cases, the roots of dollarization are not so much *market failures as policy failures*, to the extent that policy does not address obvious imperfections. When deposits are guaranteed or when bankrupt banks or companies are bailed out, creditors often imperfectly internalize the related credit risk. Unless they have much to lose in the event of default -that is, they have enough equity at stake- they transact in the currency that maximizes *the option value of the implicit guarantee*. Similarly, the central bank's ability to *provide liquidity* in the foreign currency also increases moral hazard and promotes use of the dollar, reducing banks' incentives to maintain costly reserves in foreign currency (Dooley, 2000; Ize, Kiguel and Levy Yeyati, Chapter 9): more bank reserves could crowd in private indebtedness in dollars, which, under a managed exchange rate, further increases bank reserves, resulting in a vicious circle that often leads to a disruptive unwinding.

Prudential regulation that does not take foreign exchange risks into account exacerbates this problem and benefits the dollar at the expense of the local currency. Uniform deposit insurance and the central bank's involvement as a "lender of last resort" (LoLR) clearly illustrate this (Broda and Levy Yeyati, 2003). The same applies to prudential banking regulations, which emphasize limits on open monetary positions but neglect the potential currency mismatch of dollar debtors when calculating capital requirements (Gulde *et al.*, 2004; Levy Yeyati, Martínez Pería and Schmukler, 2004).

¹¹ This resident/nonresident distinction is in line with evidence that shows that the deepening of domestic intermediation precedes debt de-dollarization (Bordo, Meissner and Redish 2002) and relates to the negative correlation between external dollarization and the size of domestic financial markets (Claessens, Klingebiel and Schmukler 2003; Eichengreen, Hausmann and Panizza 2003a).

The endogenous nature of monetary and exchange rate policy also plays an important role. In a de-dollarized economy, the monetary authority tolerates greater exchange rate flexibility; in a dollarized economy, it may prefer a fixed or dirty exchange rate scheme out of fear of the financial stress associated with foreign exchange devaluations in the presence of currency mismatches (Chamon and Hausmann, 2003; Armas *et al.*, 2006, accurately describes how Peru successfully dealt with this dilemma). In this case, the distribution of the real exchange rate shows small variations and long positive tails typical of a *peso problem* -conditions that both favor dollarization. The endogenous nature of monetary policy may thus lead to corner solutions in which both dollarization coupled with a fixed exchange rate and the de-dollarization coupled with a floating exchange rate are optimal *depending on the initial level of dollarization*. Thus, we could say that several Latin American countries -and many emerging countries- went from the first to the second equilibrium in the 2000s, thanks to a deliberate (and costly) decision to de-dollarize.

E. What do the data say?

The empirical literature on FD boomed in the early 2000s, when a significant number of works began to verify the testable implications of the analytical literature with data. Next, we summarize what we believe are their main conclusions.

Research by Nicolás Honohan and Ize (2003) and Levy Yeyati (2006) are efforts to test many of the cited hypotheses. In their cross-sectional regressions covering several countries, both find convincing evidence that the MVP explains much of the dollarization at the expense of the inflation rate, confirming the initial results of Ize and Levy Yeyati (2003). While the version of the portfolio model focused on interest rate volatility has not yet been tested due to difficulties in obtaining cross-sectional data on dollar interest rates for a large number of countries, in general, the increased volatility of interest rates in the local currency -particularly on the credit side- in dollarized economies (Barajas and Morales, 2003) is consistent with the view that *relative volatility matters*. Furthermore, for some countries in particular, there is strong evidence underpinning the portfolio vision: debtors are inclined to better cover their foreign exchange risks in the context of more flexible exchange rate regimes (Martinez and Werner, 2001; Goldstein and Turner, 2004; Kamil, 2005).

In any case, the MVP explains only part of the dollarization phenomenon. While there is a clear correlation between FD and the pass-through coefficient, the latter's effect on FD is significantly less than one to one, indicating that dollarization is only partially explained by the "observed" MVP and that there is ample room to find additional explanations. Evidence that identifies the main factors underlying "*over-dollarization*" is scarce and much less consistent. The main candidate is the discrepancy between the "expected" and the "observed" MVP, reflecting the persistent *lack of monetary credibility and expectations of regimes changes*. As a side note,

the fact that FD is linked to the MVP even though the latter is computed based on a fairly long period of time suggests that expected volatility matters more than recent, observed volatility, a situation that suggests the presence of “peso problems” or slow changes in expectations.¹²

Available evidence also indicates that institutional variables (legal framework, property rights, governance, etc.) are relevant (De Nicoló, Honohan e Ize, 2003; Eichengreen, Hausmann and Panizza, 2003a and 2003b). To the extent that these variables indicate important and profound determinants of low institutional credibility, which also affect monetary policy, this evidence could be taken as yet another sign of the latent problems in the local currency.

Beyond MVP-based internal solutions, the primary candidate for the determination of a high-FD corner equilibrium is endogenous monetary policy: while cross-sectional regressions show a link *between dollarization and fear of floating* (Levy Yeyati, Sturzenegger and Reggio, 2002; Reinhart, Rogoff and Savastano, 2003), predictably, there is no solid evidence on the direction of causality or the specific dynamics that cause these two variables to interact.¹³ Both, in fact, could be simultaneous consequences -without a causal relationship- of deeper structural weaknesses.

A simple exercise yields two preliminary results in line with the conclusions of the literature cited above. A regression of deposit dollarization on the exchange rate pass through (the “beta”) confirms that the positive relationship between the two variables has remained stable over the past decade (Table 1). Figure 13 shows the evolution of this positive link for each year between 2000 and 2019: statistically significant coefficients are positive and range between 0.2 and 0.44.

On the other hand, Figure 14 shows how the MVP evolved downwards in the 2000s, pointing to one of the factors behind the de-dollarization process: the combination of a portfolio approach with a drop in the exchange rate pass through. This begs a question to which we will come back below: What explains the resilience of FD in countries in the region that have managed to reduce the exchange rate pass through over the past decade? If it is not the relationship between inflation and the real exchange rate, which of the other causes mentioned in the preceding section support financial dollarization today?

¹² Regarding moral hazard and prudential regulations, Cowan, Kamil and Izquierdo (2004) corroborate the positive impact of prudential regulation, which does not consider the denomination currency, on FD: uniform deposit insurance for both local currency deposits and dollar deposits is correlated with increased FD.

¹³ Rennhack and Nozaki’s estimates (2006) point in this direction but do not reach a complete, concurrent estimate.

Table 1. Deposits, inflation, and MVP dollarization

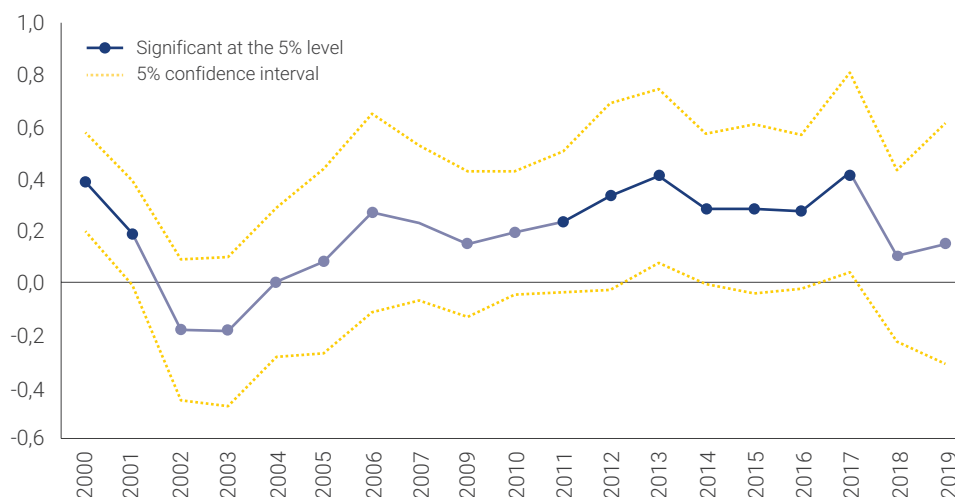
Variables	FD deposits			FD term deposits	
	Sample since 2000	2010	2017	2017	
Beta pass through	0.167 *** (0.0325)	0.166 *** (0.0336)	0.388 *** (0.0975)	0.426 ** (0.196)	0.551 * (0.290)
10-year inflation	0.00203 (0.00758)	0.00211 (0.00822)	0.00109 (0.0194)	-0.0347 (0.0690)	-0.0192 (0.0863)
Constant	0.353 *** (0.00950)	0.353 *** (0.0101)	0.281 *** (0.0523)	0.358 *** (0.0478)	0.356 *** (0.0614)
Time fixed effects	NO	Sí			
Observations	844	844	30	46	30
R-squared	0.045	0.054	0.413	0.101	0.129

Standard errors in parentheses.

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

Countries with less than 1 million inhabitants in 2018, those not dollarized in 2000, and offshore financial centers are excluded.

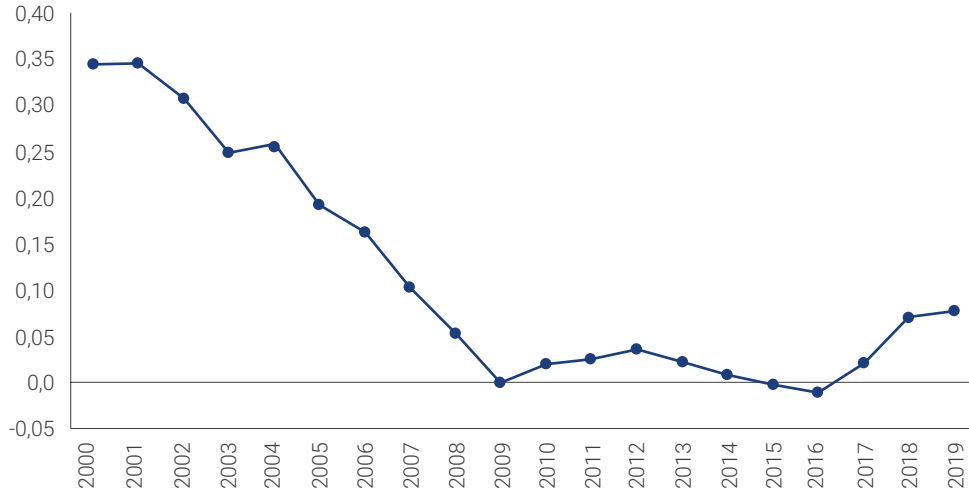
Figure 13. Deposits, inflation, and MVP dollarization



Note: Graph shows the coefficients associated with the pass-through (PT) from a deposit dollarization ratio regression as a function of the PT rate and average inflation over the past 10 years. Dotted lines show 5% confidence intervals. Countries with less than 1 million inhabitants in 2018, those not dollarized in 2000, and offshore financial centers are excluded.

Source: own calculations based on International Monetary Fund (IMF) data.

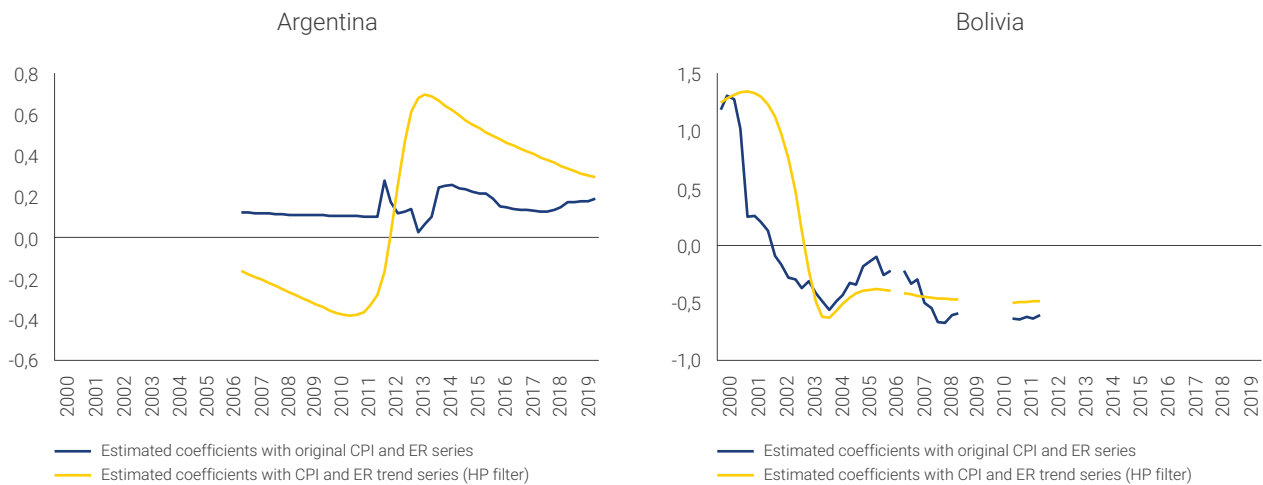
Figure 14. Annual average MVP coefficient (pass-through) since 2000



Note: Graph shows the average beta coefficients from per-country regressions of the quarterly logarithmic difference in the price level on the quarterly logarithmic difference in the peso-dollar exchange rate over a 5- to 10-year window. Quarters with a logarithmic difference in the peso-dollar exchange rate lower than 0.1% in absolute value are excluded. Countries with less than 1 million inhabitants in 2018, those not dollarized in 2000, and offshore financial centers are excluded.

Source: own calculations based on IMF data.

Figure 15. MVP dollarization (pass-through) in dollarized Latin American countries since 2000



Note: Beta coefficients from regressions of the quarterly logarithmic difference in the price level on the quarterly logarithmic difference in the peso-dollar exchange rate over a 5- to 10-year window. Quarters with a logarithmic difference in the peso-dollar exchange rate lower than 0.1% in absolute value are excluded.

Source: own calculations based on International Monetary Fund (IMF) data.

Figure 15. MVP dollarization (pass-through) in dollarized Latin American countries since 2000 (Continuation)



Note: Beta coefficients from regressions of the quarterly logarithmic difference in the price level on the quarterly logarithmic difference in the peso-dollar exchange rate over a 5- to 10-year window. Quarters with a logarithmic difference in the peso-dollar exchange rate lower than 0.1% in absolute value are excluded.

Source: own calculations based on International Monetary Fund (IMF) data.

VI. Policies: De-dollarization strategies

The economic literature -inspired by currency substitution models- first saw dollarization as a potential problem for monetary policy effectiveness to the extent that it increased the sensitivity of monetary aggregates to changes in devaluation expectations; in particular, the literature feared that dollarization, understood as RD rather than FD, would tend to strengthen the exchange rate pass through and weaken monetary transmission.¹⁴ An additional, less explored channel combines RD with FD: changes in the local interest rate, through their impact on the exchange rate, affect the net worth of debtors in dollars, partially neutralizing the direct impact on aggregate demand. For instance, a rate reduction that raises the exchange rate results in a negative balance sheet effect on mismatched debtors and, therefore, the central bank's rate reduction is offset by an increase in the risk premium that reduces credit.

While these problems never ceased to be relevant, the prevalence of FD as a more widespread phenomenon and major macro-financial problem left monetary policy concerns in the background. There are many reasons for this. Implicit dollar indexation and a large exchange rate pass through, perhaps the two major drawbacks imposed by dollarization on monetary policy, notoriously fell in the 2000s throughout Latin America. On the other hand, FD has not been a significant impediment to stabilizing inflation; in fact, the use of the exchange rate as a flexible nominal anchor has been recognized even in countries with inflation targets (explicitly, in Chile in its early years and, more recently, in Peru). In contrast, discrete depreciations, typical of explicit or dirty but misaligned pegs, may have an impact on the balance sheets of companies and banks-including, as previously stated, through the impact of a rate movement on the net worth of companies with dollarized debts. Therefore, the debate on de-dollarization over the past 20 years has largely focused on the prudential front.

A. FD and prudential risk

The so-called *balance sheet effect* refers to cases in which the increase in the local-currency value of dollar liabilities exceeds the increase in the value of the debtor's assets or revenue stream. The possibility of debtors in dollars no longer being able to repay their loans can trigger a banking crisis -even if banks' liquidity positions are balanced by regulation- exacerbating the impact of capital outflows on the real economy and, ultimately, leading to costly macroeconomic crises.¹⁵

¹⁴ The latter stems from the fact that rates and liquidity in dollars are beyond the control of the monetary authority. As stated by IMF experts, "dollarization poses a challenge to achieving a coherent and independent monetary policy" (Baliño, Bennett and Borensztein 1999).

¹⁵ The vast analytical literature on the subject includes Krugman (1999); Chang and Velasco (2000); Aghion, Bacchetta and Banerjee (2001a and 2001b); Gertler, Gilchrist and Natalucci (2001); Lawns, Chang and Velasco (2000); Knight and Krishnamurthy (2002); Jeanne and Zettelmeyer (2002); and Calvo *et al.* (2003). See also Frankel's investigation into contractive devaluations (2004).

Experience seems to justify these concerns. Although the data provide mixed results,¹⁶ evidence holds that FD is associated with an increased propensity toward financial crises, including dollar liquidity runs, a limited use of exchange rate flexibility, and, as a result, increased output volatility.¹⁷ All of the above argues in favor of a proactive de-dollarization agenda, which often is fiscally and economically costly in the near term.

The complexity and feasibility of such an agenda remains controversial and requires the analysis of a broad spectrum of economic, prudential, and institutional measures.

B. De-dollarization tools

An active and market-driven de-dollarization policy should cover at least two fronts: 1) it should revise regulations to lead to the full internalization of the risks of dollar intermediation and provide more room to maneuver to monetary policy (or suppress the market imperfections that lead to the underpricing of such risks); and 2) it should promote the use of the local currency and dollar substitutes, as well as local currency-based savings instruments. This approach rests on the following premise: a “good” and market-oriented de-dollarization policy must overcome the fear of floating the exchange rate, mitigate pro-dollarization biases, and promote local-currency and foreign-exchange hedging instruments. If everything is done as described, dollarization should decline in response to these good policies and, in turn, create increased room for future reforms in a sort of “virtuous circle.”

As FD approaches the MVP, *de-dollarization is about improving the nominal stability and credibility of the monetary authority*. The strategy should focus on measures that gradually enhance the central bank’s ability to implement an autonomous and sound monetary policy without neglecting the impact that an increase in real exchange rate flexibility may have on financial fragility. Hence, there is a need to combine anti-inflationary policy with prudential safeguards (limits on debt in dollars for debtors with non-dollarized income; differential

¹⁶ The case of contractive devaluations induced by the balance sheet effect on a microeconomic scale is still unclear (Bleakley and Cowan 2002), possibly because they are usually prevented by bailouts from the government, which are widely anticipated (see De la Torre et al. for the Argentine case).

¹⁷ Summarizing the findings of this literature, it could be said that dollarized countries have more fragile signatures (Claessens and Djankov 2000), weaker banks (De Nicoló, Honohan and Ize 2003), more contractive devaluations (Galindo, Panizza and Schiantarelli 2003), more capital flow reversals (Calvo, Izquierdo and Mejía 2004), more public debt crises (Calvo, Izquierdo and Talvi 2002), more banking crises (Levy Yeyati 2006), and more product volatility (Reinhart, Rogoff and Savastano 2003; Eichengreen, Hausmann and Panizza 2003a; Levy Yeyati 2006). In turn, the contractive impact of real exchange rate depreciations, including those due to banking crises, limits the effectiveness of countercyclical monetary policy when facing major shocks, forcing the country to reduce its exchange rate flexibility and resort to costly adjustments in the event of a negative shock (Edwards and Levy Yeyati, 2003).

mandatory bank reserves that consider systemic foreign exchange risk) and with a liquidity management that does not neglect foreign exchange volatility.

When FD exceeds the MVP, exiting a poor equilibrium with a high level of dollarization is harder, since the causes and consequences of FD tend to feed back on themselves. In particular, to the extent that default and devaluation correlate positively, as is the case even in non-dollarized economies, the dollar's hedging advantage over the local currency is unlikely to disappear unless dollar intermediation is artificially made more expensive. Even a credible shift towards a free-floating inflation targeting regime would not eliminate that correlation and may not have the expected impact.

In this case, prudential reform -that is, tightening the rules associated with dollar loans, especially to sectors without dollarized resources- may help on the margin by penalizing FD for its exchange rate risk that is only partially internalized by agents. In this manner, such reform strengthens the resilience of the banking system to these risks and facilitates greater exchange rate flexibility. Thus, prudential rules can be the key to moving from a poor equilibrium (a high level of dollarization coupled with fear of floating) to a more virtuous equilibrium where lower dollarization levels allow for a floating exchange rate that reinforces de-dollarization.¹⁸

Perhaps the proactive “market” measure par excellence is precisely the creation of a capital market in the local currency, combining the liquidity of a local institutional investor base with a natural preference for the local currency (insurance companies and pension funds) with indexed instruments that compete as equals with the dollar, especially in contexts of low monetary credibility and high nominal uncertainty (as in the case of the Chilean *Unidad de Fomento*, or UF; see Herrera and Valdés, 2004). These may be complemented by improvements in monetary policy management, a public debt policy that prioritizes instruments denominated in the local currency thereby deepening peso markets, and regulations that nudge institutional investors into peso instruments (e.g., by limiting the fraction of external assets in pension funds, or by developing performance assessment benchmarks with a strong participation of peso instruments).¹⁹

C. Should countries launch a head-on assault on dollarization?

Are the market approaches described above the only way? Should countries regulate FD more head-on? While there is no regulatory consensus about this question, the answer would appear to be a qualified “yes”.

¹⁸ This path often raises fears of disintermediation and offshoring. Moreover, if these forms of intermediation, such as offshore loans, continue to be dollar-based, de-dollarization may not decline substantially, but may become invisible (Ecuador's crisis in the late 1990s is a good example of this).

¹⁹ This is the path adopted by the Central Bank of Peru in the 2000s (see Armas and Grippa, 2006).

Measures to directly discourage dollarization -limits on dollar deposits or loans and dollar intermediation taxes- do not de-dollarize but complement and accelerate the impact and reduce the transition costs of other measures (see Hardy and Pazarbasioglu, 2006). Even a measure as extreme as the forced de-dollarization in Mexico in 1982, while it ultimately fostered the offshoring of the financial sector and the concentration of external borrowing in large companies, may have helped to lay the foundation for the return of the local currency once monetary credibility improved. Similarly, restrictions on dollar intermediation imposed after mandatory conversions in Pakistan and Argentina facilitated the growth of a deeper and healthier local currency-based intermediation-until new policy mistakes in the latter country, including most notably tinkering with the price index, aborted this attempt: de-dollarization requires a multipronged strategy without shortcuts or silver bullets.²⁰

Thus, while a gradual approach that seeks to put some “sand on the wheels” of dollarization would be less risky, the slow pace of reforms and the possibility of disruptions due to policy setbacks along the way argues in favor of a more vehement approach supported by a stronger policy commitment, at least in the case of very dollarized countries and especially in the presence of intertemporal inconsistency problems that inhibit the impact of many regulations on the margin. In other words, in addition to the required prudential restrictions, in many cases, quantitative restrictions or limits to complement the battery of market incentives must be added.

D. De-dollarization: Taxonomy

In a nutshell, based on the implications of the theory, de-dollarization measures could be ranked, in a nonexclusive manner, on the basis of three criteria. The first are measures that attack the macroeconomic dimensions that influence dollarization; the second are micro measures that, by increasing the differential costs of financial intermediation in both currencies, may dissuade investors from dollarizing their savings. The last are measures that directly affect the choice of a foreign currency as a means of payment or unit of account.

²⁰ On the other hand, evidence indicates that dollarization does not contribute to financial deepening over the long term: the relationship between FD and financial depth is null or negative, and the effect of legal restrictions is positive (De Nicoló, Honohan and Ize 2003; Levy Yeyati 2006; Cowan, Kamil and Izquierdo, 2004), suggesting that the fear of limiting, for example, dollarized loans due to the risk of disintermediation are, in the long run, unfounded.

The following list summarizes this taxonomy:

➤ Macroeconomic measures

- Monetary and exchange rate stability
 - Inflation targets (low and stable inflation)
 - ▣ Low volatility of returns in pesos
 - ▣ Fewer “procyclical” inflationary surprises (coinciding with a drop in real labor income)
 - Avoidance of the exchange rate anchors
 - ▣ Fewer procyclical exchange rate corrections
 - Exchange rate flexibility
 - ▣ Increased volatility of the real exchange rate
 - ▣ Fewer procyclical exchange rate corrections
 - Central bank independence/fiscal balance
 - ▣ No need to monetize the fiscal deficit

➤ Microeconomic measures:

- Differential reserve requirements
 - Tobin taxes
 - Mandatory liquid bank reserves for external liabilities
- Macroprudential measures (micro-regulation to address macro-financial risks)
 - Dollar loan limits to debtors without dollarized income
 - ▣ Credit risk weighting in line with the debtor's currency mismatch when calculating capital integration
 - Limits on foreign currency deposits
 - ▣ Interest rate floors on demand savings accounts
 - Exchange rate risk-adjusted deposit insurance
 - ▣ Intermediate option: same peso limit on deposit insurance for both currencies.
- Development of competitive markets and instruments in the local currency
 - Local bias in the currency of denomination of financial assets
 - Inflation-indexed financial unit of account (not to be confused with real indexation)

➤ Measures to limit currency substitution

- Low and stable inflation
- Legal tender restrictions
 - Mandatory price denomination in local currency
 - Increase of the dollar bid-ask spread.

VII. Cases

As noted, successful episodes comprised a battery of direct and indirect measures (including proper macroeconomic policy management). Six examples of responses to *de facto* dollarization are briefly outlined below, each with its own characteristics and approaches, to illustrate the complexity of de-dollarization strategies. The cases considered are paradigmatic and relevant to illustrate how different dollarization varieties work in practice, how policy should respond to each of them, and what problems are faced by de-dollarization efforts, even in economies where the original sources of dollarization have been attenuated or eliminated.

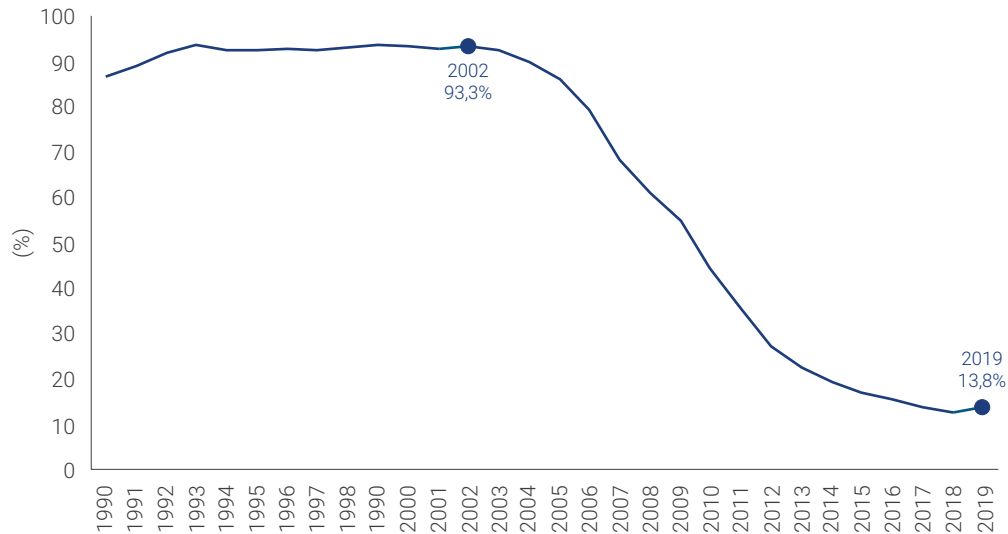
These six cases are:

- A success: **Bolivia** (the case with which the literature on financial dollarization began), a country not financially integrated and exhibiting strong FD and RD;
- A success: **Peru**, where thanks to several measures (monetary policy, price denomination) and a favorable external context, both FD and an incipient RD were controlled and reversed;
- A partial success: **Uruguay**, where despite adopting successful policies seeking stabilization and the development of domestic markets in the local currency that enabled the country to preserve access to financial markets even in times of crisis, modest results were achieved in reducing FD;
- A pending assignment: **Costa Rica**, a small and open Central American economy with FD and persistent RD (a similar situation to that of other countries in the region, such as Guatemala, Nicaragua, and the Dominican Republic);
- Two cases of *de jure* dollarization: **El Salvador**, whose mixed experience serves as a mirror for many Central American economies that frequently toy with OD; and Ecuador, a country that recurrently challenges its own OD.

A. Bolivia

Until the mid-2000s, Bolivia was one of the most dollarized countries in the world. In 2002, deposit dollarization exceeded 93%. However, policies implemented since then combined with macroeconomic stability to lead to one of the largest de-dollarization efforts in the region and the world: in 2019, only 13.8% of deposits were denominated in a foreign currency.

Figure 16. Deposit dollarization in Bolivia



Source: Central Bank of Bolivia.

Several factors explain the success of de-dollarization in Bolivia.²¹ First, macroeconomic stability strengthened confidence in the local currency: between 2004 and 2019, the economy grew at an annual 4.7% rate, and inflation reached 5% on average. Second, since the 2000s, the government and the Central Bank of Bolivia (BCB) have implemented a series of measures that also contributed to this fast de-dollarization. Macroprudential policies included higher mandatory bank reserves for foreign currency deposits, high provisions and capital requirements for loans denominated in foreign currencies, and higher capital requirements against open foreign currency positions. Additionally, a Tobin-type tax was imposed on financial transactions, which in recent years has been exclusively levied on foreign currency-denominated bank accounts.

In addition, the official foreign exchange bid-ask spread was increased for dollar sales with the goal of discouraging RD, in particular the dollarization of labor income used for transactions. This spread was increased from one to two Bolivian cents per dollar in January 1999, to four in early July 2005, to six at the end of the same month, and to ten in April 2006.²²

²¹ A study by Rio Rivera and Montero Kuscevic (2010), based on a cointegration model, finds a long-term relationship between the de-dollarization of financial liabilities and the minimum variance portfolio, in line with what is reported in section 6, and attributes de-dollarization to a flotation regime administered by the BCB, which adjusts the exchange rate via small devaluations or revaluations following monetary and exchange rate policy guidelines.

²² This is in line with the recommendations of the IMF mission to Bolivia in 1998, from which the work of Ize and Lev Yeyati (2003) originated.

An econometric study by Rivera and Kuscevic (2014), based on the portfolio optimization model of Ize and Levy (2003), concludes that the tax on financial transactions and the gradual increase in the exchange rate spread by the BCB have contributed to the process of de-dollarization of financial liabilities in Bolivia.

What was the role played by the volatility of the real exchange rate, a key variable in the financial dollarization portfolio model, which was drawn up with the Bolivian case in mind? In this regard, two periods must be distinguished, identified according to a major real shock: the discovery and exploitation of gas reserves. Until 2004, Bolivia's exchange rate policy showed no signs of fundamental changes: the exchange rate varied *pari passu* with inflation. Since 2005, in contrast, the enactment of the Hydrocarbons Law, the influx of foreign direct investment and the gas export boom created a trend towards the appreciation of the boliviano, initially contained and since 2009 slowed down by the accumulation of central bank reserves at a fixed parity of 6.91 bolivianos per dollar, while inflation fluctuated (upwards in 2007 and 2008, downwards in 2009) hand in hand with the global price of commodities. In this sense, Bolivia went through the global crisis in the opposite direction of that of the region's financially integrated economies.²³ In short, while the stability (in recent years, extreme) of the exchange rate has helped to reduce the exchange rate pass through, it was not relative price stability but the expectation of a real appreciation of the national currency that contributed to the de-dollarization of savings.

B. Costa Rica

An early study by the Central Bank of Costa Rica (Mendez and Valverde, 2003) lists the following factors behind the high and persistent deposit dollarization ratio in a country with moderate inflation and no recurring financial crises, typical in financially dollarized countries:

1. **Memory** of the period of economic instability in the early 1980s.
2. The **convertibility** of the national currency vis-a-vis the dollar (its low conversion cost).
3. **Regulations** that make no distinctions by currency (in line with what is argued as one of the causes in section 6), which favor dollar intermediation through, among other things, a similar deposit insurance for both currencies (disregarding differential risk) and a more convenient regulatory burden (reserve requirements, liquidity management) for the foreign currency as of 1996;

²³ Even though it exceeds the scope of this study, it is worth noting that the exchange rate peg was sustained to date despite the deterioration of the deficit and the terms of trade and at the expense of a sharp drop in reserves, a combination that could conspire against de-dollarization and that will surely be their final test.

4. A **exchange rate regime** of mini-devaluation since 1983 that, according to the authors, stimulates the search for protection against the loss of value of the local currency, the colón (although, strictly speaking, the regime minimizes real exchange rate volatility, in line with the conclusions of the portfolio approach described above) and that, in addition, forces banks to maintain a positive net position in foreign currency, stimulating dollarized deposits;
5. Increased **transactional demand** for dollars due to the expansion of free trade zones and foreign tourism, remittances from abroad, and corporate transnationalization;
6. A **low exchange bid-ask spread**.

It is worth noting that not all these factors have the same impact on Costa Rican dollarization. Beyond the relationships between the dollarization of prices and transactions and financial dollarization,²⁴ we can say that while 1, 2, 5 and 6 promote currency substitution, resulting in a high demand deposit dollarization ratio, factors 2, 3 and 4 favor asset substitution or FD.²⁵ Hence, not surprisingly, Costa Rica exhibits high rates of both kinds of dollarization and, in the absence of a state policy signaling de-dollarization, these ratios have remained relatively stable over the past 20 years (see Figure 4).²⁶

Dollarization is a source of ongoing concern, as stated in the IMF's April 2019 Staff Report when referring to financial vulnerabilities associated to the accumulation of external liabilities in general. The report's recommendations are in line with some of the factors outlined above: differential reserves requirements (in particular, minimizing them for deposits in the local currency) to increase the cost of dollar intermediation, and an increase in the risk weight on dollar liabilities for the calculation of mandatory liquidity requirements, in addition to a broader recommendation for macroeconomic sustainability to contain depreciation expectations.

The practical limits to these regulatory recommendations are clarified when examining the evolution of the regulation: FD in Costa Rica reflects, as in other countries, a dilemma between deepening domestic credit and prudential needs. For example, in June 2018, in view of the cyclical credit drop, the National Council for the

²⁴ Let us not forget that the distinction between liquidity and savings is not perfect: many savings assets offer liquidity benefits (directly, or indirectly as collateral to obtain financing).

²⁵ The ease of conversion between currencies favors both short-term transactional conversions as well as medium-term savings instruments.

²⁶ The dollarization pattern in CR is not much different from that in other Central American economies such as the Dominican Republic, Guatemala, Nicaragua and Belize, or even El Salvador, which officially dollarized its economy in 2001.

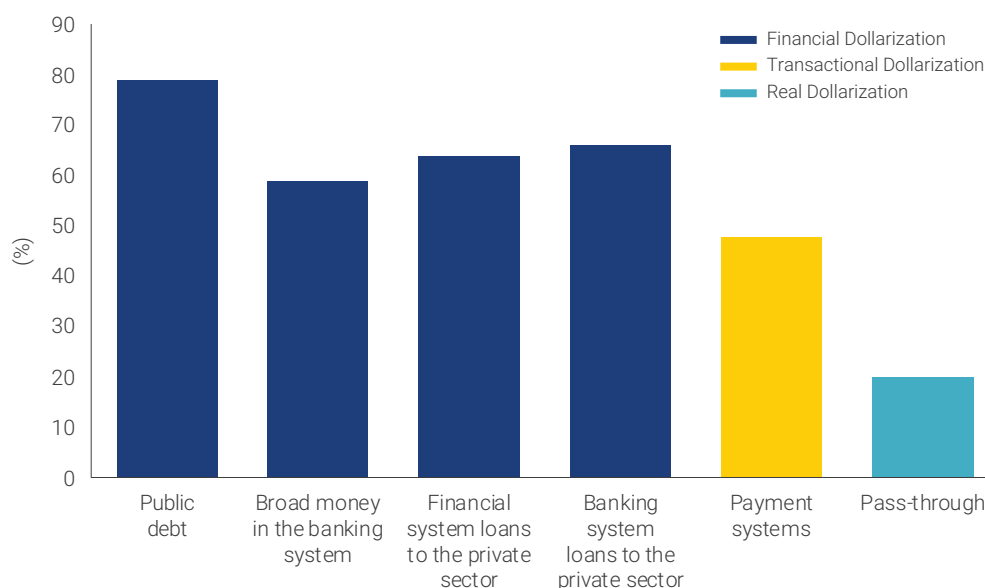
Supervision of the Financial System (CONASSIF) relaxed the restrictions on dollar loans to debtors without foreign currency income, as well as the risk-weights factors used in those cases, subordinating prudential limits to the growth needs –thereby reversing the gradual de-dollarization of private credit.

C. Peru

As illustrated by Armas and Grippa (2006), Peru, along with Bolivia, is a paradigmatic case of financial and transactional dollarization. In Figure 17, the dollarization of transactions in 2005 is proxied by an alternative to the demand deposit dollarization proposed above: the dollarization of the payment system, which combines the percentage of dollarized ATM withdrawals, check clearings, interbank transfers and bank debits.²⁷

As Bolivia, Peru has also managed to successfully reduce both types of dollarization in the 2000s, as illustrated by the evolution of transactional (demand) and savings (term) deposits (Figure 18). Deposit dollarization fell from 69% in 2001 to 33% in 2019, while credit dollarization decreased from 79% to 26% over the same period. However, the drop in the dollarization of demand deposits stopped in 2011 and has failed to fall below 35%.

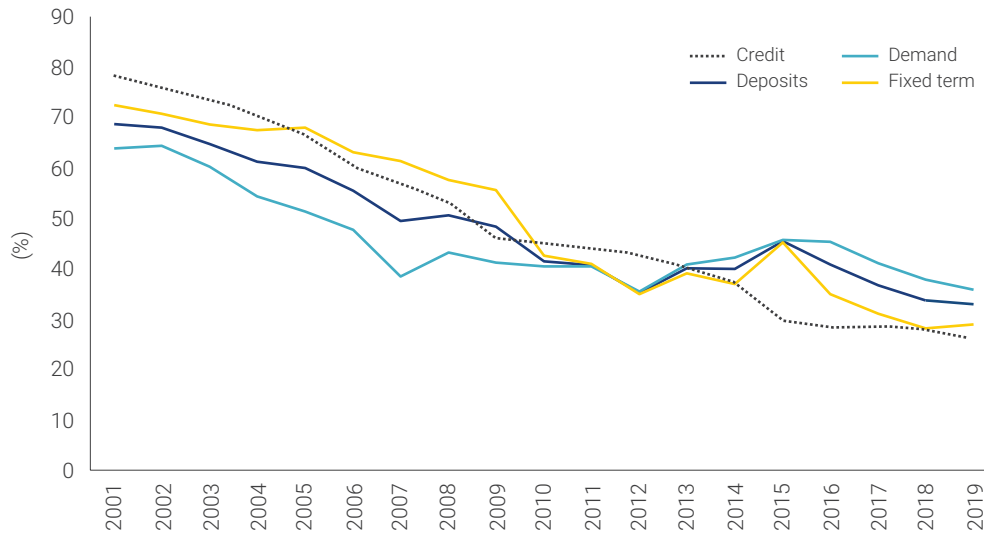
Figure 17. Financial, transactional, and real dollarization in Peru



Source: Armas and Grippa (2006).

²⁷ This measurement is probably more accurate than deposit-based measures, but it is based on usually unavailable private information.

Figure 18. Credit and deposit dollarization in Peru



Source: Central Reserve Bank of Peru.

According to Contreras *et al.* (2017), the factors that contributed to this de-dollarization process included macroeconomic stability, capital market development in the national currency, and macroprudential policies (particularly higher reserve requirements for dollar deposits, as well as temporary hikes in reserve requirements for peso deposits during capital inflow episodes to reduce the appeal of the carry trade).²⁸ Between 2001 and 2019, the Peruvian economy grew 4.9% on average, and the average fiscal balance stood at -0.3%. This led to low inflation (2.6% on average over the same period) and to lower public sector indebtedness, reducing expectations of a discrete devaluation in the future.

In relation to macroprudential policies, the inflation targeting regime and the exchange rate float led financial institutions to internalize exchange rate risks that were formerly mispriced or neglected (as in the presence of implicit guarantees against systemic risks mentioned when addressing the determinants of dollarization in section 5). Furthermore, the development of the domestic capital market in the national currency profited from the jurisdiction bias (the use of the local currency as the main denomination for financial assets issued locally) and home currency bias that lead local borrowers to substitute liquid domestic instruments for dollarized external debt.

²⁸ The mechanism, by opening the margin between active and passive rates, reduces the rate differential received by the investor and, therefore, the incentives for short-term speculative investment.

De-dollarization in Peru has slowed down since 2011 and has even showed signs of stagnation. Low interest rates and the appreciation of the local currency following the U.S. Federal Reserve's expansionary policies have slowed credit de-dollarization. In 2013, the Central Reserve Bank of the Republic of Peru (BCRP) initiated a de-dollarization program aimed at reducing the exposure of banking assets to the exchange rate risk associated with currency mismatches as well as minimizing the externalities of dollarization for financial stability. Castillo *et al.* (2016) conclude that these measures had statistically significant effects on the reduction in dollarized credit in 2015.

D. Uruguay

Following the 2002 crisis and the 2003 debt restructuring in Uruguay, a series of reforms were initiated with the purpose of reducing dollarization. Licandro and Licandro (2003) proposed a de-dollarization strategy based on two pillars: i) the internalization of dollarization risks by agents and ii) the rebuilding of peso markets.

Progress made since then can be categorized based on these two pillars (Licandro and Licandro, 2010). Regarding risk internalization, the Central Bank of Uruguay (BCU) established differential reserves requirements by currency. Additionally, banks began to face higher risk weights for lending activities that involved a currency mismatch, as this mismatch was incorporated into the debtors' credit rating. Additionally, insurance coverage for deposits in local currency became significantly higher than that for foreign currency deposits, and bank contributions to the deposit insurance fund included a fixed part (higher for foreign currency deposits) and a variable part (increasing with currency risk).

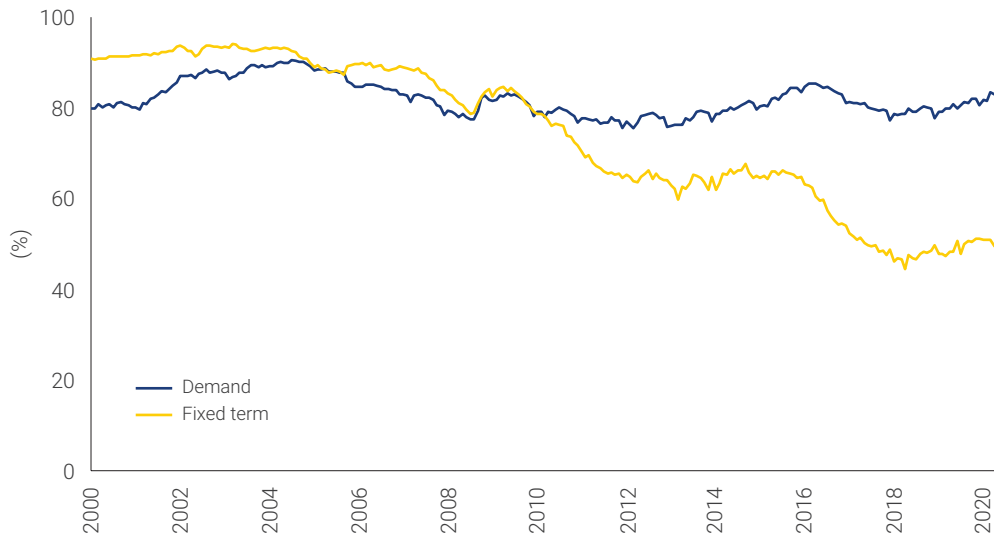
Despite these reforms, deposit de-dollarization in Uruguay has had mixed results. The dollarization of fixed-term deposits fell from 91% to 51% between 1998 and early 2020. However, the dollarization of demand deposits has persisted at approximately 80% since 1999.

In relation to the second pillar, the buildup of peso markets, following the 2002 crisis, the BCU committed itself to low and stable inflation, while fiscally prudent management enabled compliance with the 1996 BCU Organic Charter, particularly its limits on monetary financing. Despite exceeding its target range on several occasions, year-on-year inflation has not exceeded 11% since November 2003. Also, the floating of the exchange rate eliminated implicit dollar guarantees. Finally, the BCU introduced its own short-term paper (up to 3 years), the Monetary Regulation Bills, in both pesos and CPI-indexed units (IU).

The evolution of public debt not only shows a process of de-dollarization with respect to the size of the economy but also with respect to total debt. Debt in pesos has gained a significant share of total debt, consistent with

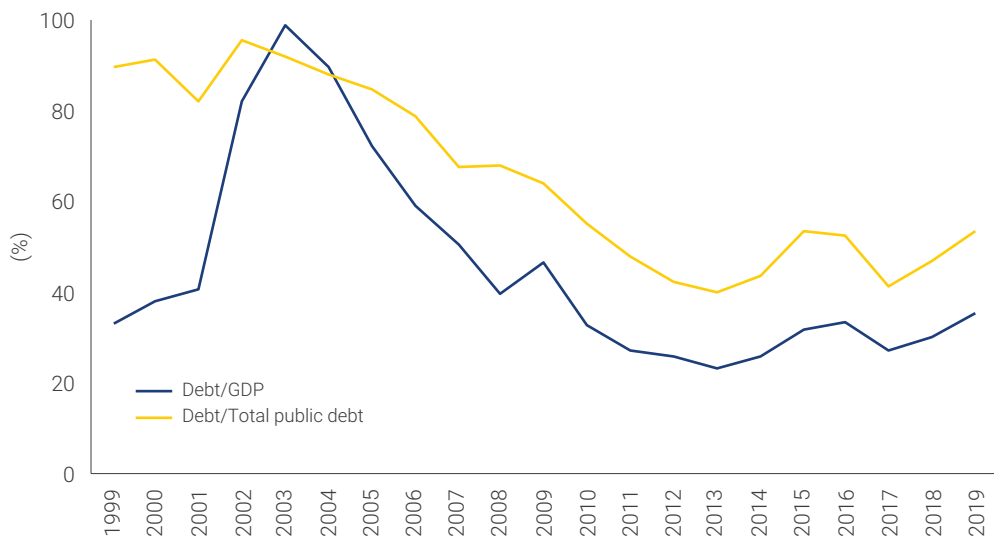
the BCU's commitment to low and stable inflation. In this case, unlike the dollarization of demand deposits, the de-dollarization of public debt may be deemed a success.

Figure 19. Deposit dollarization by type in Uruguay



Source: Central Bank of Uruguay.

Figure 20. Uruguay's public debt in foreign currency



Source: Central Bank of Uruguay.

E. Official dollarization

It could be said that if the net benefits of official dollarization were to materialize, it would be in a country such as El Salvador. El Salvador is a paradigmatic case for official dollarization: OD was adopted in quiet times, without inflationary or exchange rate pressures, with an eye set on the traditional theory of monetary unions focused on the dilemma between trade gains (in a country with strong ties to the United States both in trade and through labor exports via remittances accounting for more than 15% of GDP) and economic cycle synchronicity. The other official dollarization case in the region, Ecuador, is more problematic: it resulted from a desperate attempt to put an end to a devastating currency crisis, in a country soon to become a commodity exporter with limited access to international finance.

The **benefits** on which *de jure* dollarization was predicated in the economic literature of the 1990s include the following:²⁹

- Greater and better trade and financial integration with its main partner (the US) and its partially dollarized neighboring countries (in the case of El Salvador, fueled in part by the hope that the latter would eventually join a Central American “dollar zone”);
- Lower external financial costs and increased domestic financial development, encouraged by the elimination of currency risk (and the resulting financial crises) and expectations of increased nominal stability (essential in the case of crisis-prone Ecuador); and
- A lower inflation rate, thanks to the elimination of currency risk (which in the case of El Salvador arose from the strengthening of the dollar peg in place at the time of the dollarization).

On the other hand, the costs of *de jure* dollarization listed in the economic literature include the following:

- Increased output volatility (due to the absence of the exchange rate as a stabilizer of the economic cycle in the event of real negative shocks),³⁰ combined with lower real growth;
- Increased fiscal fragility (due to the loss of seigniorage and the inability to dilute debt and public spending via an increase in inflation);
- Increased financial fragility due to the loss of the central bank as a lender of last resort or, alternatively, due to the additional tax on the financial system because of the need to maintain a substantially larger stock of liquid foreign currency reserves.

²⁹ For a compendium of this literature, see [Levy Yeyati & Sturzenegger \(2002\)](#).

³⁰ [Edwards & Levy Yeyati \(2005\)](#).

What does the evidence tell us about these benefits and costs in the case of El Salvador and Ecuador?

1. *El Salvador*

Levy Yeyati (2012) analyzed the Salvadoran official dollarization along the terms listed above to draw the following conclusions:

➤ Benefits:

- **Commercial integration.** Controlling for the fact that all Central American economies raised their levels of trade openness in the 2000s, regardless of their exchange rate regime, no positive effect of dollarization was found. Interestingly, using a conventional gravity model, the study reported a *negative* and significant effect of the dummy “common currency with the US”, contradicting the expected trade gains with that country.
- **Financial costs and the development of domestic credit.** The effect of dollarization on local financial costs may be inferred from the evolution of the sovereign's external borrowing costs (as captured, for example, by the sovereign credit risk premium in dollars). In view of the significant improvement in financial costs in dollars in the 2000s in most developing countries, any assessments should consider the evolution of these costs in comparable countries in Latin America. Using a sovereign credit spread model based on sovereign credit ratings and overall risk aversion, no visible gain was found. On the other hand, to assess whether the dollarization coincided with a deepening of the domestic financial market, the study analyzed the evolution of the private sector lending-to-GDP ratio in El Salvador vis a vis comparable neighbors. This time, the data pointed in the opposite direction, showing a stagnation of credit relative to those prevailing in the region, at a time when the region overall exhibited a visible financial deepening.
- **Inflation.** Salvadoran inflation stood below that of other countries in the region both before and after dollarization, and dollarization did not increase or decrease these differences.

➤ Costs

- **Resilience to the crisis.** Comparing El Salvador's response to the latest global financial crisis (2008) in relation to its regional peers, both in activity and in financial terms, El Salvador appears to be among those most affected by the crisis. Of course, this is not necessarily attributable to its exchange rate regime, but it is in line with the premises in the academic literature, as is the behavior of its international reserves: while in other countries in the region, flows collapsed and reserve accumulation reversed partially as

exchange rates depreciated, in dollarized El Salvador, where the exchange rate does not operate as a buffer on the way out of crises, reserves dropped more sharply.

- **Volatility and the growth rate.** If the economic literature is ambiguous about the effects of dollarization on growth, it is more precise when addressing its (negative) influence on real volatility. A simple comparison of the variation in output volatility in the 1990s and 2000s (i.e., before and after dollarization), always relative to comparable countries in Latin America, positions El Salvador right in the middle of the sample, which would indicate that El Salvador's growth pattern (in terms of both levels and volatility) has not visibly differed from that of its neighbors because of dollarization.

In short, during the first decade of dollar adoption, El Salvador showed no improvements in any of the fields identified as potential OD benefits, and it may have paid the price of lower resilience to crises-possibly because some of the benefits (low inflation and financial cost) had already been perceived prior to the dollarization decision and others, such as a deeper trade integration with the U.S., were in fact weakened by increased Asian competition.

Certainly, these results were mediated by idiosyncratic considerations: the Salvadoran economy has been facing macroeconomic problems for several years (low growth and, consequently, rising "dollarized" public debt) and has been heavily reliant on remittances from migrant workers and, through this channel, on the U.S. economic cycle. These two factors worsened the impact of Salvadoran dollarization over the last decade, impairing external financial access and putting the economy on the brink of default in 2017 and in a state of permanent fragility that fueled a debate on official de-dollarization.

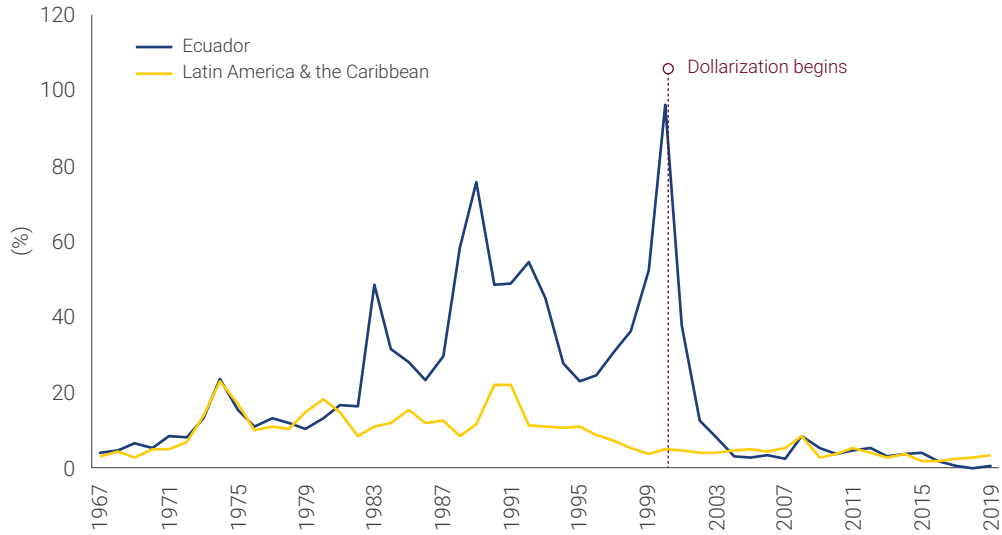
2. Ecuador

In the case of Ecuador, official dollarization was triggered by the urgencies of a currency crisis. This certainly qualifies the analysis of its effects: the starting situation was exceptionally adverse and we could assume, based on similar experiences such as those in Argentina a couple of years later, that it could have been resolved without resorting to such a drastic regime change.

In any case, while the counterfactual analysis is less clear -a comparison with neighboring countries is not enough since none of them suffered a comparable period of instability- a quick look at recent developments could lead to infer that the legal adoption of the dollar did not bring the stability that was being sought.

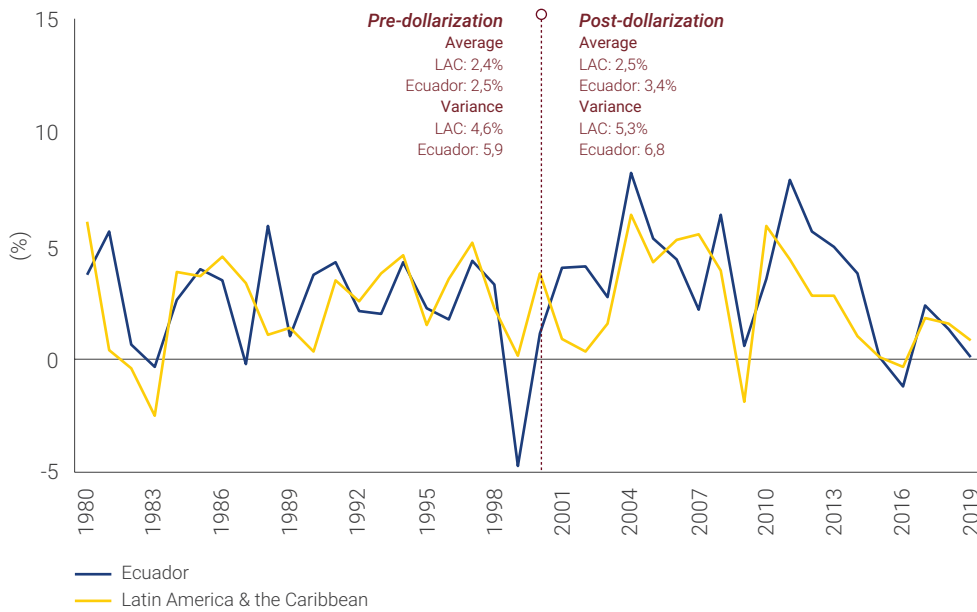
The first issue worth highlighting is that, like the Argentinean currency board (de la Torre *et al.*, 2003) and as argued by economic theory, dollarization helped to contain and reduce inflation, albeit at the expense of a somewhat higher volatility of the economic cycle (Figures 21 and 22).

Figure 21. Inflation in Ecuador and Latin America and the Caribbean (1967-2019)



Source: World Bank.

Figure 22. GDP growth in Ecuador and Latin America and the Caribbean



Source: World Bank.

However, as in El Salvador, dollarization failed to reduce or stabilize external financial costs or move them toward the region's average levels (Figure 23), not even during the reserve accumulation process in the 2000s as a result of the boom in the price of oil (Ecuador's main export) (Figure 24).

Many factors lie behind Ecuador's macroeconomic hardships -oil dependence, which exacerbates real shocks and pairs poorly with exchange rate rigidity, flirting with populist policies, political fragmentation- which today combines low growth with a deepening financial fragility that led the country to restructure its debt and to seek emergency access to the IMF in 2020. The global appreciation of the dollar, which implies the appreciation of dollarized Ecuador, probably conspired against much needed productive diversification, although diversification also evaded most of its neighbors. Ultimately, *de jure dollarization* did not eliminate Ecuador's financial costs, originally attributable to foreign exchange risk-or, if it did, it was at the expense of the risk associated with the loss of the exchange rate as a buffer against broad and periodic oil price fluctuations. Thus, it is not surprising to see that the debate about the feasibility of an eventual official de-dollarization is recurrently on the agenda of experts and political leaders in the country.

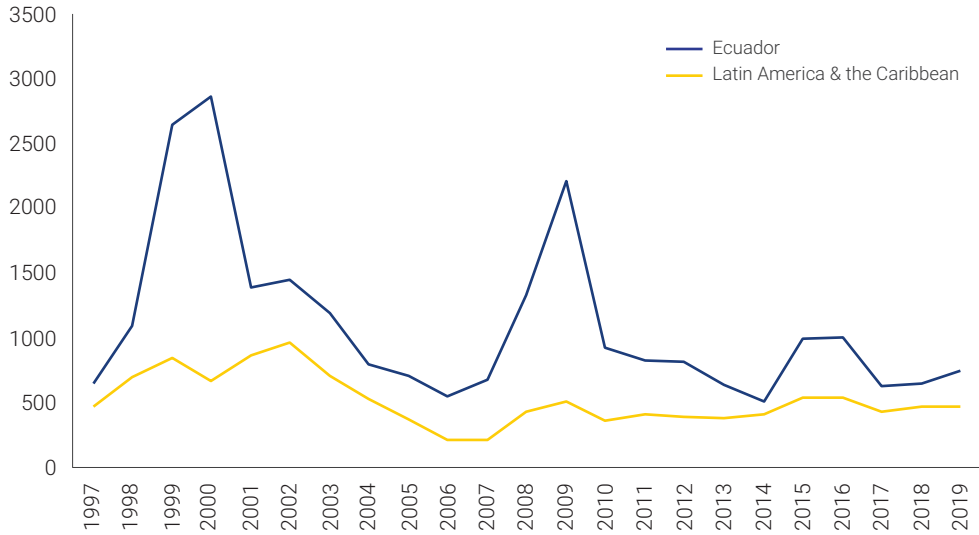
F. Venezuela

The case of Venezuela is left for the end for two reasons: it is difficult to write about empirically due to the scarcity and unreliability of the available data, and it is a country currently undergoing a volatile transition from a managed exchange rate regime, with increasingly ineffective controls, to another system that fluctuates in the country's economic debate between official dollarization to stem its crisis (in Ecuador's style) and a scheme that converges, in the hope of solving the crisis, to a dirty float precisely to elude the problems of Ecuador's oil exporting country. Another increasingly relevant feature, which curiously relates the Venezuelan case to that of El Salvador, is the exodus of workers, many of them middle- and upper-class, and the increasing incidence of diaspora remittances as a source of foreign exchange.

To date, within the framework of a hyperinflationary process, the demand for real balances in Venezuelan bolivars exists only virtually in electronic banking transactions and credit card purchases but has been displaced by the dollar -and, to a much lesser extent, the euro- in cash transactions: by the time of this writing, it is estimated that dollars are already used in approximately 65% of local market transactions, a reason why commercial banks have begun to open accounts in the foreign currency.³¹

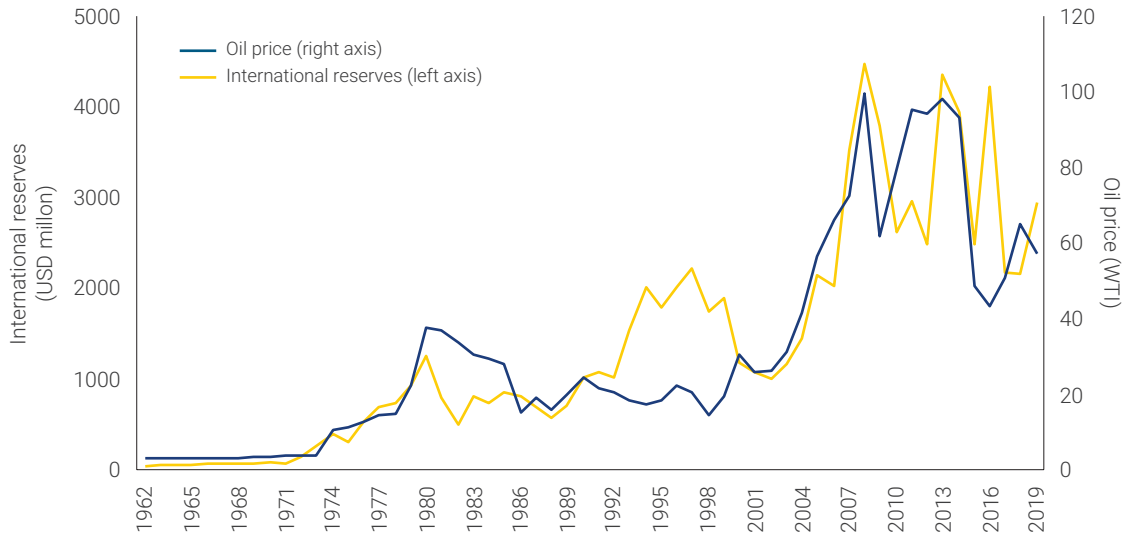
³¹ Interestingly, transactions in dollars are still illegal but were accepted *de facto* by the government as a transitory solution, and therefore they take place within a framework of dubious legality.

Figure 23. JP Morgan Emerging Markets Bond Spread (EMBI+)



Source: World Bank - Global Economic Monitor.

Figure 24. Ecuador's International Reserves and Oil Prices (West Texas Intermediate)



Source: World Bank, U.S. Energy Information Administration.

One could say that the Venezuelan economy is living through an accelerated process of currency substitution, tolerated (and even promoted) by the Chavist government since late 2019 in the absence of options to combat the flight of the national currency and its impact on real activity. In part because the highest denomination banknote (50,000 bolivars) has little real value, those who transact in bolivars do so using cards (ATMs do not usually have quantities over 100,000 bolivars). Prices are dollarized, and if the consumer prefers to pay in bolivars, payments are based on the exchange rate in the parallel market. Thus, local banknotes are held, as usually happens in other *de jure* dollarized economies, at least initially, as spare change, since the smallest dollar bills generally available are \$10 dollar bills.

The available data illustrate this accelerated currency substitution process, which has stimulated the debate about the possibility of official dollarization (Figures 25, 26, 27 and 28).

While the government continues to collect the inflationary tax to finance its fiscal deficit, seigniorage has suffered a sudden fall because of spiraling of money velocity due to the flight from the bolivar: today, the monetary base is estimated to account for less than 0.5% of GDP, or the equivalent of \$360 million, a level that could be dollarized with a fraction of the central bank's reserve stock. This is not trivial when thinking of a monetary and exchange rate regime since stabilization -and, by definition, an official dollarization- would eliminate this source of funding: the advanced currency substitution in Venezuela has come a long way along the path to the adoption of the dollar as legal tender.

Due to all of the above, the relevant question in the case of Venezuela is as much about an eventual de-dollarization -which would demand nominal stabilization as a necessary condition- as it is about the very viability of the national currency and the convenience of *de jure* dollarization, completing a process that has been occurring *de facto*. While the answer to this question goes beyond the subject of this study, it is possible to point out some criteria to consider when thinking about official dollarization.

To begin with, there is the following dilemma: Venezuela still is an oil exporting country with volatile and systemic terms of trade shocks, for which a managed floating regime would be advisable; at the same time, the country is receiving remittance dollar flows like El Salvador -unlike El Salvador, these flows are geographically diversified and therefore should exhibit a lower correlation with the US cycle, although this does not make them any less sensitive to global crises such as the COVID crisis (Figure 29).

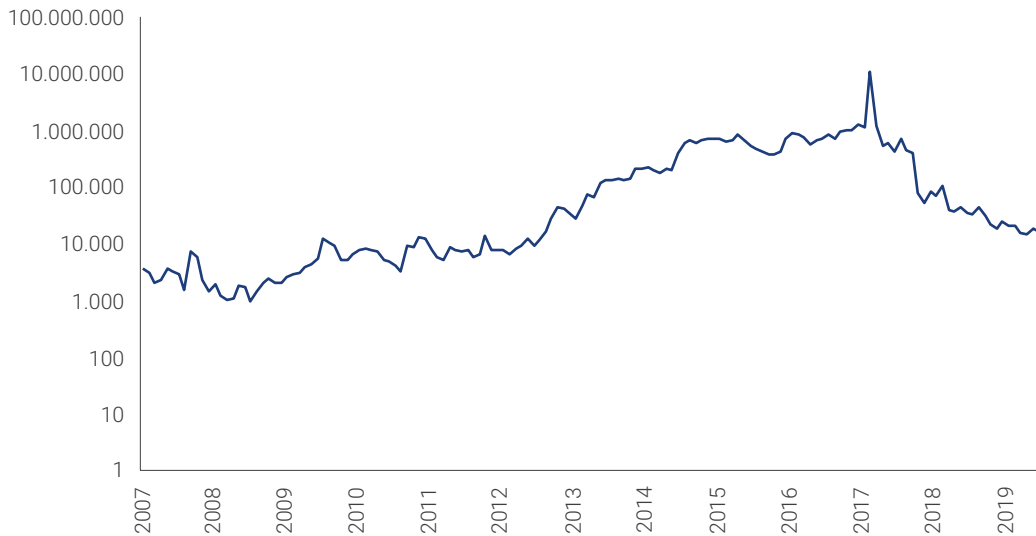
These long-term considerations cannot ignore the short-term demands from the ongoing currency substitution and hyperinflation, the kind that led Ecuador to dollarize as a last resort, which creates another dilemma: can the Venezuelan crisis be overcome -more precisely, can there be nominal stabilization and can the foundations for economic recovery be laid- without a national currency?

Figure 25. Deposits in national currency in commercial, universal and development banks In December 2007 strong bolivars (VEF)



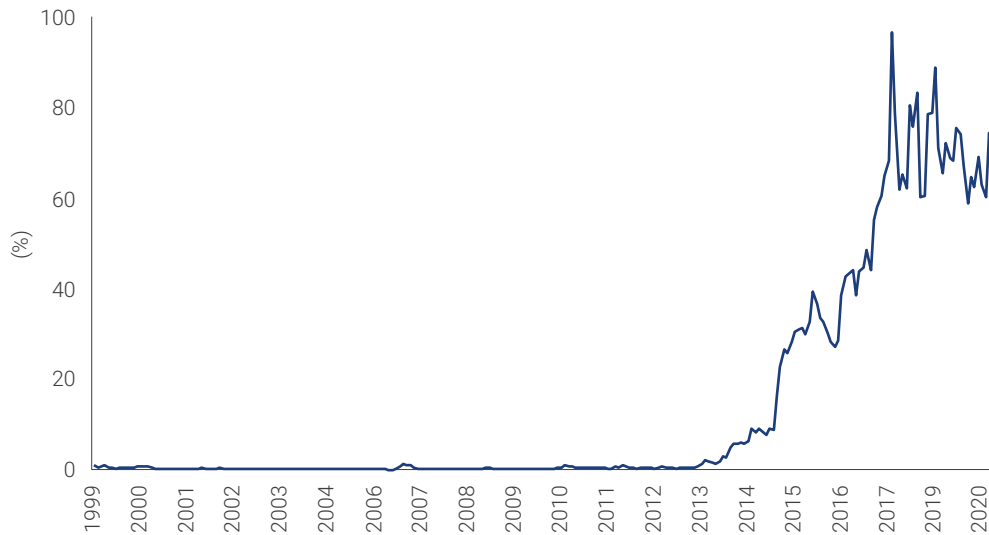
Source: Central Bank of Venezuela (nominal deposits). Stated in real terms with IMF - IFS CPI (until Dec-16) and National Assembly CPI (since Jan-17).

Figure 26. Foreign currency deposits in commercial, universal and development banks In December 2007 strong bolivars (VEF)



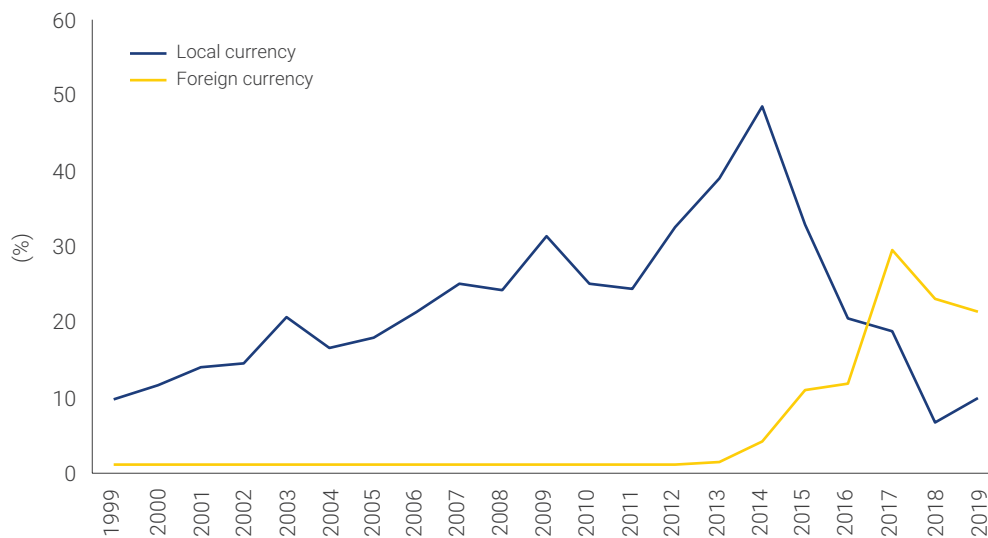
Source: Central Bank of Venezuela (dollar deposits). Stated in real terms with IMF – IFS CPI (until Dec-16) and National Assembly CPI (since Jan-17), using the official exchange rate (up to May-10) and Dollar today (since Jun-10).

Figure 27. Deposit dollarization in commercial, universal and development banks



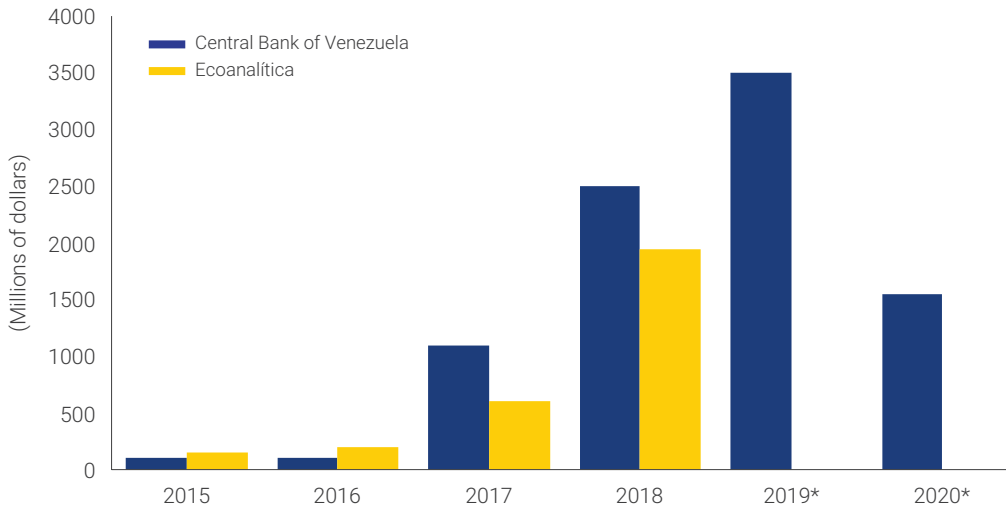
Source: Central Bank of Venezuela.

Figure 28. Deposits in commercial, universal and development banks by currency (% GDP)



Source: **Deposits:** Central Bank of Venezuela; **exchange rate:** Official (until May-10), Dollar today (since Jun-10); **GDP:** IMF-WEO.

Figure 29. Remittances to Venezuela



* Estimates and projections.

Source: World Bank, Cemla, Central Bank of Venezuela and Ecoanalítica.

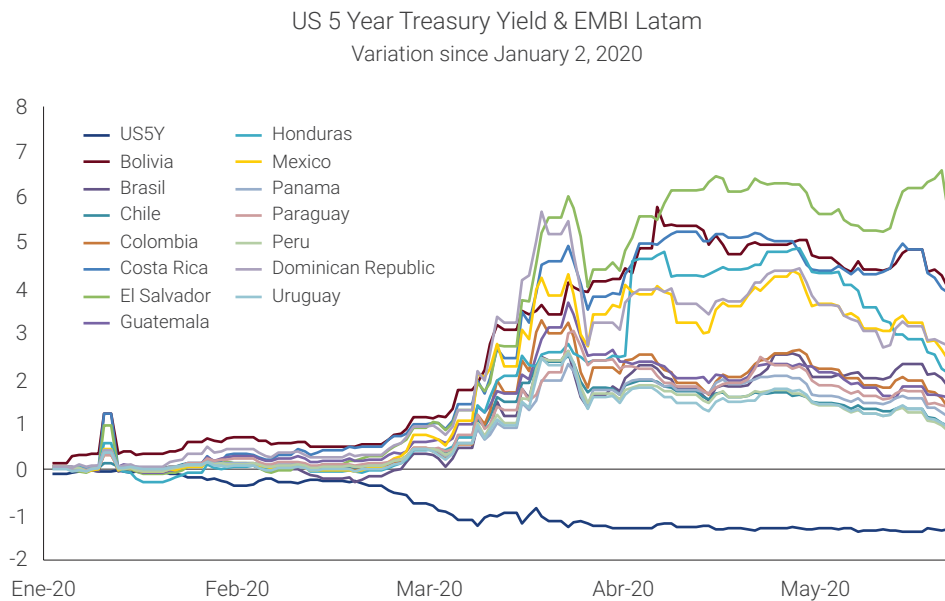
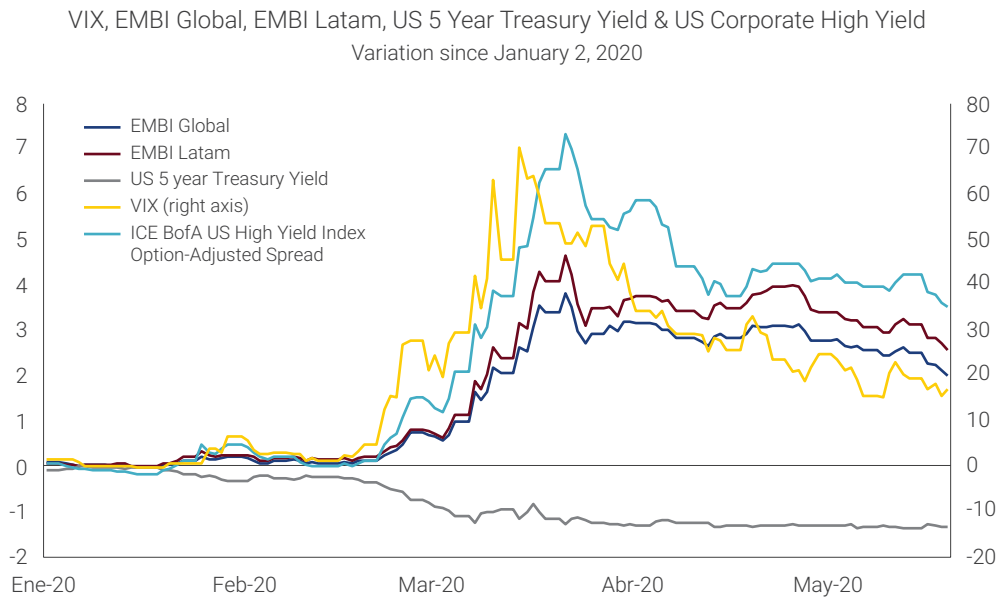
It is worth noting that while the ongoing exchange rate dynamics and the fact that the sharply falling oil output and exports are being made up for by growing remittances seems to favor official dollarization, the country can hardly grow by avoiding external restrictions (foreign currency availability), and that would hardly happen without regaining its oil potential. In fact, the dramatic contraction of the oil production -estimated to total nearly 80% in real terms from 2012 to 2020- shows, among other things, an economic pauperization that reflects a waning flow of foreign currency. De jure dollarization, far from eliminating this external constraint, would freeze the situation at the current low level of income. Paradoxically, inasmuch as Venezuela's fortune remains tied to oil exports, official dollarization would only be successful if it raised the export-remittance ratio, therefore biasing the exchange rate regime's choice towards a more flexible arrangement. For this reason, it would be convenient to consider an intermediate super fixed regime that is more reversible -and therefore less credible-, such as a currency board, with the view of gradually rebuilding a transactional demand for bolivars. Perhaps Venezuela should do without its currency for a while in order to rediscover it on the other side of stabilization.

VIII. 2020: The COVID-19 pandemic as a de-dollarization test

In a recent study, Hofmann *et al.* (2020) argued that capital outflows and the flight to quality associated with the impacts of the pandemic on global growth awakened the dormant giant of the original sin, an expression coined by Ricardo Hausmann and coauthors to refer to the difficulty faced by developing economies in issuing debt in their own currency. However, a preliminary look at the data from recent months allows some optimism in relation to this finding.

At the beginning of 2020, COVID-19 triggered a reversal in capital flows and a “flight to quality” (that is, safe) assets denominated in reserve currencies, as shown by the evolution of risk premiums in major Latin American economies (Figure 30; see Levy Yeyati and Valdés, 2020).

Figure 30. COVID-19 and external financial costs



Source: Central Bank of Panama, based on JP Morgan.

To what extent did this systemic shock dry up the demand for the local currency and reverse the progress made in terms of the de-dollarization of Latin American countries? In situations of exchange rate stress in dollarized economies, we would expect to see 1) **increased depreciation** (in the case of financial dollarization, amplified by fear of a balance sheet effect; in economies with real dollarization, amplified by the dollarization of liquid balances as protection against increased inflation); 2) **an increase in the peso-dollar interest rate premium** (to counteract the flight from the local currency) and **a deepening of the dollarization of savings** in the domestic market; and 3) a **relative increase in the sovereign credit premium** (once again, for fear of a balance sheet effect among dollarized debtors).

Figure 31 shows that, with few exceptions, dollarized emerging economies did not suffer significantly higher depreciation than their non-dollarized peers. More importantly, in both groups of countries, sensitivity to the depreciation of the “country risk” (identified by the return on sovereign hard currency bonds) was comparable.

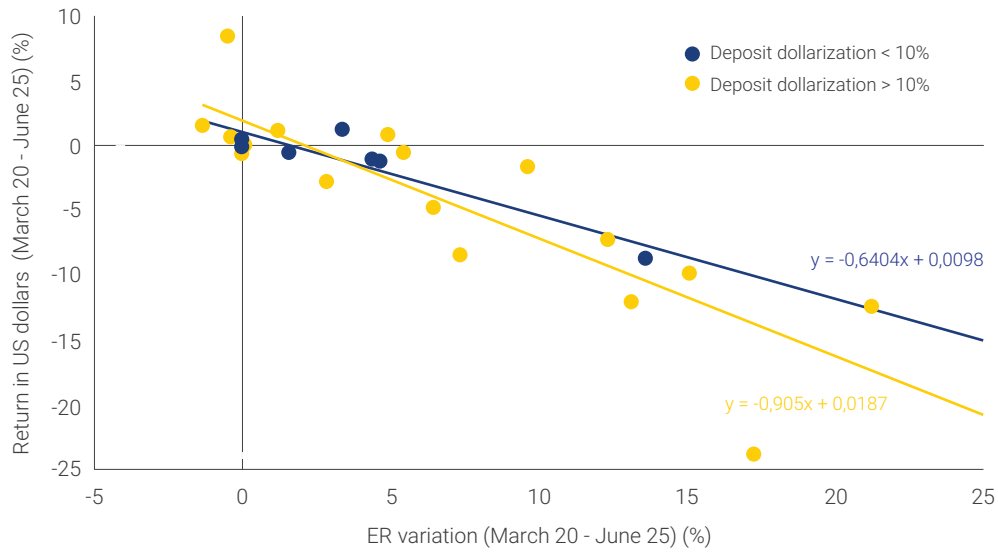
On the other hand, the comparison of external hard currency debt indices and domestic local currency debt does not suggest a change in the peso-dollar spread: massive sales associated with capital outflows, while they negatively impacted the sovereign spread (and the countries’ financing costs), had a smaller impact on domestic rates in the local currency, even when the expectation of a currency depreciation increased (Figure 32).³²

Something similar may be seen at the domestic level, looking at the impact of the pandemic on the peso-dollar interest rate differential and on the dollarization of savings in the banking system, in line with rising depreciation expectations in response to the crisis. Again, except in the case of Paraguay, the differential did not vary noticeably; in all cases, the deposit dollarization ratio remained stable or, as in the case of Peru, showed a slight downward correction (Figure 33).

How can we interpret a higher cost increase in dollars than in the domestic currency? In part, this is explained by the specificity of local demand (the local currency bias we have already mentioned several times), usually by long-term institutional investors, which enables these countries to separate their domestic markets from what happens in international markets. Does this differ depending on the degree of FD? Is the spread sensitivity related to the level of dollarization, which could be an indication of financial fragility in the face of the global strengthening of the US dollar at the start of the pandemic? While it is true that the overperformance of the local currency is milder in countries with domestic FD, the pattern remains unchanged: despite the currency depreciations seen in early 2020, demand for sovereign assets in pesos was sustained.

³² On the other hand, it is worth noting that the impact on spreads in dollarized economies with sound *fundamentals* (Peru, Uruguay) was moderate, and, combined with the drop in international rates, allowed recent external debt issuances with coupons not far above those prevailing before the crisis.

Figure 31. Foreign exchange correction and dollarized debt price variation



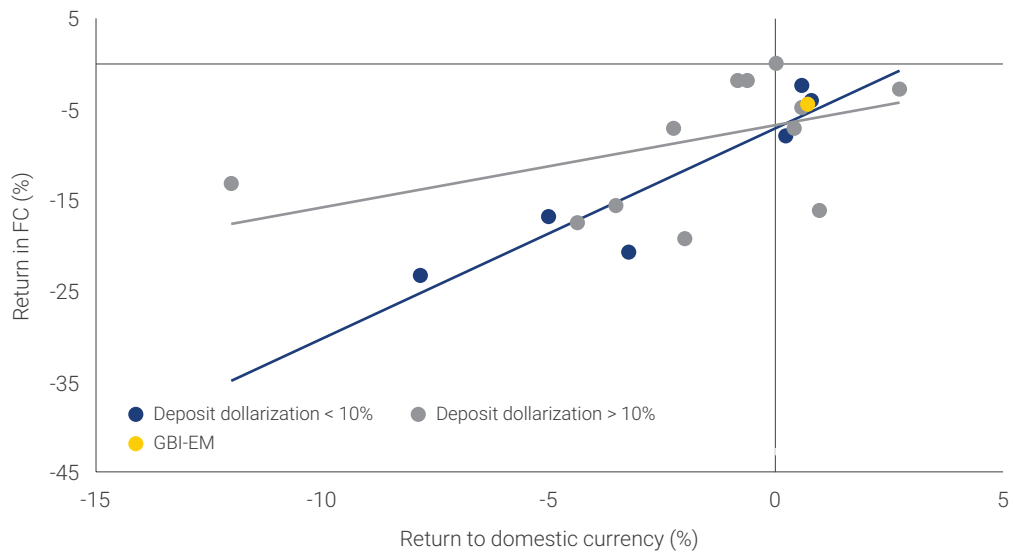
Sample (based on latest available data)

Deposit dollarization < 10%: Austria, Finland, New Zealand, Singapore, Spain, China, Colombia, and Malaysia.

Deposit dollarization > 10%: Hong Kong, Israel, Sweden, Argentina, Chile, Czech Rep., Hungary, Indonesia, Mexico, Peru, Philippines, Poland, Romania, Russia, Slovakia, Turkey, and Uruguay.

Source: Central Bank of Panama, based on JP Morgan; IFS - IMF.

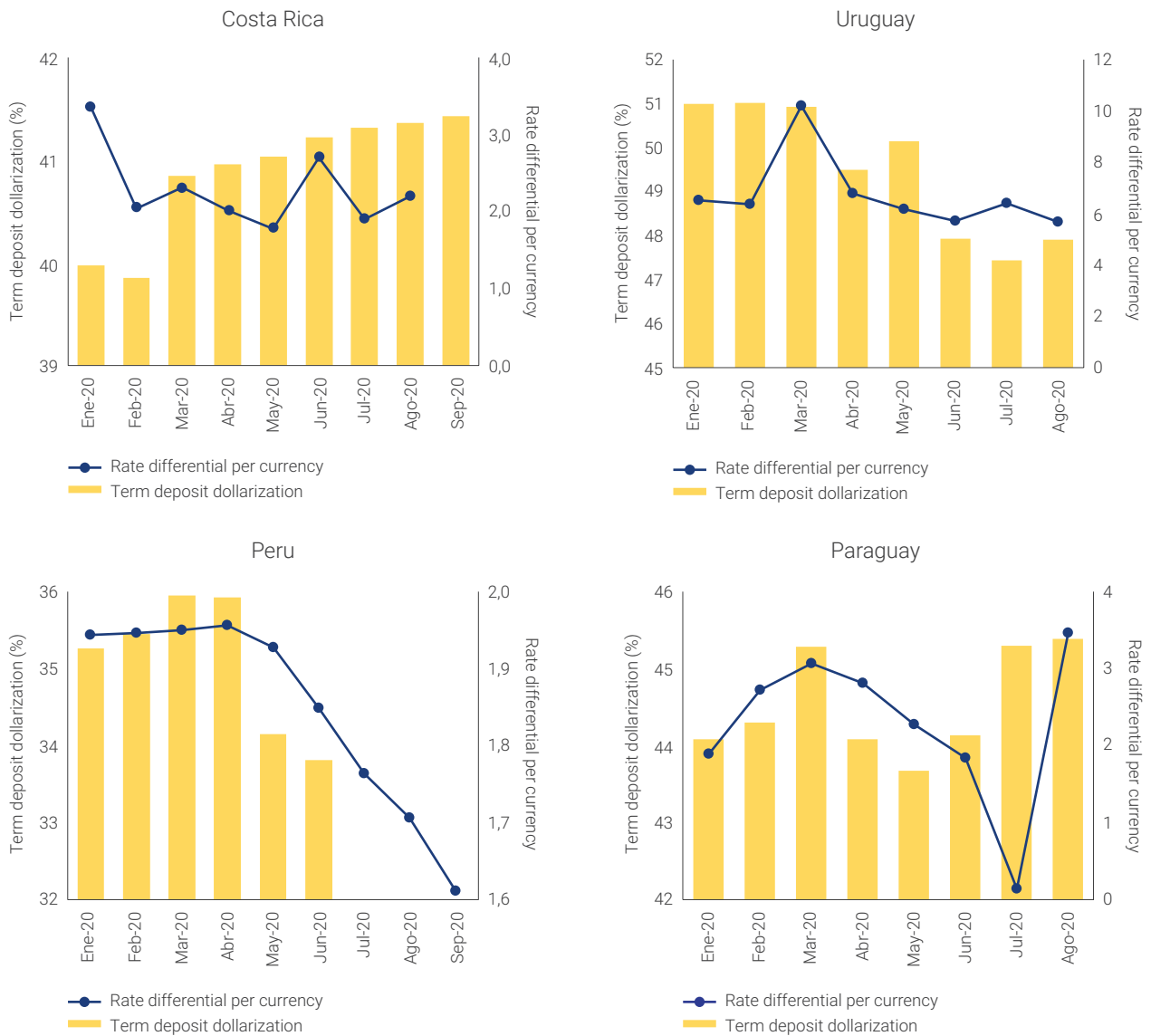
Figure 32. Returns on sovereign bonds by currency in the first quarter of 2020



Source: Central Bank of Panama, based on JP Morgan.

While the pandemic is far from over and accumulated fiscal risks may induce financial fragility in the future, the evidence available so far seems to indicate that, without a deterioration in the policies and institutions that supported financial de-dollarization, the latter looks today as resilient as financial dollarization was before in their absence, confirming that the policies referred to in this study can reduce dollarization on a permanent basis.

Figure 33. COVID effect, dollarization, and interest rate differentials by currency



Source: Central Bank of Costa Rica, Central Reserve Bank of Peru, Central Bank of Paraguay, Central Bank of Uruguay.

IX. Conclusions

A series of preliminary conclusions can be drawn from this study. First, dollarization can no longer be systematically seen as an inevitable phenomenon or as one without any consequences. Countries that formulated a comprehensive agenda of de-dollarization policies have managed, to varying degrees, to successfully attack the phenomenon. Based on a simple taxonomy introduced and illustrated in this study, 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).

Second, de-dollarization policy agendas must adapt to the type and extent of the dollarization, as well as to the macroeconomic, institutional and structural constraints the economy faces: before embarking on a de-dollarizing effort, countries should study the roots of the phenomenon, its risks and costs, and the implications of the corresponding monetary and prudential policy reforms. Understanding the complexity of the phenomenon and its economic implications is an unavoidable first step.

Third, while it is still an option for some extremely small and open economies, official dollarization has strong contraindications-among others, its permanent nature, as illustrated by the case of El Salvador reviewed in this study, as well as by the always latent de-dollarization debate in officially dollarized Ecuador.

Finally, both the academic literature and the analysis of practical experiences -particularly the failures- point to the presence of important feedback mechanisms: RD boosts the betas that induce FD; FD reduces the margin for floating the exchange rate, strengthening the dollar as a savings unit and its negative correlation with nonfinancial income in crisis events; temporary inconsistency problems suggest that partial incentives or calls to internalize systemic risk are often ineffective and sometimes require unpopular quantitative restrictions. As importantly, the ideal times for de-dollarization often coincide with periods of expectations of appreciation in which the market penalizes debtors in the local currency -and the public credit officer that, as long as the risk does not manifest itself, is perceived as assuming an onerous hedge- and requires specific interventions to counter market failures; in particular, as with any other hedge, it requires a long-sighted will to elude the temptation of short-term currency speculation.

All these interrelationships, and several others mentioned in this study, converge on a general recommendation: de-dollarization implies a contemporaneous political and fiscal cost that demands political support. To be successful, financial de-dollarization must be embraced as a state policy.

References

- Aghion, P., P. Bacchetta y A. Banerjee (2001a): "Currency Crises and Monetary Policy in an Economy with Credit Constraints". *European Economic Review*, vol. 45, pp. 1121-50.
- (2001b): "A Corporate Balance-Sheet Approach to Currency Crises". Working Paper n.º 3092 (Gerzensee: Swiss National Bank).
- Armas, A. y F. Grippa (2006): "Inflation Targeting in a Dollarized Economy: The Peruvian Experience". En *Financial Dollarization: The Policy Agenda*, edited by Adrián Armas, Alain Ize y Eduardo Levy-Yeyati. New York: Palgrave MacMillan.
- Armas, A., Ize, A., & Yeyati, E. L. (Eds.). (2006). *Dolarización Financiera: la agenda de política*. International Monetary Fund.
- Arteta, C. (2003): "Are Financially Dollarized Countries More Prone to Costly Crises?". International Finance Discussion Paper n.º 763 (Washington, D.C.: Board of Governors of the Federal Reserve of the United States of America).
- Aspachs, O., E. Nier y M. Tiesset (2005): "Liquidity, Banking Regulation and the Macroeconomy: Evidence on Bank Liquidity Holdings from a Panel of UK-Resident Bank" (mimeo). London School of Economics.
- Baliño, T., A. Bennett y E. Borensztein (1999): "Monetary Policy in Dollarized Economies". IMF Occasional Paper n.º 171 (Washington, D.C.: International Monetary Fund).
- Barajas, A. y R. A. Morales (2003): "Dollarization of Liabilities: Beyond the Usual Suspects". IMF Working Paper 03/11 (Washington, D.C.: International Monetary Fund).
- Bleakley, H. y K. Cowan (2002): "Corporate Dollar Debt and Depreciations: Much Ado About Nothing?". Working Paper n.º 02-5 (Boston: Federal Reserve Bank of Boston).
- Broda, C. y E. Levy Yeyati (2003): "Endogenous Deposit Dollarization". Staff Report n.º 160 (Nueva York: Reserva Federal de Nueva York). Próximo a publicarse en el *Journal of Money, Credit, and Banking*.
- Burger, J. D. y F. E. Warnock (2003): "Diversification, Original Sin, and International Bond Portfolios". International Finance Discussion Papers n.º 755 (Washington, D.C.: Board of Governors of the Federal Reserve of the United States of America).
- Burnside, C., M. Eichenbaum y S. Rebelo (2001): "Hedging and Financial Fragility in Fixed Exchange Rate Regimes". *European Economic Review*, vol. 45, pp. 1151-93.
- Caballero, R. y A. Krishnamurthy (2002): "A Dual Liquidity Model for Emerging Markets". *American Economic Review*, vol. 92, pp. 33-7.
- (2004): "Exchange Rate Volatility and the Credit Channel in Emerging Markets: A Vertical Perspective". NBER Working Paper 10517 (Cambridge, MA: National Bureau of Economic Research).
- Bordo, M.D., C. Meissner y A. Redish (2003): "How "Original Sin" was Overcome: The Evolution of External Debt Denominated in Domestic Currencies in the United States and the British Dominions". NBER Working Paper n.º 9841 (Cambridge, MA: National Bureau of Economic Research).

- Calvo, G. (2001): "Capital Markets and the Exchange Rate with Special Reference to the Dollarization Debate in Latin America". *Journal of Money, Credit, and Banking*, vol. 33, pp. 312-34.
- Calvo, G. y P. Guidotti (1989): "Credibility and Nominal Debt: Exploring the Role of Maturity in Managing Inflation". IMF Staff Papers, vol. 37 (setiembre), pp. 612-35.
- Calvo, G., A. Izquierdo y L. F. Mejía (2004): "On the Empirics of Sudden Stops: The Relevance of Balance-Sheet Effects". NBER Working Paper n.º 10520 (Cambridge, MA: National Bureau of Economic Research).
- Calvo, G., A. Izquierdo y E. Talvi (2002): "Sudden Stops, the Real Exchange Rate and Fiscal Sustainability: Argentina's Lessons". NBER Working Paper n.º 9828 (Cambridge, MA: National Bureau of Economic Research).
- Carranza, L., J. E. Galdón-Sánchez y J. Gómez Biscarri (2004): "Exchange Rate and Inflation Dynamics in Dollarized Economies". Faculty Working Paper n.º 10/04 (Pamplona: Universidad de Navarra, School of Economics and Business Administration).
- Castillo, P., Vega, H., Serrano, E., & Burga, C. (2016). *De-dollarization of credit in Peru: the role of unconventional monetary policy tools* (No. 2016-002). Central Reserve Bank of Peru.
- Céspedes, L. F., R. Chang y A. Velasco (2000): "Balance Sheets and Exchange Rate Policy". NBER Working Paper n.º 7840 (Cambridge, MA: National Bureau of Economic Research).
- Chamón, M. (2001): "Foreign Currency Denomination of Foreign Currency Debt: Has the Original Sin Been Forgiven but Not Forgotten?" (not published). (Cambridge, MA: Harvard University).
- Chamón, M. y R. Hausmann (2003): "Why Do Countries Borrow the Way they Borrow?". Not published (Cambridge, MA: Harvard University).
- Chang, R. y A. Velasco (2000): "Financial Fragility and the Exchange Rate Regime". *Journal of Economic Theory*, vol. 92, pp. 1-34 (may).
- (2004): "Monetary Policy and the Currency Denomination of Debt: A Tale of Two Equilibria". NBER Working Paper n.º 10827 (Cambridge, MA: National Bureau of Economic Research).
- Claessens, S. y S. Djankov (2000): "Publicly Listed East Asian Corporates: Growth, Financing and Risks", in *Asian Corporate Recovery: Findings from Firm Level Studies in Five Countries*. Ed. by D. Dwor-Frecaut, F. Colaco y M. Hallward-Driemeier (Washington, D.C.: World Bank).
- Claessens, S., D. Klingebiel y S. Schmukler (2003): "Government Bonds in Domestic and Foreign Currency: The Role of Macroeconomic and Institutional Factors". Policy Research Working Paper Series n.º 2986 (Washington, D.C.: World Bank).
- Contreras, A., Quispe, Z., Regalado, F., & Martínez, M. (2017). Dolarización real en el Perú. *Revista Estudios Económicos*, 33, 43-55.
- Cowan, K. y Q.T. Do (2004): "Financial Dollarization and Central Bank Credibility". Policy Research Working Paper n.º. 3082 (Washington, D.C.: World Bank).

- Cowan, K., H. Kamil y A. Izquierdo (2004): "Macroeconomic Determinants of Dollarization: A New Look at the Evidence". Inter-American Development Bank.
- De la Torre, A., E. Levy Yeyati y S. Schmukler (2003): "Living and Dying with Hard Pegs: The Rise and Fall of Argentina's Currency Board". *Economía*, vol. 5, n.º 2, pp. 43-9.
- De la Torre, A. y S. Schmukler (2004): "Coping with Risk Through Mismatches: Domestic and International Financial Contracts for Emerging Economies". World Bank Working Paper n.º 3212 (Washington, D.C.: World Bank).
- De Nicoló, G., P. Honohan y A. Ize (2003): "Dollarization of Bank Deposits: Good or Bad?". IMF Working Paper n.º 03/146. Publicado como "Dollarization of Bank Deposits: Causes and Consequences". *Journal of Banking and Finance*, vol. 29, n.º 7, pp. 1697-727.
- Domac, I. y M.S. Martínez Pería (2006): "Banking Crises and Exchange Rate Regimes: Is There a Link?". Próximo a publicarse en el *Journal of Monetary Economics*.
- Dooley, M. (2000): "A Model of Crisis in Emerging Markets". *The Economic Journal*, vol. 110, pp. 256-72.
- Edwards, S., & Levy-Yeyati, E. (2003). Flexible Exchange Rate As Shock Absorber. NBER Working Paper.
- Edwards, S., & Yeyati, E. L. (2005). Flexible exchange rates as shock absorbers. *European Economic Review*, 49(8), 2079-2105.
- Eichengreen, B. y R. Hausmann (1999): "Exchange Rates and Financial Fragility". NBER Working Paper n.º 7418 (Cambridge, MA: National Bureau of Economic Research).
- Eichengreen, B., R. Hausmann y H. Panizza (2003a): "The Pain of Original Sin", in B. Eichengreen y R. Hausmann (eds.): *Debt Denomination and Financial Instability in Emerging Market Economies* (Chicago: University of Chicago Press).
- (2003b): "Currency Mismatches, Debt Intolerance and Original Sin: Why They Are Not the Same and Why It Matters". NBER Working Paper n.º 10036 (Cambridge, MA: National Bureau of Economic Research).
- Frankel, J. (2004): "Contractionary Currency Crashes in Developing Countries". Prepared for the IMF Fifth Annual Research Conference, 5 Noviembre 2004. Próximo a publicarse en el IMF Staff Papers, International Monetary Fund.
- Fischer, S. (2001). Exchange rate regimes: is the bipolar view correct? *Journal of economic perspectives*, 15(2), 3-24.
- Galindo, A. y L. Leiderman (2005): "Living with Dollarization and the Route to Dedollarization". IADB Working Paper n.º 526 (Washington, D.C.: Inter-American Development Bank).
- Galindo, A., U. Panizza y F. Schiantarelli (2003): "Debt Composition and Balance Sheet Effects of Currency Depreciation: A Summary of the Micro Evidence". *Emerging Markets Review*, vol. 4, n.º 4, pp. 330-9.
- Gertler, M., S. Gilchrist y F. Natalucci (2001): "External Constraints on Monetary Policy and the Financial Accelerator". Federal Reserve Bank of San Francisco.
- Goldstein, M. y P. Turner (2004): "Measuring Currency Mismatch: Beyond Original Sin", in *Controlling Currency Mismatches in Emerging Economies*, Institute for International Economics.

- González-Eiras, M. (2003): "Liquidity Demand in the Presence of a Lender of Last Resort" (No publicado, Buenos Aires: Universidad de San Andrés).
- Gulde, A.-M., D. H. Hoelscher, A. Ize, D. Marston y G. De Nicoló (2004): "Financial Stability in Dollarized Economies". IMF Occasional Paper n.º 230 (Washington, D.C.: International Monetary Fund).
- Guidotti, P. and C. Rodríguez, "Dollarization in Latin America: Gresham's Law in Reverse?," IMF Staff Papers, Washington: International Monetary Fund, Vol. 39, pp. 518–544, 1992.
- Hardy, D. C., & Pazarbasioglu, C. (2006). Desdolarización forzada: La versión. *Dolarización financiera: la agenda de política*, 319.
- Herrera, L. O. y R. Valdés (2004): "Dedollarization, Indexation and Nominalization: The Chilean Experience". Working Paper n.º 261 (Santiago de Chile: Banco Central de Chile).
- Hofmann, B., Shim, I., & Shin, H. S. (2020). Original sin redux and policy responses in emerging market economies during the COVID-19 pandemic. *COVID-19 in Developing Economies*, 353.
- Honohan, P. y A. Shi (2002): "Deposit Dollarization and the Financial Sector in Emerging Economies". World Bank Policy Research Working Paper n.º 2748 (Washington, D.C.: World Bank).
- Ize, A., & Levy-Yeyati, E. L. (1998). Dollarization of financial intermediation: Causes and policy implications. IMF Working Paper.
- Ize, A. y E. Levy Yeyati (2003): "Financial Dollarization". *Journal of International Economics*, vol. 59 (marzo), pp. 323-47.
- Ize, A. y E. Parrado (2002): "Dollarization, Monetary Policy, and the Pass-Through". IMF Working Paper n.º 02/188 (Washington, D.C.: International Monetary Fund).
- Ize, A. y A. Powell (2004): "Prudential Responses to De Facto Dollarization". IMF Working Paper 04/66 (Washington, D.C.: International Monetary Fund). Revised and published in *Journal of Policy Reform*, vol. 8, n.º 4 (2005), pp. 241-62.
- Jeanne, O. (2002): "Why Do Emerging Economies Borrow in Foreign Currency?". IMF Working Paper 03/177 (Washington, D. C.: Fondo Monetario Internacional).
- Jeanne, O. y J. Zettelmeyer (2002): "Original Sin, Balance Sheet Crises, and the Role of International Lending". IMF Working Paper n.º 02/234 (Washington, D. C.: International Monetary Fund).
- Kamil, H. (2005): "Does Moving to a Flexible Exchange Rate Regime Reduce Corporate Balance Sheet Mismatches in Emerging Countries?" (mimeo). International Monetary Fund.
- Krugman, P. (1999): "Balance Sheet Effects, the Transfer Problem and Financial Crises", in P. Isard, A. Razin and A. Rose (eds.): *International Finance and Financial Crises, Essays in Honour of Robert Flood* (Dordrecht: Kluwer).
- Levy Yeyati, E. (2004): "Dollars, Debts and the IFIs: De-Dollarizing Multilateral Lending". CIF Working Paper n.º 11/2004 (Buenos Aires: Universidad Di Tella).
- (2006): "Financial Dollarization: Evaluating the Consequences". To be published shortly in *Economic Policy* (January 2006).

- Levy Yeyati, E., M. S. Martínez Pería y S. Schmukler (2004): "Market Discipline under Systemic Risk: Evidence from Bank Runs in Emerging Economies". World Bank Policy Research Working Paper n.º 3440 (Washington, D.C.: World Bank).
- Levy Yeyati, E., and F. Sturzenegger (2002): "Dollarization: A Primer," in Dollarization, Levy Yeyati, E. and F. Sturzenegger, eds., MIT Press.
- Levy Yeyati, E., F. Sturzenegger y I. Reggion (2002): "On the Endogeneity of Exchange Rate Regimes". CIF Working Paper n.º 11/2002 (Buenos Aires: Universidad Di Tella).
- Levy Yeyati, E. (2012). Balance de la dolarización en El Salvador. *Elypsis/UTDT/Brookings*. Junio, 1980-2013.
- Levy Yeyati, E., & Valdés, R. (2020). 6 COVID-19 in Latin America: How is it different than in advanced economies? *COVID-19 in Developing Economies*, 100.
- Licandro, G., & Licandro, J. A. (2003). Una estrategia para enfrentar los perjuicios de la dolarización. *Revista de economía*, 10(1), 163-171.
- Licandro, G., & Licandro, J. (2010). Fragilidad financiera y dolarización: ¿Cuánto se avanzó. ____ *Reconstruir el Mercado en Pesos. Desdolarización y fragilidad: avances y agenda pendiente*. Montevideo: Universidad Católica.
- Luca, A. (2002): "Credit Dollarization, Bank Currency Matching, and Real Activity" (No publicado). (East Lansing, MI: Michigan State University).
- Martínez, L. y A. Werner (2001): "The Exchange Rate Regime and the Currency Composition of Corporate Debt: The Mexican Experience". Presentado en el NBER Inter-American Seminar on Economics (July).
- Méndez-Quesada, E., & Kikut-Valverde, A. C. (2003). La dolarización parcial en Costa Rica. Banco Central de Costa Rica.
- Morales, J.A. (2003): "Dollarization of Assets and Liabilities: Problem or Solution? The case of Bolivia". Presented at the Annual IMF and World Bank meeting.
- Reinhart, C., K. Rogoff and M. Savastano (2003): "Addicted to Dollars". NBER Working Paper n.º 10015 (Cambridge, MA: National Bureau of Economic Research).
- Rennhack, R., & Nozaki, M. (2006). Financial Dollarization in Latin America. In *Financial Dollarization* (pp. 64-96). Palgrave Macmillan, London.
- Rivera, M. A., & Kuscevic, C. M. M. (2014). Desdolarización financiera en Bolivia. *Estudios económicos*, 3-25.
- Savastano, M. (1992): "The Pattern of Currency Substitution in Latin America: An Overview". *Revista de Análisis Económico*, vol. 7, n.º 1, pp. 29-72.
- Savastano, M. (1996): "Dollarization in Latin America: Recent Evidence and Some Policy Issues," IMF Working Paper, 96/4, Washington: International Monetary Fund, January, 1996.
- Thomas, L. R. (1985): "Portfolio Theory and Currency Substitution". *Journal of Money, Credit, and Banking*, vol. 17.