Modeling the Dynamics of Financial Dollarization under Structural Shifts in Latin America: The New Fourier Panel ARDL Approach

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ABSTRACT

This study investigates the determinants and dynamic structure of financial dollarization in thirteen Latin American countries from 2004 to 2023, namely Argentina, Chile, Mexico, Guatemala, Paraguay, Costa Rica, Uruguay, Bolivia, the Dominican Republic, Honduras, Nicaragua, Trinidad and Tobago, and Peru. Although dollarization remains persistent across the region, empirical research addressing its nonlinear nature and structural break dynamics is still limited. To fill this gap, the study applies Fourier Panel ARDL together with Fourier Panel KPSS tests to financial dollarization analysis for the first time in the literature, offering an innovative framework that captures smooth regime transitions through frequency based structural components. Preliminary tests reveal strong cross sectional dependence and slope heterogeneity, confirming the relevance of second generation panel methods. The CIPS and Fourier KPSS tests show that all variables are integrated of order one, while both Pedroni and Westerlund cointegration tests provide strong evidence of a stable long run relationship among them. Long run estimates from the Fourier Panel ARDL model indicate that financial development reduces dollarization, whereas inflation, interest rate differentials, and exchange rate depreciation increase it. In the short run only the exchange rate is statistically significant, and the negative and significant ECM coefficient reflects a strong adjustment mechanism toward long run equilibrium. Moreover, the Dumitrescu and Hurlin panel causality test identifies one way causality from financial development to financial dollarization and two way causality between inflation and dollarization and between the exchange rate and dollarization, demonstrating that dollarization evolves through interactive interest rate and exchange rate channels. By introducing Fourier based panel methods into the analysis of Latin American dollarization for the first time, the study provides original methodological and empirical contributions to the existing literature.

Keywords: Dollarization, Fourier Panel ARDL, Fourier Panel KPSS, Financial Development, Inflation, Exchange Rate

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1. INTRODUCTION

Dollarization refers to a situation in which a foreign currency partially assumes the core functions of the domestic currency—namely, serving as a unit of account, a medium of exchange, and a store of value. From an institutional standpoint, dollarization can be classified into three main forms: unofficial dollarization, where the foreign currency is not legal tender but is widely held as a store of wealth; semiofficial dollarization, where the foreign currency has legal tender status while the domestic currency remains dominant in wages, taxation, and everyday transactions; and official dollarization, where the foreign currency becomes the sole or prevailing legal tender within the economy (Schuler, 2000). Beyond these institutional arrangements, the literature highlights financial dollarization as a distinct and particularly consequential phenomenon, defined as a situation in which a substantial share of bank deposits, loans, and external liabilities is denominated in foreign currency, even when the domestic currency continues to circulate (Levy-Yeyati, 2006).

Financial dollarization is especially important from an economic policy perspective because it weakens the effectiveness of monetary policy transmission, amplifies exchange rate pass-through to domestic prices, and increases financial fragility through balance sheet mismatches. The share of foreign-currency deposits in total deposits—commonly used as a proxy for financial dollarization-reflects residents' store-of-value preferences and shapes incentives to hedge against inflation and exchange rate volatility. As such, it directly affects monetary policy credibility, financial depth, and the stability of the banking system. Importantly, an increase in dollar-denominated deposits does not translate mechanically into a corresponding increase in dollar lending. Banks typically respond by either expanding foreign-currency loans or reallocating part of their dollar liabilities abroad. However, dollar lending to firms without foreign-currency revenues constitutes an imperfect hedge, particularly in the absence of depreciation-linked gains, often leading banks to replace exchange rate risk with elevated credit risk—a dynamic repeatedly observed during financial crises (Honohan & Shi, 2002).

The growing prevalence of deposit dollarization has therefore attracted heightened attention from policymakers, as it creates a complex set of trade-offs. On the one hand, rising foreign-currency use undermines monetary sovereignty, constrains lender-of-last-resort functions, and increases vulnerability to currency mismatches. On the other hand, deposit dollarization is frequently interpreted as a market-driven response to globalization, financial integration, and cross-border capital mobility, leading some observers to argue that national policy intervention may be ineffective or even counterproductive (De Nicoló et al., 2005). This tension has made dollarization a persistent policy dilemma, particularly in emerging and developing economies.

Latin America provides a particularly fertile ground for analyzing these dynamics, given its long history of macroeconomic instability, high inflation, and recurrent financial crises. During the 1970s and 1980s, chronic inflation and exchange rate volatility severely eroded confidence in domestic currencies, encouraging widespread currency substitution in favor of the U.S. dollar. Dollarization during this period reflected not only a response to hyperinflation but also a rational adaptation to policy uncertainty and weak institutional credibility. A substantial body of empirical literature documents the prevalence of currency substitution across the region during this era, confirming that dollarization became deeply embedded in financial intermediation and savings behavior (Savastano, 1996).

Although renewed crises in the late 1990s—such as the Mexican crisis, the Russian default, and the Brazilian devaluation—reignited interest in official dollarization as a potential path to stability, subsequent experience demonstrated that dollarization outcomes depend critically on political institutions, social cohesion, and incentive structures. While cases such as Panama and

El Salvador suggest that stability can be achieved under dollarization, other experiences reveal that it may narrow policy space and reinforce structural vulnerabilities if not supported by strong institutions (Starr, 2001).

From the early 2000s onward, financial dollarization declined unevenly across Latin America. Some countries experienced sharp reductions due to policy-driven measures, while others recorded only gradual or partial declines despite improvements in inflation control, fiscal discipline, and financial deepening. The persistence of financial dollarization in this context highlighted its structural and institutional roots, suggesting that credibility gains alone are insufficient to generate rapid de-dollarization (Rennhack & Nozaki, 2006). Later evidence further showed that high dollarization levels amplified sensitivity to global financial shocks and sovereign risk, reinforcing the macro-financial relevance of the phenomenon (Marí del Cristo & Gómez-Puig, 2017).

Structural changes in the region's financial systems—particularly the entry of foreign banks, increased competition, and strengthened regulation—contributed to improved balance sheet resilience and supported gradual de-dollarization in several countries. These developments enhanced risk management practices and reduced currency mismatches, thereby reinforcing monetary credibility and financial stability (Gonzalez et al., 2015). Nevertheless, the experience of Peru illustrates that even under a credible inflation-targeting regime and low inflation, partial dollarization can persist. While credit dollarization declined substantially, transactional dollarization and firm-level exposure to foreign currency remained high, sustaining exchange rate pass-through and constraining monetary policy effectiveness (Contreras et al., 2017).

More recently, global shocks such as the COVID-19 pandemic and subsequent tightening of global monetary conditions have once again brought financial dollarization to the forefront. Although Latin American banking systems demonstrated resilience where policy frameworks were credible and institutions strong, ongoing global uncertainty, exchange rate volatility, and risk perceptions continue to shape demand for foreign-currency assets. These dynamics underscore that financial dollarization is not a static condition but an adaptive and evolving process, reflecting the interaction between domestic policy credibility and an increasingly interconnected global financial environment (Levy-Yeyati, 2021). In recent years, however, global uncertainty, inflationary pressures, and tightening monetary policies have brought financial dollarization back to the forefront. Despite improvements in the region, sensitivity to external shocks, exchange rate volatility, and risk perceptions continue to influence the demand for foreign currency.

This study aims to empirically analyze the determinants and dynamics of financial dollarization in Latin American economies while introducing a significant methodological innovation to the existing literature. Focusing on the period from 2004 to 2023, the analysis utilizes long-span panel data to capture the evolution of financial dollarization across a broad set of countries, including Argentina, Bolivia, Chile, Colombia, Costa Rica, the Dominican Republic, Guatemala, Honduras, Mexico, Nicaragua, Paraguay, Peru, Uruguay, Venezuela, Belize, and Haiti. This time-frame is particularly relevant, as it encompasses major macro-financial transformations in the region, ranging from post-crisis stabilization efforts and the consolidation of inflation-targeting regimes to the COVID-19 shock and the recent phase of global monetary tightening.

Beyond identifying the direction and magnitude of the relationships between key macroeconomic variables and financial dollarization, the study seeks to uncover the structural evolution of the dollarization process itself, distinguishing between episodes of persistence and potential de-dollarization. Financial dollarization is measured by the share of foreign-currency-denominated deposits in total bank deposits, serving as a proxy for residents' store-of-value preferences and the extent of foreign currency use within the financial system. The explanatory variables include

the nominal exchange rate, the inflation rate, interest rate differentials between domestic economies and the United States (proxied by the U.S. federal funds rate), gross domestic product (GDP), and indicators of financial development such as domestic credit to the private sector. In this way, the model jointly evaluates domestic macroeconomic conditions and global financial influences within a unified analytical framework.

Methodologically, the primary contribution of this study lies in the application of the Fourier Panel ARDL cointegration approach to the analysis of financial dollarization in Latin America for the first time. This framework offers substantial advantages over traditional linear panel models by allowing for the incorporation of both abrupt structural breaks and smooth regime shifts that evolve gradually over time. Such flexibility is particularly important for analyzing financial dollarization, which is inherently shaped by long-lasting institutional changes, policy credibility, and evolving market expectations. In addition, the use of the Fourier KPSS unit root test enables a more precise assessment of the persistence and stationarity properties of dollarization series, thereby strengthening the robustness of the empirical findings.

Through this comprehensive methodological framework, the study not only identifies the long-run and short-run determinants of financial dollarization but also sheds light on potential de-dollarization paths and areas of structural vulnerability across Latin American economies. By explicitly accounting for nonlinear dynamics, country-specific heterogeneity, and temporal adjustments, the analysis provides a more nuanced understanding of how domestic policies and external shocks interact to shape financial behavior in emerging markets. In doing so, the study fills an important gap in the literature concerning the structural and dynamic nature of financial dollarization in Latin America and offers empirically grounded insights with direct relevance for monetary authorities and policymakers.

The remainder of the paper is structured as follows. The second section reviews the theoretical and empirical literature on financial dollarization. The third section describes the data set and the specification of the econometric model. The fourth section outlines the core methodological framework, including the Fourier Panel ARDL approach and related unit root tests. The fifth section presents and discusses the empirical results, while the final section concludes with a summary of the main findings and their policy implications.

2. LITERATURE REVIEW

This section provides a concise overview of the theoretical and empirical studies that seek to explain the phenomenon of financial dollarization. The literature addresses the historical origins, macroeconomic determinants, policy implications, and institutional dynamics of dollarization within a multidimensional framework, with particular emphasis on the Latin American context. Below, the key studies that examine the functional, behavioral, and institutional aspects of dollarization are summarized in order to establish the theoretical foundation on which the present research is built. Balino, Bennett and Borensztein (1999) emphasize that the capacity of central banks to manage money supply, interest rates, and credit conditions is severely constrained in dollarized economies, and they introduce the distinction between currency substitution and asset substitution motivated by store of value considerations. Edwards and Savastano (1999) discuss the sustainability of exchange rate regimes under conditions of capital mobility and argue that developing economies face a bipolar choice in exchange rate arrangements. Schuler (2000) classifies dollarization as official, semi official, and unofficial, thereby shaping contemporary empirical discussions on the topic.

Honohan and Shi (2002) show that deposit dollarization is not merely a portfolio choice but a structural transformation of financial intermediation, and they find that rising foreign currency deposits increase exchange rate pass through and financial fragility. Calvo (2002) argues that

although dollarization may enhance credibility, it eliminates monetary policy sovereignty. De Zamaroczy and Sa (2002) demonstrate in the case of Cambodia that high levels of dollarization limit the effectiveness of monetary policy. The Minimum Variance Portfolio model developed by Ize and Levy Yeyati (2003) interprets dollarization as a rational response to macroeconomic uncertainty. Reinhart et al., (2003) define dollarization as a form of policy dependency, and Feige (2003) develops a comprehensive dollarization index, showing that conventional measures fail to capture the full extent of the phenomenon.

Winkler et al., (2004) examine official dollarization and euroization, assessing their macroeconomic effects through the lenses of the bipolar view of exchange-rate regimes and optimum currency area theory. Their econometric analysis indicates that adopting a common currency enhances trade integration, suggesting that monetary integration often follows deeper economic linkages rather than preceding them. While dollarized economies may achieve greater price stability, their long-term growth performance tends to be comparatively weaker. Overall, the study implies that official dollarization can bolster trade relations but does not necessarily ensure sustained economic growth.

De Nicoló et al., (2005) investigate the determinants and implications of bank deposit dollarization using cross-country econometric evidence. Their analysis identifies high inflation volatility, weak monetary credibility, and underdeveloped financial systems as the principal drivers of foreign-currency deposits. The study further demonstrates that dollarization amplifies systemic risk by generating currency mismatches and constraining the effectiveness of monetary policy. The authors conclude that successful de-dollarization requires sustained macroeconomic stability alongside the deepening of domestic financial markets.

Starting from the mid 2000s the literature increasingly focused on policy and institutional structures. Levy Yeyati (2006) shows that dollarization increases financial fragility and output volatility, while Ize and Parrado (2002) reveal the asymmetric interaction between real and financial dollarization. Honohan (2007) emphasizes that dollarization tends to persist in countries with a history of high inflation. Alvarez Plata and García Herrero (2008) find that high dollarization strengthens exchange rate pass through. Neanidis and Savva (2009) identify exchange rate volatility, interest rate differentials, and institutional quality as key determinants of short term dollarization dynamics.

Mwase and Kumah (2015) argue that nominal indicators of dollarization can be misleading and propose a measure of real dollarization. Subsequent studies show that dedollarization is achievable not only through price stability but also through coordinated monetary, fiscal, and macroprudential policies.

Bumin and Ozcalici (2023) develop a predictive framework for financial dollarization in Turkey using machine learning and genetic algorithms. Utilizing weekly data from 2005 to 2022, they evaluate four classification models—K-Nearest Neighbor, Decision Tree, Naïve Bayes, and Support Vector Machine—whose parameters are optimized via a genetic algorithm. The results indicate that model performance varies across economic sub-periods, achieving up to 90% accuracy in stable conditions and around 73% across the full sample, with Naïve Bayes exhibiting superior predictive capacity under rolling-window schemes. The study underscores that algorithmic optimization can significantly enhance forecasting of financial dollarization dynamics.

Wagdi et al., (2023) investigate the evolving interaction between the petrodollar system and de-dollarization trends among OAPEC member states. Employing a descriptive analytical approach, the study finds that, despite the sustained predominance of the U.S. dollar in oil transactions, several member countries are progressively exploring alternative currencies for energy trade within the context of broader economic diversification strategies. The authors contend that this

gradual shift toward de-dollarization is primarily motivated by pragmatic considerations—namely, the reduction of exchange-rate exposure and the enhancement of regional monetary autonomy—rather than by overtly political objectives.

Saaida (2024) examines the potential impact of BRICS Plus–led de-dollarization on global financial and power structures. Employing an analytical-descriptive approach, the study finds that member countries' initiatives—such as trading in local currencies, establishing alternative payment systems, and fostering financial cooperation—are aimed at reducing exposure to U.S. economic influence. While the effectiveness of these measures depends on addressing internal divergences and strengthening institutional credibility, they could progressively diminish U.S. monetary dominance and facilitate a transition toward a multipolar currency system.

Gerding and Hartley (2024) reassess claims of global de-dollarization using updated data on central bank reserves, foreign exchange trading, debt denomination, and trade invoicing. Their findings indicate that the U.S. dollar's global predominance has remained largely stable through late 2023, accounting for approximately 59% of global reserves and participating in around 90% of FX transactions. Dollar usage in debt markets and trade invoicing has similarly remained steady, while the euro and renminbi have declined in relative share. The authors conclude that fears of de-dollarization are overstated and that dollar supremacy persists despite major geopolitical and economic shocks, including COVID-19 and the Russia–Ukraine conflict.

Dalgic (2024) develops a model of financial dollarization in emerging markets, conceptualizing it as an endogenous insurance mechanism. Using a calibrated small open economy framework, the study demonstrates that households hold foreign-currency deposits to hedge against income and inflation shocks, while firms borrow in dollars to benefit from lower interest rates. The findings suggest that, although dollarization heightens balance sheet vulnerabilities, it simultaneously stabilizes consumption by offering partial insurance against domestic shocks. The author concludes that constraining dollarization may mitigate systemic risk but could increase consumption volatility.

Arnold (2024) examined de-dollarization through the lens of monetary sovereignty and systemic rebalancing, noting that BRICS-led initiatives remain symbolically significant but institutionally constrained by entrenched dollar dominance.

Abbas et al., (2025) examine the accelerating process of global de-dollarization and its implications for U.S. hegemony. Using a political–economic framework, they argue that the dollar's post–World War II dominance—supported by U.S. military and financial power—is gradually being challenged by multipolar economic structures, technological change, and strategic initiatives by China, Russia, and BRICS nations. The study highlights that financial sanctions, reliance on dollar-based systems, and the rise of digital currencies have strengthened global efforts to diversify reserves and conduct trade in local currencies. The authors conclude that, although the dollar remains dominant, its hegemonic foundation is weakening, indicating a gradual transition toward a multicurrency global order.

Goswami et al., (2025) examine emerging financial architectures associated with de-dollarization, including digital currencies and regional settlement systems. They conclude that, although these initiatives may gradually diminish the dollar's centrality, their overall impact remains limited in both scope and temporal persistence.

Latin American literature has served as a central foundation for explaining dollarization. Savastano (1996) shows that chronic inflation triggers dollarization, Niskanen (2000) argues that full dollarization in Latin America should be a last-resort measure for countries lacking credible monetary institutions, as it eliminates exchange-rate risk but entails significant costs, including the loss of seigniorage and monetary sovereignty, and Rennhack and Nozaki (2006) demonstrate

that it exhibits strong persistence. Kokenyne et al., (2010) together with Sosa and García Escribano (2011) find that dedollarization depends on macroeconomic stability and prudential regulation. Armas et al., (2014) and Castillo et al. (2016) show that reserve requirements are an effective tool for dedollarization in the case of Peru. Marí del Cristo and Gómez-Puig (2017) find that dollarized economies display lower sovereign risk volatility, and Gonzalez et al., (2015) examine the role of competitive dynamics.

Kuscevic and Martin (2015) find that financial dollarization initially destabilized money demand in Bolivia (1990–2014), but gradual de-dollarization restored stability and strengthened the long-run relationship between money, income, and interest rates, improving monetary policy effectiveness.

Catão and Terrones (2016) find that financial dollarization in 28 emerging markets is persistent but reversible. In Peru, the 2002 shift to inflation targeting reduced credit dollarization by ~2.5 percentage points per year, aided by credible macroeconomic policies and prudential rules on foreign-currency lending. External factors also influenced de-dollarization, while prudential measures alone were insufficient for lasting results.

Anderson (2016) shows that Ecuador's 2000 dollarization sharply reduced inflation, supported GDP growth, and increased trade openness, but also reduced monetary autonomy, leaving the economy vulnerable to external shocks; long-term success depends on fiscal discipline and strong institutions.

Castillo-Ponce et al., (2021) find that Ecuador's dollarization increased GDP sensitivity to U.S. output and strengthened sectoral linkages—especially in finance, commerce, and public administration—confirming deeper macroeconomic and financial integration.

Levy Yeyati (2021) shows that the persistence of dollarization is determined by institutional credibility, while Vargas and Sanchez (2023) demonstrate the role of macroprudential measures in the case of Uruguay. Recent studies including Cachanosky et al. (2023), Carvache et al. (2023), and Connolly (2025) emphasize that the long term effects of dollarization are closely linked to institutional quality and policy coherence.

Overall, the existing literature shows that dollarization is not a temporary response to short term shocks but a deep structural process shaped by macroeconomic instability, institutional credibility, and the configuration of the financial system. However, most empirical studies remain limited to linear models and do not fully account for the influence of structural breaks. In this regard, the present study offers an important contribution to the literature. For the first time, long term panel data covering the period from 2004 to 2023 for thirteen Latin American countries are analyzed using the Fourier Panel ARDL and Fourier KPSS approaches, providing a comprehensive assessment of the structural and dynamic nature of dollarization. Thanks to the flexibility of the method, the nonlinear, regime shifting, and institutionally sensitive characteristics of dollarization processes in the region are captured in a more realistic manner. In doing so, the study delivers an original methodological and empirical contribution to the Latin American dollarization literature.

3. MODEL AND DATA

In this study, annual data for thirteen Latin American countries, namely Argentina, Chile, Mexico, Guatemala, Paraguay, Costa Rica, Uruguay, Bolivia, Dominican Republic, Honduras, Nicaragua, Trinidad and Tobago, and Peru, for the period from 2004 to 2023 are used to examine the determinants of financial dollarization. The variables employed in the analysis consist of financial development, the exchange rate, inflation, and the interest rate differential between the domestic policy rate and the United States Federal Funds Rate. The domestic interest rate variable is derived

from the policy rate series of the respective countries. Prior to the empirical analysis, all series were transformed into logarithmic form, which allows the coefficients to be interpreted as elasticities and stabilizes variance by reducing the influence of extreme values.

During the logarithmic transformation, some variables, particularly the inflation rate, occasionally contained negative values. Since logarithmic transformation cannot be directly applied to variables with zero or negative observations, the widely used approach in the literature was followed by adding a positive shift to the relevant series. In this context, a constant value of 10 units was added to all observations of the inflation rate, after which the logarithm was taken. This procedure is a technical transformation applied to ensure that the series becomes strictly positive. The literature clearly demonstrates that such adjustments do not distort relative differences, variance, or the underlying economic relationship within the model. Positive shifts of this kind represent a standard approach in panel data studies where low or negative inflation is observed.

Accordingly, the theoretical model of the study is specified as follows:

$$FCD_{it} = f(FD_{it}, F_{it}, ER_{it}, INF_{it}) \tag{1}$$

Equation (1) is transformed into its econometric form, the model takes the following panel regression structure:

$$FCD_{it} = \alpha_0 + \theta_1 FD_{it} + \theta_2 F_{it} + \theta_3 ER_{it} + \theta_4 INF_{it} + \varepsilon_{it} \tag{2}$$

Here, α_0 represents the constant term. FCD_{it} denotes financial dollarization, FD_{it} denotes financial development, F_{it} refers to the interest rate differential between the domestic economy and the United States, ER_{it} represents the exchange rate, and INF_{it} denotes the inflation rate. The coefficients $\theta_1 - \theta_4$ indicate the marginal effects of the respective variables on financial dollarization, while ε_{it} represents the error term. The definitions, data sources, and full names of all variables used in the study are presented in detail in Table 1.

Table 1. Variable detail.

Short Name	Long Name	Search
FD	Domestic credit to private sector by banks (% of GDP)	World Bank (WDI)
F	Monetary policy-related Rate (LA) - Effective Federal Funds Rate (USA)	IMF / Central Banks / Federal
ER	Domestic currency per US Dollar	International Money Fund (IMF)
FCD	Foreign Currency Deposits (% of total deposits, end of period)	Inter American Development Bank (IADB)
INF	Inflation, consumer prices (annual %)	World Bank (WDI)

The descriptive statistics presented in Table 2 show that the variables used in the study exhibit pronounced heterogeneity and high volatility both across countries and over time. The mean value of financial dollarization (FCD) is approximately 34 percent, while the maximum reaches 94 percent, indicating that dollarization levels vary widely among Latin American countries. Similarly, the large standard deviations and wide minimum and maximum ranges observed in the financial development (FD), exchange rate (ER), and inflation (INF) variables demonstrate that macroeconomic conditions differ substantially across countries and reflect the structural vulnerabilities of the region.

The strong skewness and high kurtosis values observed in the interest rate differential (F) and inflation (INF) variables indicate that the series deviate substantially from the normal distribution and that extreme values tend to cluster, particularly during periods of crisis. This confirms that the panel data structure exhibits considerable temporal and cross sectional variation and supports methodological choices that account for structural breaks, including the Fourier approach. Overall, the table shows that the data set is characterized by high volatility,

which makes the use of flexible econometric methods capable of capturing nonlinear dynamics an analytically appropriate choice.

Table 2. Descriptive statistics.

	FD	F	ER	FCD	INF
Mean	36.62077	5.598320	540.6438	34.25631	7.245438
Median	32.17031	3.885000	20.33875	22.38013	4.786798
Maximum	88.25237	94.97000	7331.260	93.91772	133.4889
Minimum	9.501285	-2.030000	2.550000	0.477666	-0.017479
Std. Dev.	18.21029	9.632969	1510.335	25.99056	11.19421
Skewness	0.855379	5.954977	3.250555	0.804665	7.235793
Kurtosis	3.048457	45.16670	12.26157	2.538570	70.57327
Observations	260	260	260	260	260

The correlation matrix presented in Figure 1 shows that the linear relationships among the variables are generally weak. The correlation values between financial dollarization (FCD) and the other macroeconomic variables range from approximately minus 0.03 to 0.15, indicating that dollarization is a multidimensional phenomenon that cannot be explained by any single macroeconomic indicator. The strongest correlation is the high positive relationship (0.78) observed between the interest rate differential (F) and inflation (INF), which reflects the structural interconnectedness of interest rate and inflation dynamics in Latin America.

The moderate negative correlations between financial development (FD) and both the interest rate differential (minus 0.44) and inflation (minus 0.47) suggest that more developed banking systems tend to be associated with more stable macroeconomic conditions. The generally low correlation coefficients indicate that there is no strong multicollinearity among the variables and that the variable structure is suitable for model estimation. These findings confirm that the risk of multicollinearity in the panel regression analysis is limited and that the selected set of variables provides an econometrically consistent structure.
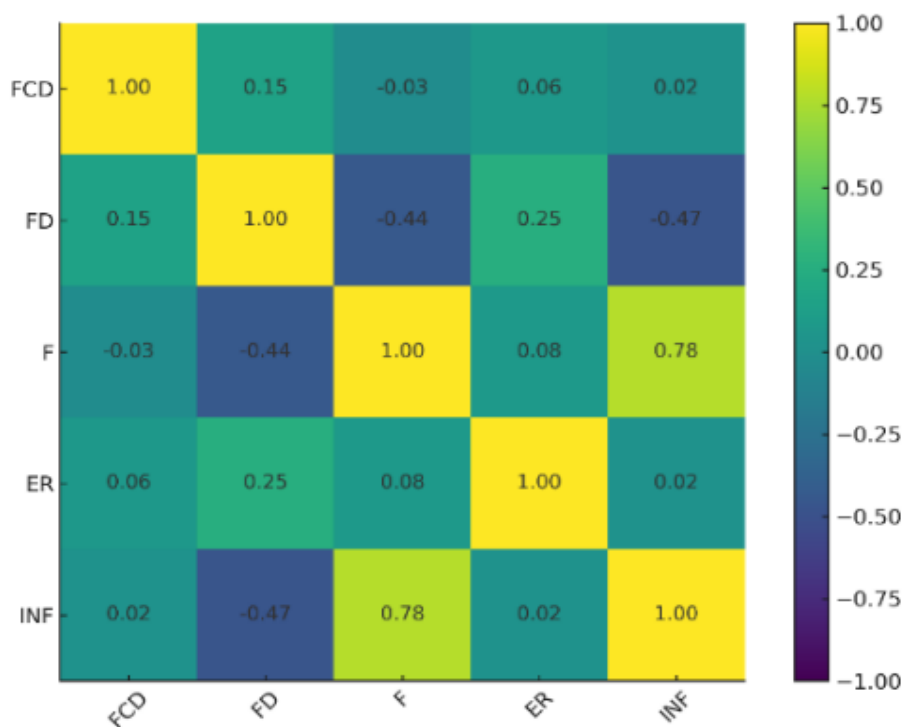

Figure 1. Correlation matrix
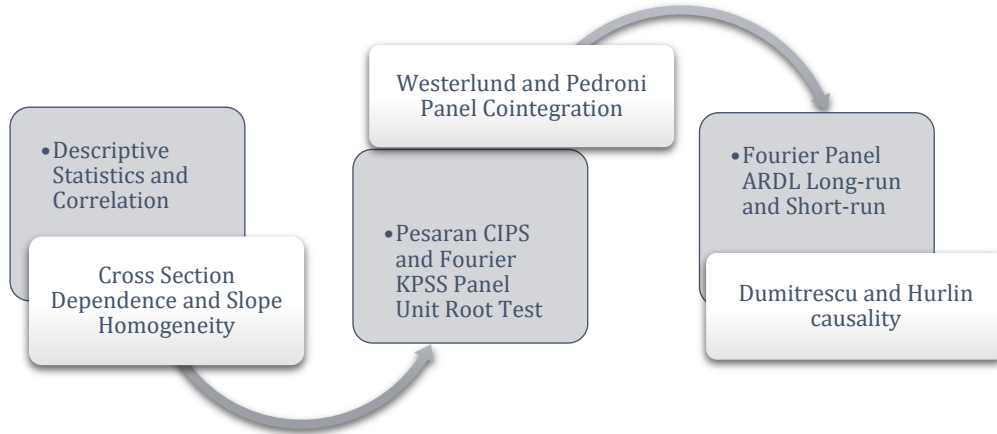
4. METHODOLOGY

Figure 2. Methodology path

This section provides a concise overview of the panel econometric methods used in the study. A visual methodological roadmap is presented in Figure 2. As cross-sectional dependence was identified in the variables, the CIPS test (Pesaran, 2007) was used to assess stationarity. By accounting for common shocks and cross-sectional dependence, this test offers more reliable results than classical ADF procedures. Pesaran's CADF framework reduces the impact of unobserved common factors by including cross-sectional averages in the level and differenced equations. The CADF regression for the FCD variable is given in Equation (3).

$$\Delta FCD_{it} = \alpha_i + \rho_i^* FCD_{it-1} + d_0 \overline{FCD}_{t-1} + d_1 \Delta \overline{FCD}_{t-1} + \varepsilon_{it} \tag{3}$$

In the equation, ΔFCD_{it} denotes the first difference of financial dollarization for unit i, capturing short-run dynamics, while α_i represents unit-specific fixed effects. The lagged level term FCD_{it-1} is used to test for a unit root, and the cross-sectional averages $\overline{FCD}_{t-1}$ and $\Delta \overline{FCD}_{t-1}$ are included to control for dependence arising from common factors. The error term ε_{it} reflects idiosyncratic shocks. At the unit level, the CADF statistic $t_i(N, T)$ is computed as the coefficient of the lagged level term divided by its standard error, and the panel-level CIPS statistic is obtained by averaging the CADF values across all units. As the CIPS test is unreliable in the presence of structural breaks, the analysis also applies the Fourier Panel KPSS test developed by Nazlioglu and Karul (2017). This test captures smooth, gradual structural shifts through low-frequency trigonometric components, and can handle both cross-sectional dependence and heterogeneity.

Cointegration among variables was assessed using the Pedroni (1999, 2004) and Westerlund (2007) tests. Although Pedroni's test is a first-generation method, Stata's automatic cross-sectional correction was used to reduce dependence bias. The Westerlund test evaluates the null of no cointegration within an error-correction framework and accounts for possible structural breaks in the panel. The model employed in the analysis is specified as follows:

$$\Delta y_{i,t} = \Psi_i' d_t + \phi_i y_{i,t-1} + \lambda_i' x_{i,t-1} + \sum_{j=1}^{p_i} \omega_{i,j} \Delta y_{i,t-j} + \sum_{j=0}^{p_i} \gamma_{i,j} \Delta x_{i,t-j} + e_{i,t} \tag{4}$$

The test consists of two group-mean statistics (G_t and G_a) and two panel statistics (P_t and P_a), all of which are based on the ratio of the estimated error-correction coefficient to its standard error (Dai et al., 2025).

To analyze long- and short-run dynamics, the study employs a Panel ARDL framework enhanced with Fourier terms. The integration of sine and cosine components into econometric analysis has markedly strengthened traditional methodologies by allowing for the flexible modeling of smooth and nonlinear structural changes. Consequently, Fourier-based approaches have become increasingly prominent in the literature, both through the introduction of advanced testing procedures and through a growing body of empirical studies applying Fourier unit root and Fourier cointegration techniques (Enders and Lee, 2012a, 2012b; Aliyev and Eylasov, 2025; Omay, 2015; Eylasov et al., 2023; Becker et al., 2006; Aliyev et al., 2022; Christopoulos and Leon-Ledesma, 2010; Aliyev et al., 2024; Tsong et al., 2016; Banerjee et al., 2017). The conventional Panel ARDL approach accommodates dependent variables that are I(1) and regressors that may be I(0) or I(1). By augmenting the model with Fourier frequency terms, the analysis accounts for gradual structural breaks and allows nonlinear fluctuations to be modeled flexibly. This strengthens the estimation of both long-run coefficients and the error-correction mechanism. Accordingly, the Fourier-augmented Panel ARDL model is adapted to the variables of the study and is expressed as follows:

$$\Delta FCD_{i,t} = \alpha_1 + \psi_1 \sin\left(\frac{2\pi k t}{T}\right) + \psi_2 \cos\left(\frac{2\pi k t}{T}\right) + \sum_{j=1}^{p} \delta_{ij}\Delta FCD_{i,t-j} + \sum_{j=0}^{q1} \beta_{ij}\Delta FD_{i,t-j} + \sum_{j=0}^{q2} \gamma_{ij}\Delta F_{i,t-j} + \sum_{j=0}^{q3} \theta_{ij}\Delta ER_{i,t-j}$$
$$+ \sum_{j=0}^{q4} \eta_{ij}\Delta INF_{i,t-j} + \zeta_1 FCD_{i,t-1} + \zeta_2 FD_{i,t-1} + \zeta_3 F_{i,t-1} + \zeta_4 ER_{i,t-1} + \zeta_5 INF_{i,t-1} + \varepsilon_{it} \tag{5}$$

Here, k denotes the Fourier frequency and T represents the time dimension. The coefficients $\zeta_1 - \zeta_5$ capture the long-run relationships among the variables, while the lagged coefficients of the first differences—$\delta_{ij}, \beta_{ij}, \gamma_{ij}, \theta_{ij}, \eta_{ij}$—represent the short-run dynamics of the model.

Finally, the causal relationships among the variables were examined using the Dumitrescu and Hurlin (2012) panel Granger causality test. This test is suitable for heterogeneous panels and requires that the variables be stationary in their first differences. The bivariate panel model is specified as follows:

$$FCD_{i,t} = \alpha_{1i} + \sum_{k=1}^{K} a_{2i}^{(k)} FCD_{i,t-k} + \sum_{k=1}^{K} \beta_{1i}^{(k)} FD_{i,t-k} + \varepsilon_{i,t} \tag{6}$$

$$FD_{i,t} = \alpha_{2i} + \sum_{k=1}^{K} a_{3i}^{(k)} FD_{i,t-k} + \sum_{k=1}^{K} \beta_{2i}^{(k)} FCD_{i,t-k} + \varepsilon_{i,t} \tag{7}$$

Within the scope of this study, the model was applied to the variables financial dollarization and financial development. When FCD was treated as the dependent variable, the lagged values of FD were included in the model to test the direction of causality. The null hypothesis is $\beta_i^{(k)} = 0$, and its rejection indicates the existence of panel-level Granger causality running from FD to FCD.

4. EMPIRICAL RESULTS AND DISCUSSION

4.1 Empirical results

This section presents the findings obtained from the panel econometric methods. Table 3 reports the test results regarding cross sectional dependence and the homogeneity or heterogeneity of slope coefficients. When the cross-sectional dependence tests in Panel A are examined, the CDW plus statistic stands out as the most methodologically appropriate choice. This is because the CDW plus test has higher statistical power than the traditional CD and CDW tests and exhibits greater sensitivity in detecting common shocks and interdependence among units in both small and

medium sized panels. For this reason, the interpretation is based on the CDW plus results. The significance of the CDW plus statistics for all variables (p less than 0.05) indicates the presence of pronounced cross sectional dependence in the panel data set.

The slope homogeneity test results reported in Panel B show, in a manner consistent with both the Pesaran and Yamagata (2008) and Blomquist and Westerlund (2013) approaches, that the coefficients are not homogeneous across the panel. The significance of the Delta and adjusted Delta statistics in both methods (p less than 0.05) indicates that the effects of the variables in the model on financial dollarization differ across countries and that the panel units display a heterogeneous structure. This finding confirms that dollarization dynamics in Latin American countries vary according to country specific macroeconomic conditions, policy regimes, and levels of financial depth, and that a common slope does not hold throughout the panel. Therefore, it is methodologically appropriate for the subsequent analyses to employ approaches that account for heterogeneity and cross-sectional dependence.

Table 3. Cross sectional dependence and slope homogeneity test results.

Panel A: Cross sectional dependence				
Variable	CD	CDw	CDw+	CD*
FD	25.83	0.11	230.08	0.64
	(0.000)	(0.916)	(0.000)	(0.523)
F	13.42	-1.95	144.24	0.15
	(0.000)	(0.051)	(0.000)	(0.882)
ER	17.06	-2.66	206.01	3.30
	(0.000)	(0.008)	(0.000)	(0.001)
FCD	1.18	-0.00	200.63	1.09
	(0.240)	(0.999)	(0.000)	(0.276)
INF	11.57	0.13	126.61	-1.23
	(0.000)	(0.896)	(0.000)	(0.219)
Panel B: Slope homogeneity				
	Delta	p-value	adj. Delta	p-value
Pesaran and Yamagata (2008)	6.211	0.000	7.703	0.000
	Delta	p-value	adj. Delta	p-value
Blomquist and Westerlund (2013)	14.034	0.000	17.407	0.000

Notes: p-values in parenthesis. CD: Pesaran (2015, 2021), CDw: Juodis and Reese (2021), CDw+: CDw with power enhancement from Fan et al. (2015)
CD*: Pesaran and Xie (2021)

Table 4 evaluates the stationarity properties of the variables used in the study by employing both the CIPS panel unit root test and the Fourier KPSS stationarity test. When the CIPS results are examined first, it is observed that the variables are not stationary in their level form under both the constant specification and the constant and trend specification. However, once the first differences are taken, all series become statistically stationary. This finding from the CIPS test provides strong evidence that all variables in the panel data set are integrated of order one, I(1), and confirms that the series contain unit roots. Accordingly, while the level values of the series exhibit weak persistence, the differenced series attain a stable structure that reflects short run dynamics.

The Fourier Panel KPSS test conducts stationarity analysis under a reversed hypothesis structure, where the null hypothesis indicates stationarity and the alternative hypothesis indicates the presence of a unit root. In addition, the Fourier approach incorporates frequency components into the model in order to capture possible smooth and gradual structural changes in the series. However, because the method requires the assessment to be performed only on level values, it should be noted that applying the test to first differences would reduce its power. The Fourier KPSS results show that none of the variables are stationary in their level form and that the null hypothesis is rejected (p less than 0.05). This finding is fully consistent with the results obtained from the CIPS test and confirms that all series are integrated of order one, I(1).

When the findings from both tests are evaluated together, a methodologically robust conclusion emerges that all variables contain unit roots and become stationary after first differencing, displaying an integration order of I(1). This outcome indicates that panel cointegration analyses are both necessary and appropriate for investigating the long run relationships among the series. It also shows that structural transitions and smooth trend shifts play an important role in the data set, which supports the use of Fourier based approaches.

Table 4. Fourier KPSS and CIPS Panel unit root test results.

Model	Constant			Constant and Trend		
Variables	CIPS	F-KPSS	Prob	CIPS	F-KPSS	Prob
FD	-1.982**	2.4389	0.007	-0.867	9.9334	0.000
ΔFD	-6.184***	---	---	-4.571***	---	---
F	-0.510	14.2162	0.000	1.431	7.4666	0.000
ΔF	-6.441***	---	---	-4.789***	---	---
ER	2.921	4.7024	0.000	3.202	5.2139	0.000
ΔER	-4.144***	---	---	-2.930***	---	---
INF	-0.535	17.3607	0.000	0.054	3.3898	0.000
ΔINF	-12.005***	---	---	-10.172***	---	---
FCD	2.040	14.9083	0.000	1.653	10.7866	0.000
ΔFCD	-4.013***	---	---	-2.081**	---	---

Note: *** indicates significance at the 1% level. The delta (Δ) symbol indicates that the variables are expressed as first differences.

After establishing that all series exhibit an integration order of I(1), panel cointegration tests were applied to examine the long run relationship among the variables. The Westerlund (2007) and Pedroni (1999, 2004) test results presented in Table 5 provide strong evidence for the existence of a long run cointegration relationship across the panel. In the Westerlund test, the significance of the bootstrap robust p values for the Pt and Pa statistics, which are based on the error correction mechanism, indicates the presence of a common long run relationship in the panel. The bootstrap procedure of the Westerlund test produces more robust results by accounting for cross sectional dependence, which makes the significance levels methodologically reliable.

The results of the Pedroni (1999, 2004) cointegration test are consistent with the findings of Westerlund. The significance of both the Modified Phillips Perron t statistic and the ADF statistic (p less than 0.10) confirms the existence of a long run cointegration relationship among the variables under both model specifications, with or without a time trend.

When the results of both tests are considered together, it becomes clear that financial dollarization, financial development, the interest rate differential, the exchange rate, and inflation share a statistically significant, stable, and long run cointegration relationship within the model.

After confirming the presence of a panel cointegration relationship, the long run and short run dynamics among the variables were analyzed using the Fourier Panel ARDL approach. The long run results presented in Table 6 show that all coefficients in the model are statistically significant and that dollarization behavior is strongly explained by the key macroeconomic variables in the region. Financial development (FD) has a significant negative long run effect on dollarization, with a coefficient of 0.228. This finding indicates that countries with more developed financial systems tend to exhibit greater confidence in the domestic currency, which in turn reduces the preference for deposits denominated in foreign currency. Therefore, deeper and more stable financial structures play a limiting role in the dollarization process in Latin American countries.

Table 5. Westerlund (2007) and Pedroni (1999) cointegration test results.

Westerlund (2007)	Bootstrap (100)				Pedroni (1999)	Without Time Trend		With Time Trend	
	Gt	Ga	Pt	Pa		Statistic	p-value	Statistic	p-value
Value	-0.893	-2.071	-5.368	-2.324	Modified Phillips–Perron t	3.4642	0.0003	3.9593	0.0000
z value	3.808	3.959	0.364	1.869	Phillips–Perron t	1.8212	0.0343	1.4932	0.0677
p value	1.000	1.000	0.642	0.969	Augmented Dickey–Fuller t	2.2454	0.0124	1.5173	0.0646
Robust p value	0.620	0.200	0.020	0.080					

The positive and significant long run coefficients of inflation (INF), the interest rate differential (F), and the exchange rate (ER) are consistent with the dollarization literature. An increase in the inflation rate weakens confidence in price stability, erodes the value of the domestic currency, and encourages economic agents to shift toward foreign currency-denominated assets. Depreciation of the exchange rate similarly increases the perceived risk of the domestic currency and accelerates the dollarization process.

The positive coefficient of the interest rate differential reflects an important region-specific dynamic. In Latin America, higher domestic interest rates relative to those of the United States often indicate rising country risk rather than stronger monetary policy. As a result, a widening interest rate gap leads investors to view the domestic currency as more fragile and to shift toward foreign currency denominated assets. This finding is fully consistent with the interest rate dollarization paradox highlighted in existing studies on the region.

Table 6. Fourier Panel ARDL long and short-run finding.

Long-run					Short-run				
Variable	Coefficient	Std. Error	t-Statistic	Prob	Variable	Coefficient	Std. Error	t-Statistic	Prob
FD	-0.228880	0.029421	-7.779404	0.0000	ECM	-0.335555	0.097080	-3.456491	0.0007
INF	0.207547	0.029872	6.947774	0.0000	ΔFD	-0.252166	0.218120	-1.156090	0.2496
F	0.134424	0.012570	10.69367	0.0000	ΔF	-0.002914	0.101573	-0.028688	0.9772
ER	0.269587	0.010488	25.70472	0.0000	ΔINF	-0.075068	0.095571	-0.785473	0.4335
					ΔER	1.014507	0.548809	1.848562	0.0666
					@SIN	-0.012573	0.005753	-2.185357	0.0305
					@COS	0.020124	0.034339	0.586056	0.5588

In the short run analysis, only the first difference of the exchange rate (ΔER) is found to be statistically significant, indicating that short term movements in the exchange rate have an immediate and strong effect on dollarization. By contrast, inflation, the interest rate differential, and financial development are not significant in the short run. This suggests that the influence of these variables operates primarily through long run level relationships rather than through short term fluctuations.

The ECM coefficient, which represents the error correction mechanism of the model, is negative and highly significant, with a value of 0.335. This indicates that when the system deviates from its long run equilibrium, approximately 33 percent of the disequilibrium is corrected in the following period. This result confirms that the cointegration relationship functions properly and that the model exhibits a strong mechanism of adjustment back toward equilibrium.

The results related to the Fourier terms show that the SIN component is significant while the COS component is not, indicating that structural breaks and smooth nonlinear transitions are successfully captured by the model. One of the main advantages of the Fourier approach is its ability to incorporate gradual economic transitions into the model through frequency components without imposing an artificial number of regimes. The significance of the SIN component suggests that cyclical patterns and nonlinear processes play an important role in the behavior of the series. These findings show that dollarization is neither a fully linear process nor one driven solely by abrupt

breaks. Instead, it follows a flexible dynamic that evolves gradually over time and responds sensitively to wave like fluctuations in macroeconomic conditions.

Overall, the Fourier Panel ARDL results indicate that dollarization is strongly determined by both macroeconomic stability indicators and the level of financial development. The long-run effects are consistent and theoretically expected, while in the short run exchange rate volatility plays the dominant role. Taken together, these findings demonstrate that dollarization in Latin American countries is a structural and multidimensional phenomenon that responds to both economic and financial variables and becomes more pronounced in volatile macroeconomic environments.

Table 7. Dumitrescu and Hurlin (2012) causality test results.

Null Hypothesis	W-bar	Z-bar	P-value	Result
FD does not Granger-cause FCD	3.4831***	2.6737	0.0075	Unidirectional
FCD does not Granger-cause FD	1.3185	0.8121	0.4167	
INF does not Granger-cause FCD	1.1705	0.4346	0.6638	No causality
FCD does not Granger-cause INF	5.0900	1.3895	0.1647	
F does not Granger-cause FCD	10.6224***	8.4419	0.0000	Bidirectional
FCD does not Granger-cause F	3.3998**	2.5234	0.0116	
ER does not Granger-cause FCD	133.5391***	165.1306	0.0000	Bidirectional
FCD does not Granger-cause ER	6.3461***	2.9907	0.0028	

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively.

To examine the dynamic interaction among the variables, the Dumitrescu and Hurlin (2012) panel Granger causality test was applied, and the results are presented in Table 7. The findings indicate that dollarization has a multidimensional structure and that macroeconomic variables shape dollarization behavior through different timing channels. First, a significant and unidirectional causality running from financial development (FD) to financial dollarization (FCD) is identified. This result suggests that the depth and maturity of the financial system have predictive power over the future path of dollarization. In other words, the development of the banking sector strengthens confidence in the domestic currency and exerts a reducing effect on dollarization. However, no causality is detected in the opposite direction, from FCD to FD, which indicates that short term fluctuations in dollarization do not determine the level of financial development.

No significant causality is found between inflation (INF) and financial dollarization (FCD), implying that short- and medium-term fluctuations in inflation do not directly and immediately influence dollarization behavior. In contrast, a bidirectional causality relationship is detected between the interest rate differential (F) and FCD. This finding shows that changes in the interest rate differential affect dollarization and that dollarization generates feedback effects on financial conditions. Thus, the relationship between interest rates and dollarization is characterized by mutual interaction. An increase in the interest rate differential raises country risk perceptions and leads to higher dollarization, while rising dollarization reduces the effectiveness of monetary policy and influences interest rate dynamics.

Bidirectional causality is also identified between the exchange rate (ER) and FCD. This indicates that the dollarization process is strongly linked to the exchange rate regime and to exchange rate volatility. Depreciation in the exchange rate increases dollarization, while rising dollarization heightens the sensitivity of the exchange rate, increases foreign currency demand, and generates new exchange rate pressures. This reciprocal interaction highlights the dollarization and exchange rate spiral as a major source of macroeconomic fragility in Latin American countries.

Overall, the causality findings show that dollarization maintains strong and mutually influential relationships with key macro financial indicators such as financial development, the interest rate differential, and the exchange rate. In particular, the bidirectional causality relationships between FCD and F, and between FCD and ER, demonstrate that dollarization is a structural phenomenon that both shapes financial conditions and is affected by them. Thus, the existence of an intense feedback

mechanism within the dollarization, exchange rate, and interest rate triangle is empirically confirmed. These findings indicate that policymakers should not focus on a single instrument when addressing dollarization. Instead, they should adopt a policy mix that simultaneously strengthens exchange rate stability, price stability, and financial deepening.

4.2 Discussion

This study provides important empirical and methodological insights into the dynamics of financial dollarization in Latin America. By employing the Fourier Panel ARDL approach, the analysis goes beyond conventional linear frameworks and offers a richer understanding of how dollarization evolves in response to macroeconomic and financial conditions under structural change. The findings contribute to the literature by demonstrating that dollarization is not merely a reaction to short-term macroeconomic instability, but a persistent and structurally embedded process shaped by financial development, inflation dynamics, exchange rate behavior, and interest rate perceptions.

One of the most notable findings is the strong and negative long-run relationship between financial development and financial dollarization. This result supports the argument advanced by De Nicoló et al. (2005), Levy Yeyati (2006), and Catão and Terrones (2016) that deeper and more sophisticated financial systems reduce residents' incentives to hold foreign-currency deposits. In contrast to studies that emphasize inflation stabilization as the primary driver of de-dollarization, the present findings highlight that financial deepening plays a more fundamental and durable role. This suggests that confidence in the domestic currency is transmitted not only through price stability but also through the availability, diversity, and credibility of domestic financial instruments.

The positive long-run effects of inflation and exchange rate depreciation on dollarization are consistent with classical currency substitution theories and the minimum variance portfolio framework proposed by Ize and Levy-Yeyati (2003). Persistent inflation erodes the real value of domestic currency holdings, while exchange rate depreciation increases perceived currency risk, leading households and firms to shift toward foreign-currency assets. However, the short-run results reveal that inflation does not exert an immediate impact on dollarization, whereas exchange rate movements do. This asymmetry suggests that inflation influences dollarization primarily through expectation and credibility channels over time, while exchange rate fluctuations operate as an immediate and visible signal of currency risk.

The interest rate differential emerges as a particularly revealing variable in the Latin American context. The positive long-run relationship between the domestic–U.S. interest rate gap and dollarization confirms the existence of an "interest rate paradox," whereby higher domestic interest rates are interpreted as indicators of increased country risk rather than stronger monetary credibility. This finding aligns with Honohan and Shi (2002) and Neanidis and Savva (2009), who argue that interest rate increases in emerging markets often fail to attract local-currency savings when risk perceptions dominate return considerations. The causality results further reinforce this interpretation by showing bidirectional feedback between the interest rate differential and dollarization, indicating that rising dollarization can itself weaken monetary transmission and necessitate higher interest rates.

The short-run dominance of the exchange rate underscores the central role of currency volatility in shaping dollarization behavior. The immediate response of dollarization to exchange rate changes suggests that even temporary depreciation episodes can have lasting effects on portfolio preferences, particularly in economies with a history of macroeconomic instability. This finding supports the view that dollarization exhibits hysteresis, whereby past shocks leave a permanent imprint on financial behavior, even after macroeconomic conditions improve.

From a methodological perspective, the significance of the Fourier sine component confirms that financial dollarization follows nonlinear and smoothly evolving dynamics rather than abrupt regime

shifts alone. This result validates the use of Fourier-based methods in capturing gradual institutional change, policy learning, and evolving expectations. Traditional models that assume stable coefficients may therefore underestimate the persistence and adaptability of dollarization in response to repeated macro-financial shocks.

Overall, the discussion of the empirical findings reinforces the interpretation of financial dollarization as a structural, path-dependent, and interactive phenomenon. The coexistence of long-run equilibrium relationships with strong short-run exchange rate sensitivity and bidirectional causality highlights the limits of single-instrument policy approaches. Instead, the results support a broader view in which dollarization both reflects and reinforces underlying macro-financial fragilities in Latin American economies.

5. CONCLUSION AND POLICY RECOMMENDATION

This study provides an original and methodologically innovative contribution to the literature by examining the determinants and dynamic structure of financial dollarization in thirteen Latin American countries over the period 2004–2023. By employing the Fourier Panel ARDL framework together with the Fourier Panel KPSS unit root test, the analysis captures nonlinear dynamics, smooth structural breaks, and gradual regime shifts that conventional linear panel approaches are unable to detect. This methodological advancement allows financial dollarization to be modeled not as a static or episodic phenomenon, but as an evolving process shaped by institutional credibility, macroeconomic volatility, and structural transformations in financial systems.

The preliminary diagnostic tests reveal strong cross-sectional dependence and slope heterogeneity across countries, confirming the necessity of second-generation panel techniques. Both the CIPS and Fourier KPSS tests indicate that all variables are integrated of order one, while the Pedroni and Westerlund cointegration tests provide robust evidence of a stable long-run equilibrium relationship among financial dollarization, financial development, inflation, the interest rate differential, and the exchange rate. These results imply that although the intensity and channels of dollarization vary across countries, the phenomenon evolves around a common long-run macro-financial structure in the region.

The long-run estimates from the Fourier Panel ARDL model demonstrate that financial development plays a crucial mitigating role by reducing financial dollarization, whereas inflation, exchange rate depreciation, and a widening interest rate differential significantly increase it. These findings reinforce the view that dollarization in Latin America is deeply rooted in macroeconomic instability and weak confidence in domestic financial systems. In particular, the positive effect of the interest rate differential reflects a region-specific paradox: higher domestic interest rates often signal increased country risk rather than improved monetary credibility, thereby accelerating currency substitution instead of discouraging it. In the short run, exchange rate movements emerge as the dominant driver of dollarization, highlighting the sensitivity of foreign-currency deposit behavior to immediate currency risk. The negative and statistically significant error correction coefficient confirms that deviations from long-run equilibrium are corrected relatively quickly, indicating a strong adjustment mechanism.

The panel causality results further reveal that financial dollarization is characterized by strong feedback mechanisms. Unidirectional causality from financial development to dollarization underscores the central role of financial system depth and institutional quality in shaping currency preferences. Meanwhile, bidirectional causality between dollarization and both the exchange rate and the interest rate differential highlights a self-reinforcing loop in which dollarization both responds to and amplifies macro-financial instability. This triangular interaction constitutes a key source of fragility in Latin American economies and underscores the limits of isolated policy interventions.

The empirical findings of this study suggest that effective strategies to reduce financial dollarization must extend well beyond short-term monetary tightening or exchange rate management. Instead, de-dollarization should be approached as a long-term, structural policy objective supported by a comprehensive and coordinated policy framework.

First, financial development should be placed at the core of de-dollarization strategies. Strengthening domestic financial markets, expanding access to local-currency financial instruments, and improving banking sector depth can significantly reduce households' and firms' incentives to hold foreign-currency deposits. Policies aimed at enhancing competition within the banking sector, improving payment system infrastructure, and fostering long-term domestic savings instruments—such as local-currency bonds and pension funds—can reinforce confidence in the domestic currency and reduce reliance on foreign currencies as a store of value.

Second, macroeconomic stability remains a necessary but insufficient condition for de-dollarization. While maintaining low and predictable inflation is essential, the results show that inflation control alone does not automatically translate into reduced dollarization. Policymakers must therefore complement price stability with credible fiscal frameworks, transparent policy communication, and institutional consistency to anchor expectations over the long term. Persistent fiscal imbalances or policy reversals can quickly undermine credibility gains and sustain dollarization even in low-inflation environments.

Third, exchange rate policy should prioritize volatility management rather than rigid targeting. The strong short-run impact of exchange rate fluctuations on dollarization indicates that excessive volatility can rapidly trigger currency substitution. While fully fixed exchange rate regimes may reduce dollarization in the short term, they often create longer-term vulnerabilities. A credible and flexible exchange rate regime, supported by adequate foreign exchange reserves and clear intervention rules, can help smooth excessive fluctuations without sacrificing policy autonomy.

Fourth, the interest rate–dollarization paradox identified in the analysis implies that high interest rates should not be viewed as a straightforward tool to defend the domestic currency. When higher rates are perceived as compensation for risk, they may intensify dollarization rather than curb it. This finding highlights the importance of reducing structural risk perceptions through institutional reforms, fiscal discipline, and policy credibility, rather than relying excessively on interest rate adjustments.

Fifth, macroprudential and regulatory policies should be explicitly integrated into de-dollarization efforts. Measures such as differentiated reserve requirements on foreign-currency deposits, stricter capital requirements for foreign-currency lending to unhedged borrowers, and enhanced supervision of currency mismatches can reduce systemic risk and discourage excessive foreign-currency intermediation. However, the results suggest that such measures are most effective when implemented alongside broader macroeconomic and financial reforms, rather than in isolation.

Finally, the bidirectional feedback between dollarization, exchange rates, and interest rate dynamics indicates that policy coordination is essential. Monetary, fiscal, financial, and macroprudential policies must be designed as part of a coherent strategy aimed at strengthening institutional credibility and reducing vulnerability to external shocks. Fragmented or inconsistent policy actions may inadvertently reinforce the very dynamics that sustain dollarization.

In sum, the findings of this study demonstrate that financial dollarization in Latin America is a structural and path-dependent phenomenon shaped by macroeconomic volatility, financial development, and institutional credibility. Addressing dollarization therefore requires a holistic and long-term policy approach that combines macroeconomic stability with deep financial reforms and credible institutions. By highlighting the nonlinear and interactive nature of dollarization dynamics, this study provides policymakers with empirically grounded insights into how sustainable de-dollarization can be achieved without undermining financial stability or economic resilience.

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