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New Indicators for Measuring Financial Conditions in a Financially Dollarized Economy

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New Indicators for Measuring Financial Conditions in a Financially Dollarized Economy*

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Abstract

This paper introduces novel monthly indicators to assess financial conditions in Peru's partially dollarized economy. Recognizing the unique monetary landscape, we develop separate measures for domestic (sol) and foreign currency (USD) financial conditions. These indicators are derived using principal component analysis (PCA) on a set of currency-specific relevant variables. We further employ a Bayesian Vector Autorregressive (VAR) model identified through zero and sign restrictions for structural analysis. Our findings reveal that the estimated indexes respond consistently to macroeconomic and financial shocks. The historical decomposition demonstrates that sol-denominated financial conditions are influenced by: i) Monetary policy actions, ii) Macroeconomic factors (aggregate supply and demand), iii) Inflation expectations and iv) Domestic currency liquidity demand. Similarly, USD-denominated financial conditions are affected by macroeconomic factors, with significant additional contributions from: i) Exchange rate fluctuations, and ii) An exogenous idiosyncratic component linked to global financial conditions. This research provides valuable insights into the complex dynamics of financial conditions in dual-currency economies, offering policymakers and researchers a nuanced tool for economic analysis and decision-making in Peru and similar markets.

JEL Classification: E47, E51

Key words: Factor Models, Principal Component Analysis, Financial Conditions

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1 Introduction

Measuring the financial conditions through different indicators is extremely relevant. This is especially true for decision makers regarding consumption and investment, as well as for the design of economic policies such as monetary and macroprudential ones, among others. These indicators serve as a signal or thermometer of the current state of the financial system, especially in relation to the cost of financing. However, since financial conditions have different dimensions (short and long-term interest rates, bond markets, country risk indicators, etc.), it is necessary to summarize this information in an index clear and economically meaningful. The first examples can be found in Mayes and Virén (2001) and Goodhart and Hofmann (2002).

In this paper, new financial conditions indexes are constructed for Peru for the period 2005-2024. Unlike the work of Nivín and Pérez (2019), which is based on the methodology developed by Koop and Korobilis (2014), the proposed index is simpler to calculate and does not need data that is published with a considerable delay (for example , financial statements, etc.). Specifically, it is estimated taking into account observable variables in real time and at high frequency, so that the resulting indicator can be obtained in a reasonable time, and is also easy to interpret for the interested users. Strictly speaking, simple averages of standardized scale variables are taken into account, as proposed by Arrigoni *et al.* (2021), and the Principal Components strategy is used[1][2]. Similar applications for other countries, both advanced and emerging ones, can be found in Gauthier *et al.* (2004) for Canada, Manning and Shamloo (2015) for Greece, Ho and Lu (2013) for Poland, Khundrakpam *et al.* (2017) for India, Armendáriz and Ramírez (2015) for Mexico, Auer (2017) for Czech Republic, Hungary and Poland, i.e. the three main non-euro-area EU member States in Central and Eastern Europe (CEE), among others. Although these indicators are mainly used to measure current financial conditions, Aramonte *et al.* (2017) find that there is also considerable short-term predictive power of these indicators.

Given the previous introduction, the Financial Conditions Indexes (FCI) are obtained for both

[1]See Stock and Watson (2011) for a comprehensive analysis of Dynamic Factor Models (DFM) and the use of Principal Component Analysis (PCA) methodology.

[2]The firs examples using PCA analysis can be found in English *et al.* (2005), Hatzius *et al.* (2010), among others.

domestic currency (soles or PEN) and foreign currency (USD) and for the time horizon 2005-2024, and this is the main contribution of this paper. Our approach is based mainly on capturing the factors associated with the cost of funding both currencies. The latter is reflected in the selection of variables such as short- and long-term interest rates, along with some relevant spreads for the Peruvian financial system, which mainly represent the availability of liquidity and the slope of the yield curve. The evolution of both indicators reflects greater synchronization in periods of global crises. However, given the persistence in the partial dollarization in the Peruvian economy, there is room for differentiated financial conditions per currency[3]. The obtained indicators tell us the following:

- **Financial Conditions in Domestic Currency (soles or PEN)**: a neutral level of financial conditions is observed at the beginning of the sample, and then a strong tightening of these conditions is recorded during the Global Financial Crisis (2008-2009). Subsequently, we observe loose financial conditions until 2011, which coincides with the end of the commodity boom period. Between the years 2012 to 2016, a relatively neutral level of financial conditions is observed, then they become loose as of 2017. The latter intensified during the Covid-19 pandemic, given the monetary policy response to contain its effects. Within the period 2021-2023, a tightening of financial conditions is observed, which is in line with more restrictive policies in response to the abrupt jump in inflation until 2023. Finally, during 2024 financial conditions that are still restrictive but looser than in 2023.

- **Financial Conditions in Foreign Currency (USD)**: The estimated indicator is mainly related to the evolution of global financial conditions, mainly given by the United States. We observe that these financial conditions were restrictive at the beginning of the sample (at least more restrictive than the ones in domestic currency), and this was intensified during the 2008-09 crisis period. These financial conditions became relatively neutral between 2010 and 2013, and were flexible from 2014 to 2021, with a relative intensification at the beginning of the Covid-19 pandemic, where it should be noted that these conditions were more flexible than currency conditions. domesticated between 2013 and 2017. Addi-

[3]See also Departamento de Modelos Macroeconómicos (2009), Winkelried (2013) and Aguirre *et al.* (2023).

tionally, these were tightened in the period 2021-2023, given the period of high inflation, and today (2024) they are more restrictive than financial conditions in national currency, given that international interest rates are expected to remain higher for longer.

Given the estimated Financial Conditions indexes, we want to provide a plausible explanation for their evolution over time. Thus, we proceed to carry out a structural analysis of their determinants through a Bayesian Vector Autorregressive (BVAR) model. To do so, we consider the indexes both in domestic and foreign currency, along with a set of relevant macroeconomic variables from the Peruvian economy. Then we identify macroeconomic and financial structural shocks using a mixture of zero and sign restrictions, so that we can compute the impulse responses for relevant shocks and also the contribution of them to the FCIs through the historical decomposition.

The estimated indexes respond to macroeconomic and financial shocks in a consistent manner, and the historical decomposition shows that, in the case of financial conditions in soles, these are determined not only by monetary policy actions, but also by macroeconomic factors such as aggregate supply and demand, as well as by inflation expectations and the demand for liquidity in soles. On the other hand, although financial conditions in foreign currency are also determined by aggregate supply and demand factors, in this case there is a significant contribution from exchange rate shocks and the exogenous idiosyncratic component of this index, which would reflect the global monetary policy stance. Likewise, domestic monetary policy does not contribute significantly to the evolution of these financial conditions in foreign currency.

In conclusion, the estimated indexes contain relevant information about the Peruvian financial system and the cost of funding in both currencies, and these are explained by traditional macroeconomic and financial structural shocks. Likewise, these indicators serve as an additional signal that reflect current financial market conditions.

The document is organized as follows: section 2 describes the data and the computation of the Financial Conditions Indexes, section 3 performs a structural analysis and presents the

historical decomposition of the estimated indexes, and section 4 concludes.

2 Measuring Financial Conditions in an economy with partial financial-dollarization

2.1 Financial Conditions Data in Domestic Currency (soles or PEN)

We proceed to detail each of the variables included in the index, along with a brief justification and economic intuition. The selected variables are depicted in Figure 1, and in all cases an increase in the level of these variables means a tightening of financial conditions.

- **Three-month Prime Lending Rate** ($Aprime3m$): It is the most representative lending interest rate of the financial system in soles, and has a high pass-through effect of changes in the monetary policy interest rate (Pérez, 2021).
- **Ten-year yield of the Soberanos Bond** ($10Y$): It is the interest rate of the 10-year generic bond of the government of Peru denominated in soles (sovereigns). It is highly representative of the cost of long-term financing in soles, which is then translated into the evolution of mortgage loan interest rates.
- **The spread between the domestic currency interbank rate and the federal funds rate** ($Spread_{INT-FFR}$): The inclusion of this spread has the objective of capturing short-term exchange rate pressures on the sol (PEN) and its effect on the cost of financing in local currency.
- **The spread between the Ten-year yield of the Soberanos Bond and the Ten-year yield of the US Treasury bonds** ($Spread_{BTP10Y-Treasury10Y}$): The inclusion of this spread has the objective of capturing long-term exchange rate pressures on the sol (PEN) and its effect on the cost of financing in local currency.
- **The spread between the Three-month Prime Lending Rate and the Three-month Central Bank Securities interest rate** ($Spread_{Aprime3m-CD}$):The inclusion of this spread has the objective of capturing the availability of liquidity in the monetary

market in soles, because the interest rate of the Central Bank securities (Certificates of Deposit or CDBCRP) is considered a risk-free rate.

- **The spread between the Ten-year yield of the Soberanos Bond and the Three-month Central Bank Securities interest rate** ($Spread_{BTP10Y-3mCD}$): The inclusion of this spread has the purpose of capturing the slope of the Yield Curve in soles.

The variables listed above are available at high frequency (monthly and in some cases weekly or daily). In this case, in order to later make the connection between the estimated FCI and other macroeconomic factors, we have chosen to work on a monthly frequency. Likewise, given that we have included both the level of some interest rates as well as some representative spreads, the principal component analysis to be performed (PCA) should not be interpreted as the typical decomposition of the yield curve (i.e., the factors of level, slope and curvature). Rather, these levels are intended to reflect the financial conditions of a particular financial system, which is why this level of detail is included.

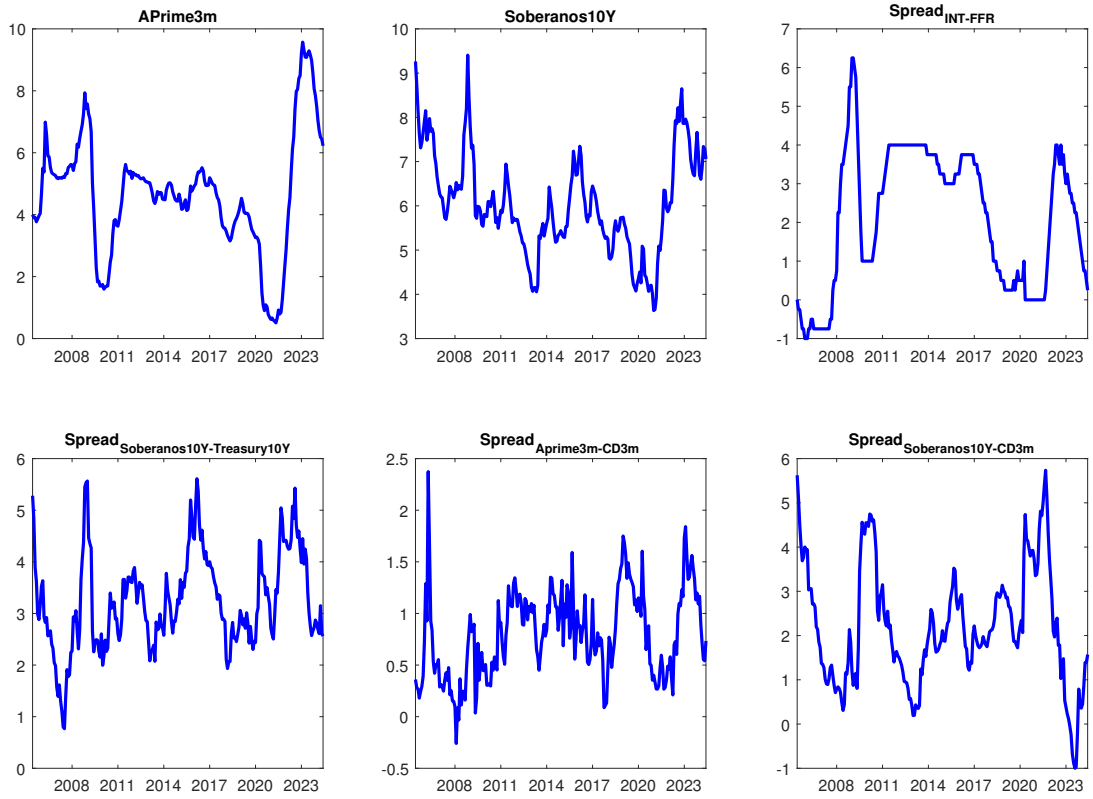

Figure 1: Financial Conditions Data in % (PEN) (2005-2024)

2.2 Financial Conditions Data in Foreign Currency

We now proceed to detail each of the variables included for the case of foreign currency, along with a brief justification and economic intuition. The selected variables are depicted in Figure 2.

- **Interbank Rate in Foreign Currency** (INT_{USD}): Is the overnight rate for the non-collateralized interbank loans in foreign currency (mainly USD)across domestic financial institutions. The latter closely follows the Federal Funds Rate (FFR), unless there is a special episode of liquidity scarcity in USD.
- **Three-month Prime Lending Rate** ($Aprime3m_{USD}$): It is the most representative lending interest rate of the financial system in USD, similar to the Prime Lending Rate in soles. Given that most of the credit dollarization is associated with the corporate segment, this interest rate is relevant for our analysis.
- **Ten-year yield of the Global Bond** ($Global10Y$): It is the interest rate of the 10-year generic bond of the government of Peru denominated in USD (Global). Similar to the case of domestic currency, it is highly representative of the cost of long-term financing in USD, which is then translated into the evolution of mortgage loan interest rates in that currency. Given that there is a non-negligible degree of dollarization in the Peruvian debt, this interest rate is also relevant for our analysis.
- **The spread between the Three-month Prime Lending Rate and the Interbank interest rate** ($Spread_{Aprime3m-INT}$): The inclusion of this spread aims to capture the availability of liquidity in foreign currency, since the interbank interest rate is considered risk-free.
- **The spread between the Ten-year yield of the Global Bond and the Ten-year yield of the US Treasury bonds** ($Spread_{Global10Y-Treasury10Y}$): The inclusion of this spread aims to capture the country risk premium (similar to the EMBI), since it represents how much more expensive it is for Peru to borrow in foreign currency compared to the United States.

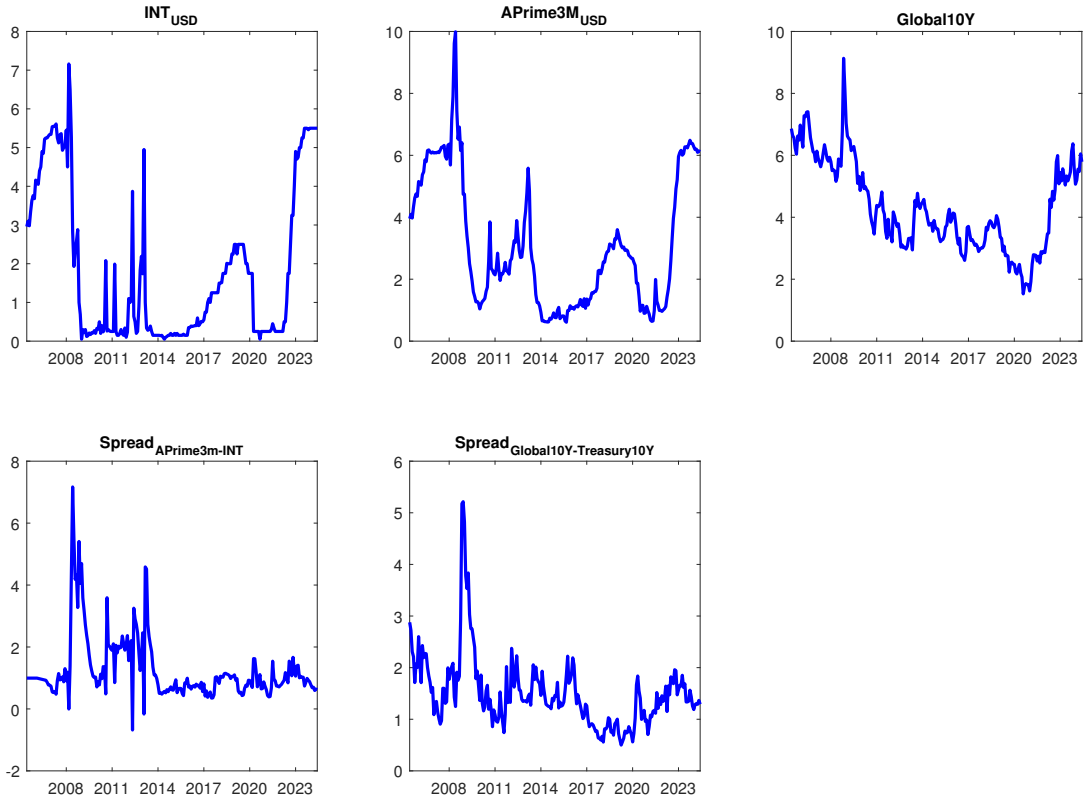

Figure 2: Financial Conditions Data in % (USD) (2005-2024)

2.3 Dynamic Factor Models and Principal Components Analysis

Considering the data shown in the previous section, it is then necessary to briefly describe the methodology we use to obtain the financial condition indexes. Basically, the principal components methodology (PCA) allows you to quickly, effectively and robustly calculate the most representative factors given a previously selected set of variables[4].

Thus, a dynamic factor model (DFM) has a general form such as:

$$F_t = AF_{t-1} + u_t \tag{1}$$

$$Y_t = WF_t + v_t \tag{2}$$

where Y_t is a $(N \times 1)$ column vector containing the observable variables, and F_t is a $(r \times 1)$

[4]See Stock and Watson (2011) and Focardi and Fabozzi (2012), among others.)

column vector containing the identified factors, and where A and W are matrices of parameters. The pair of equations $(1)-(2)$ can also be considered a particular case of a state-space system. The main idea is that the N variables included in Y_t can be summarized by r factors ($r \ll N$) in F_t.

How are the factors obtained? Specifically, an analysis of eigenvalues and eigenvectors is carried out for the covariance matrix $E\left(\tilde{Y}_t\tilde{Y}_t'\right)$, where $\tilde{Y}_t$ contains the standardized data of Y_t. Thus, the covariance matrix can be decomposed as:

$$E\left(\tilde{Y}_t\tilde{Y}_t'\right) = W\Lambda W' \tag{3}$$

where W is the matrix of eigenvectors (one per each column) such that $WW' = I$, and Λ is a diagonal matrix containing the sorted eigenvalues in its main diagonal. That is, we define $\lambda = (\lambda_1, \lambda_2, \ldots, \lambda_N)'$, with $\lambda_1 > \lambda_2 > \ldots > \lambda_N$, so that $\Lambda = diag\,(\lambda)$. Given that $W^{-1} = W'$, then we can pin down the factor such that

$$F_t = W'Y_t \tag{4}$$

and we can also compute the forecasts of the observables given a number of factors such as $r \ll N$.

$$\widehat{Y}_t = \begin{bmatrix} w_1 & w_2 & \cdots & w_r \end{bmatrix} \begin{bmatrix} f_{1t} \\ f_{2t} \\ \vdots \\ f_{rt} \end{bmatrix} \tag{5}$$

Bai and Ng (2002) have elaborated a criteria to determine the optimal number of factors. Nevertheless, following the previous literature of how to obtain the Financial Conditions Indexes, we will only take the first principal component of our database, and we will consider it as the most representative given the selected observables in each currency.

2.4 Results

The results show the identification of the common factor of financial conditions. The estimated indicator for domestic currency is depicted in Figure 3. In particular, a tightening of financial conditions is observed during the periods of the International Financial Crisis (2008-2009) and, to a lesser extent, Taper Tantrum (2013). Likewise, a relaxation of financial conditions is observed at the beginning of the pandemic period (2020), which is associated with the policy response, mainly through the reduction of short and long-term interest rates, and the *spreads* of liquidity through monetary injection. Subsequently, a gradual reversal of that mentioned effect has been observed since 2021, and this is associated with the normalization and tightening of these financial conditions, in line with what is observed both globally and in other emerging countries. At the end of the sample we also observe a more neutral outlook for financial conditions in soles with respect to its last peak in 2022-2023.

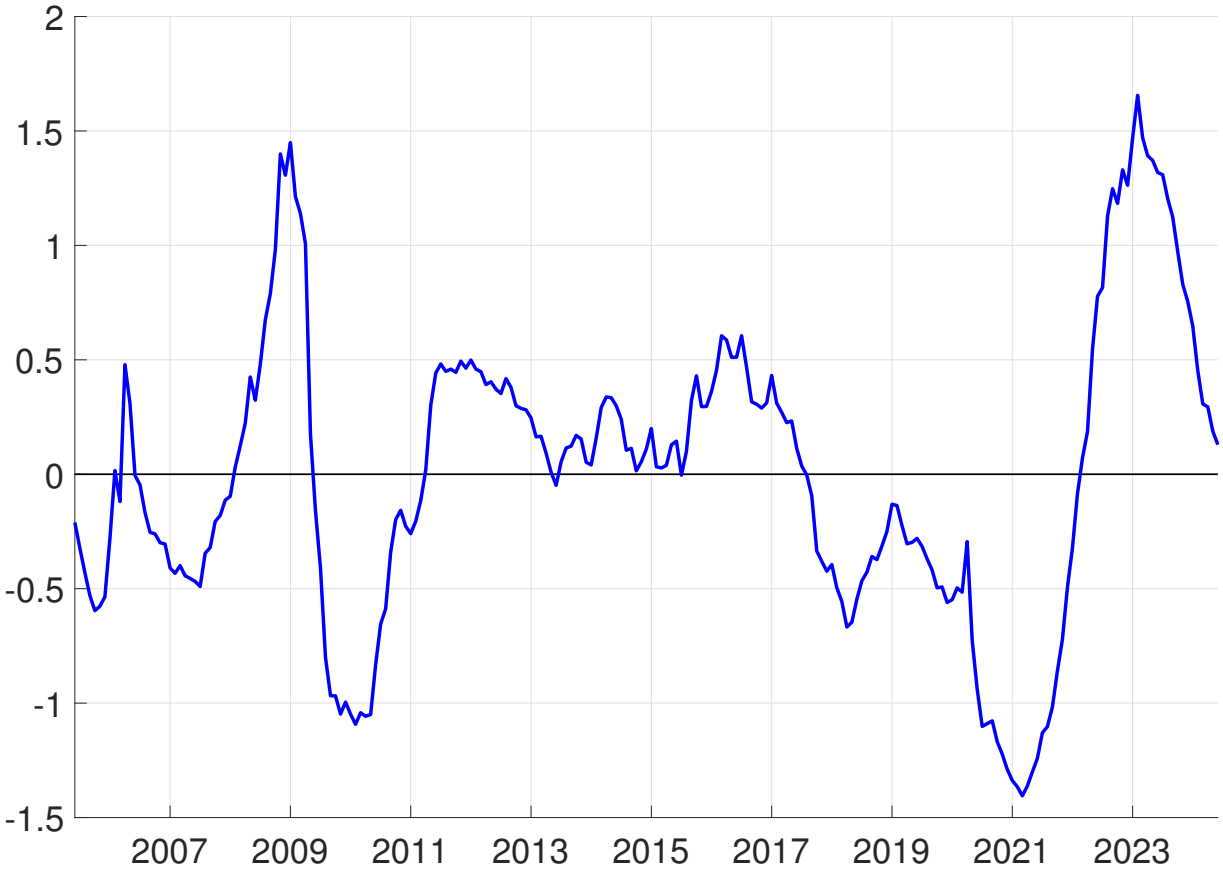

Figure 3: **Peru: Financial Conditions Index in Soles (2005-2024)**

With respect to the evolution of financial conditions in foreign currency, the results can be seen in Figure 4. In this case, it is very clear that the peak of the greatest tightening of these conditions was in 2008-09 during the international financial crisis, well above what was recorded at the beginning of the Covid-19 pandemic, to later move on to a long episode of more flexible financial conditions. This is also consistent with other indices of financial conditions that represent only the case of the United States[5].

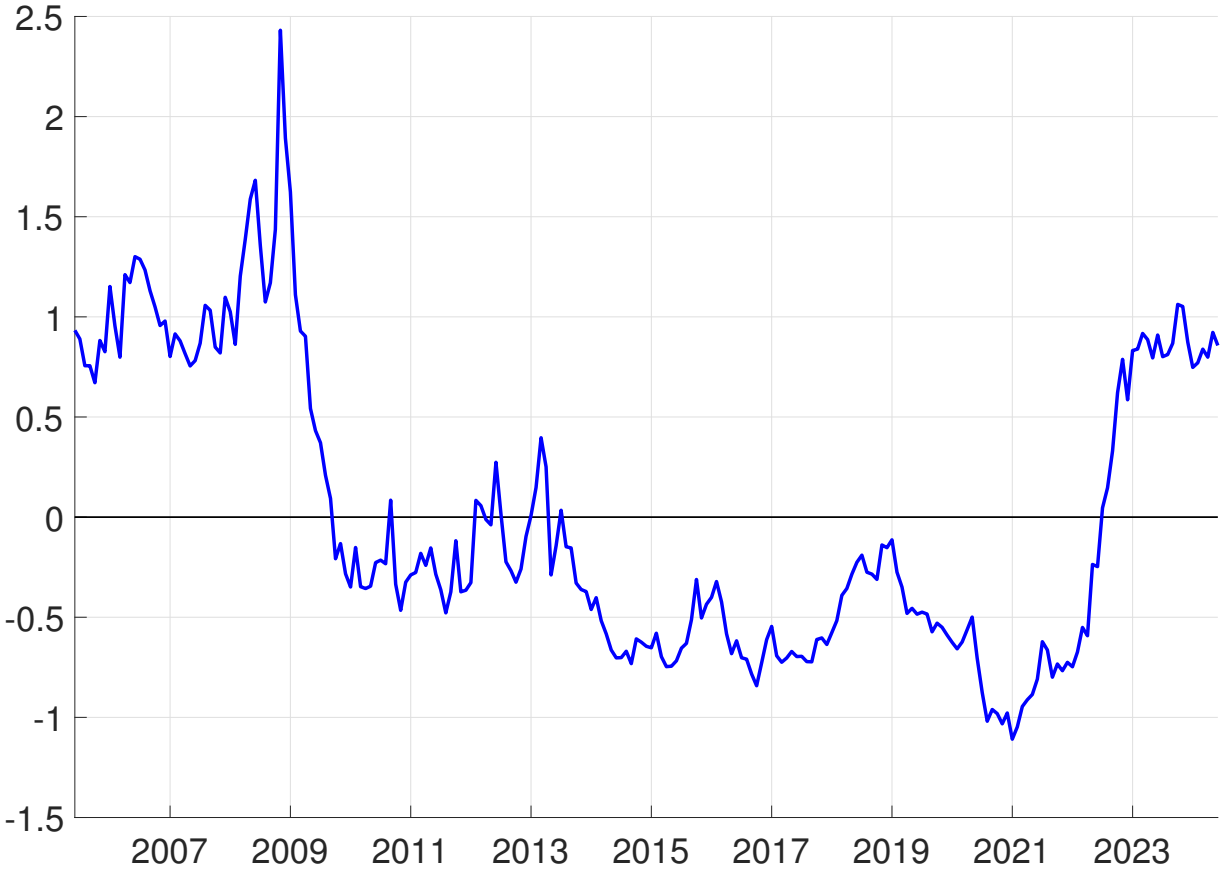

Figure 4: **Peru: Financial Conditions Index in Foreign Currency (2005-2024)**

Finally, if we both estimated indexes in a single chart, as can be seen in Figure 5, different episodes have been recorded throughout the recent history. In the period 2005-2010, relatively tougher financial conditions are observed in the case of foreign currency, which is consistent with the higher interest rates on average during that decade, together with the shock derived

[5]See e.g. the National Financial Conditions Index (NFCI) of Chicago: https://www.chicagofed.org/research/data/nfci/current-datahttps://www.chicagofed.org/research/data/nfci/current-data

from the international financial crisis (2008-09). Subsequently, tougher financial conditions were observed in soles from 2011 to 2017, in a period where lower interest rates in dollars were recorded on average, and where greater exchange and liquidity pressure was also seen after the taper tantrum (2013). Within the years 2018 and 2020, which includes the start of the Covid-19 pandemic, relatively similar financial conditions are observed, with interest rates close to zero. Moreover, like several emerging countries, financial conditions in Peru began to tighten earlier than in the case of advanced economies (2021-2022), and at the end of the sample, tougher financial conditions in foreign currency are observed, which which derives from the uncertainty regarding the future monetary policy stance of the Federal Reserve.

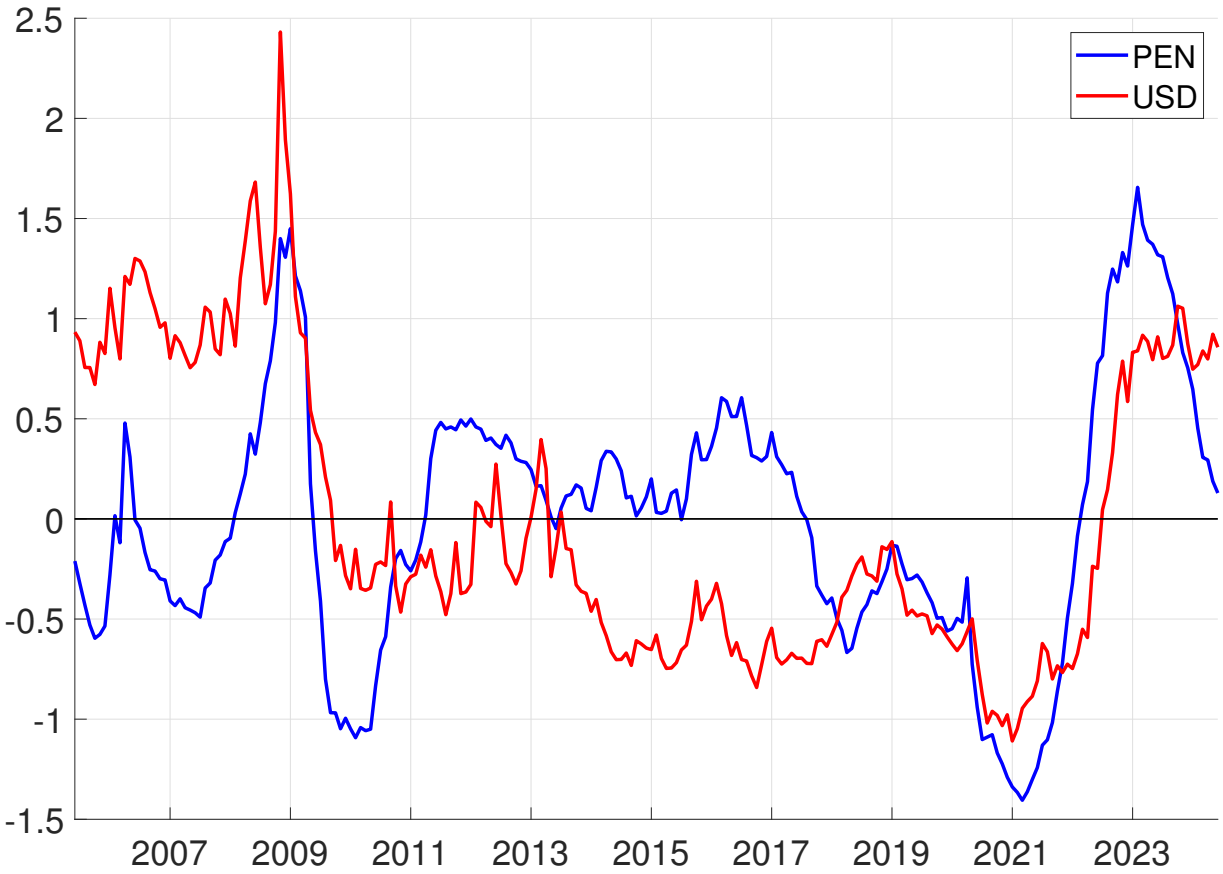

Figure 5: **Peru: Financial Conditions Indexes (2005-2024)**

3 Structural Analysis of the Estimated Indexes

3.1 Main specification

In order to capture the determinants of the estimated financial condition indexes, we proceed to carry out a dynamic and structural analysis, which we will implement through the estimation and identification of a Bayesian vector autorregressive model (BVAR). For that purpose, we consider a vector of variables y_t, which includes the two Financial Conditions Indexes plus a relevant set of macroeconomic and financial variables. The model specification is expressed in equation (3.1):

$$y_t = c + \sum_{k=1}^{p} B_k y_{t-k} + \varepsilon_t, \qquad \varepsilon_t \sim N(0, \Omega) \tag{6}$$

where y_t is a $N \times 1$ vector of macroeconomic and financial variables properly transformed to be stationary, and we have data for $t = 1, \ldots, T$ periods. The error term ε_t is normally distributed with zero mean and covariance matrix Ω that is $N \times N$.

Following a Bayesian perspective, the posterior distribution of model 3.1 is given by:

$$P\left(\Theta \mid y^T\right) \propto P\left(y^T \mid \Theta\right) P(\Theta) \tag{7}$$

where the full set of parameters is given by $\Theta = \{\beta, \Omega\}$, with $\beta = vec(c, B_1, B_2, \ldots, B_p)$. Moreover, posterior simulation is carried out using standard Markov Chain Monte Carlo (MCMC) methods. The normality distribution assumption for ε_t triggers the fact that there exist an analytical expression for the for $P\left(\beta \mid \Omega, y^T\right)$ as a conditional Normal distribution, and $P\left(\Omega \mid \beta, y^T\right)$ as a conditional Inverse-Wishart distribution. As a result, we can safely run the Gibbs Sampling algorithm and get a fast convergence to the posterior distribution (see Kim and Nelson (1999) and Koop and Korobilis (2010)).

Going to our empirical application, the variables included in the vector y_t are depicted in

Figure 6. That is, we consider the two estimated indexes (FCI_{PEN}, FCI_{USD}) and we also include for the Peruvian economy the Headline CPI YoY Inflation, the 12-month ahead inflation expectations, the YoY growth rate of the GDP monthly indicator, the YoY growth rate of the monthly Terms of Trade index, the Interbank Rate expressed in annual terms (in %), the YoY growth rate of the monthly Money Aggregate (Liquidez en soles), and the YoY growth rate of the Exchange Rate (PEN per USD) in monthly frequency, i.e. Exchange Rate depreciation[6].

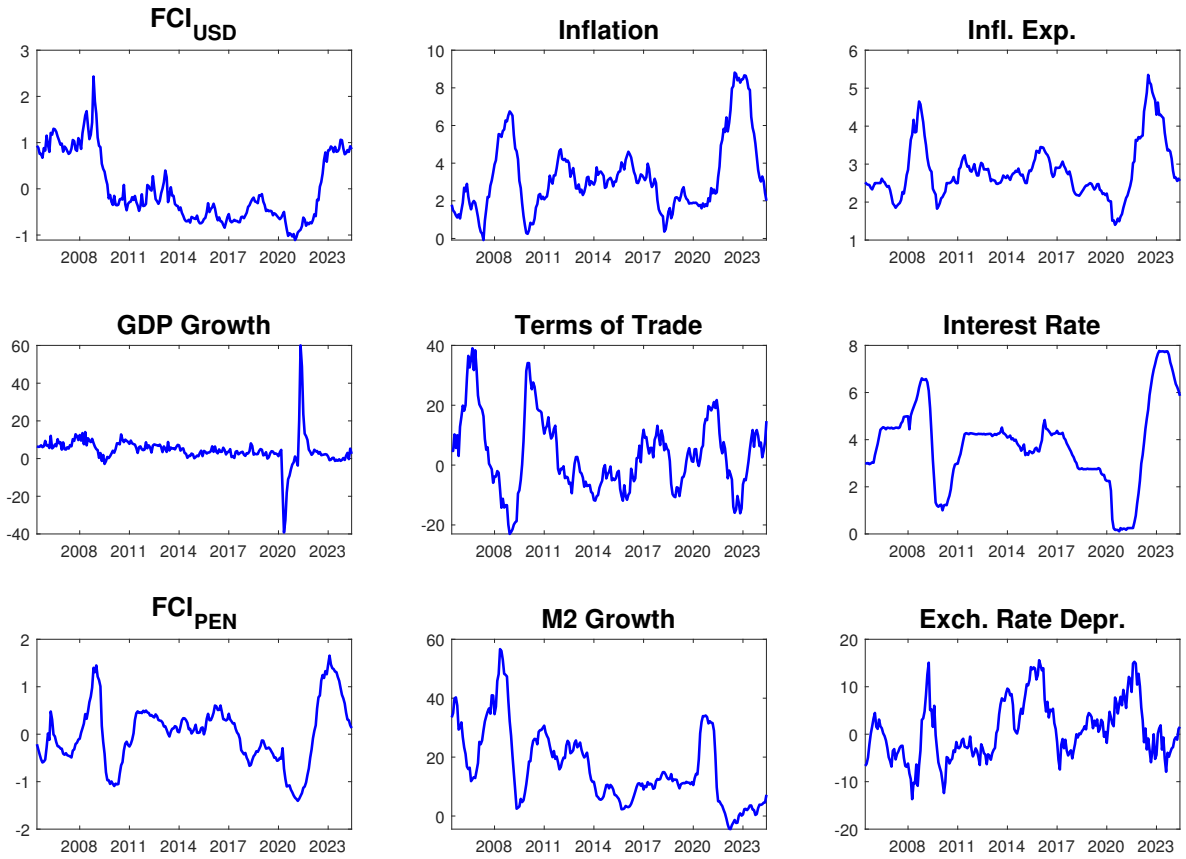

Figure 6: **Data included in the BVAR model (2005-2024)** (y_t)

We consider the order shown in Figure 6, where the FCI in USD is the most exogenous variable, and where the exchange rate depreciation is the most endogenous one. Similar approaches for the Peruvian economy can be found in Nivín and Pérez (2019), among others. Moreover, as Pérez Forero (2024) points out, we can safely estimate a BVAR model with constant coefficients

[6]All these variables can be downloaded from the Central Bank of Peru website: https://estadisticas.bcrp.gob.pe/estadisticas/series/https://estadisticas.bcrp.gob.pe/estadisticas/series/

and variances including the Covid-19 pandemic episode. Finally, we use a standard Minnesota prior (Litterman, 1986), and we truncate the posterior of β in order to rule out the case of an explosive companion form (Koop and Korobilis, 2010).

3.2 Structural Shocks Identification

After computing the reduced-form parameters Θ, we are ready to identify structural shocks. For that purpose, we use an algorithm that allows us impose a mixture of Zero and Sign Restrictions. The restrictions are set in order to identify other traditional macroeconomic shocks, such as: i) monetary policy, ii) aggregate demand, iii) aggregate supply, iv) exchange rate, v) terms of trade, and vi) money demand shocks. As a result, it will be possible to get the historical decomposition of FCIs in each currency. The full set of restrictions are summarized in Table 1.

Var / Shock	Mon. Policy	Aggr.Demand	Aggr.Supply	Terms of Trade	Inf. Exp.	Money Demand	Exch. Rate	FCI-PEN	FCI-USD	Cat.
FCI_{USD}	?	?	?	?	?	?	?	?	>0	S
Inflation	≤ 0	≥ 0	>0	?	≥ 0	?	≥ 0	?	?	S
Infl. Exp	≤ 0	?	?	?	>0	?	?	?	?	S
GDP Growth	≤ 0	>0	≤ 0	≥ 0	?	≥ 0	?	?	?	S
Terms of Trade	?	?	?	>0	?	?	?	?	?	S
Interbank Rate	>0	≥ 0	≥ 0	?	?	≥ 0	≥ 0	?	?	F
FCI_{PEN}	?	?	?	?	?	?	?	>0	?	F
M2 Growth	≤ 0	?	?	?	?	>0	?	?	?	F
ER Depr.	≤ 0	?	?	≤ 0	?	?	>0	?	≥ 0	F

Table 1: Identification Restrictions
'S' means *slow* and 'F' means *fast*

Now we proceed to explain the economic intuition behind the identification restrictions for each structural shocks. In first place, we consider *slow* variables as the ones that do not react contemporaneously to other shocks except of their specific one (zero restrictions). In this group of variables we include the FCI in USD, the GDP growth, the Headline Inflation, and Inflation Expectations. We assume that each structural shock is orthogonal (independent) of the remaining shocks in the system, so that we can interpret the associated impulse responses of each one as an estimated average causal effect for the period 2005-2024. In particular, regarding the monetary policy shock, we consider the usual liquidity effect, the uncovered interest rate parity assumption, and also a negative effect on output and inflation. Aggregate demand

shocks reflect the usual inflationary pressures that trigger a hike in interest rate, the negative aggregate supply shocks capture the textbook tradeoff between output and prices, with a hike in interest rate after a persistent effect on inflation. Terms of trade shocks capture the commodity boom effect, with a rise in output and an appreciation of the domestic currency. Inflation expectations will provoke a rise in total inflation, and money demand shocks will also reflect a textbook effect, with positive pressure on economic activity and interest rates. Finally, we also put additional restrictions to capture the idiosyncratic effects of shocks to financial conditions, both in domestic and foreign currency. In the case of foreign currency, we also impose that tighter financial conditions will reflect a higher demand for dollars, which also triggers and exchange rate depreciation.

3.3 Impulse responses for selected identified shocks

Monetary policy shocks (see Figure 7) produce tighter financial conditions in soles (PEN), and also register statistically significant effects in all the restricted variables, i.e. interest rate (+), inflation (-), GDP growth (-), M2 growth (-), Exchange Rate depreciation (-). As expected, there is no significant effect on Financial Conditions in Foreign Currency, and a negligible effect on terms of trade, given that they are basically governed by the dynamics of exogenous commodity prices.

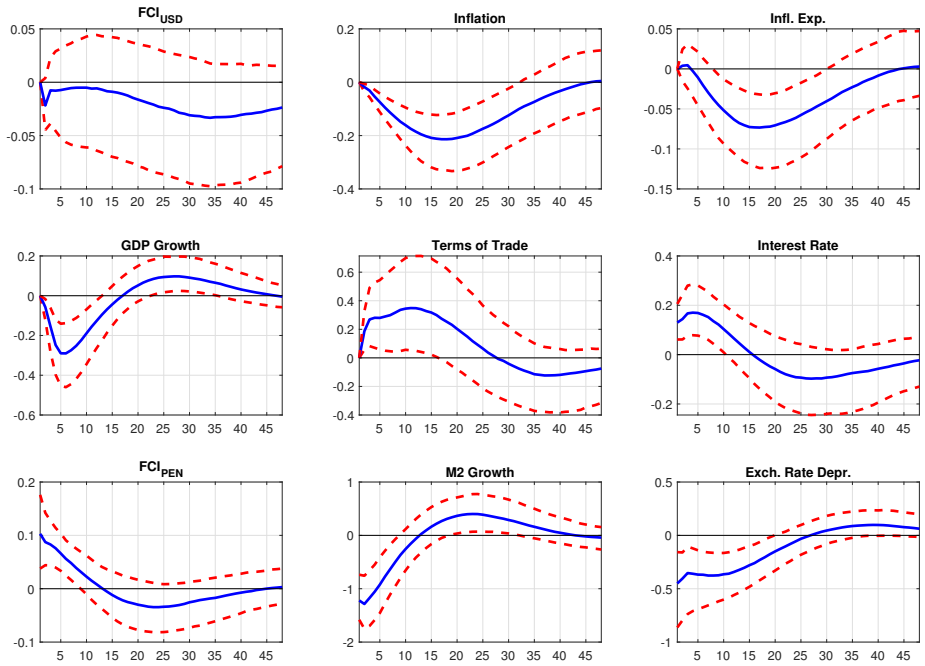

Figure 7: **Monetary Policy Shock (median value and 68% C.I.)**

Aggregate supply shocks (see Figure 8) also produce tighter financial conditions in both currencies and a statistically significant effects in all the restricted variables. The latter is triggered by the fact that a significant fraction of supply shocks may come from foreign forces, as it was the case in the recent surge of inflation in 2021-2023.

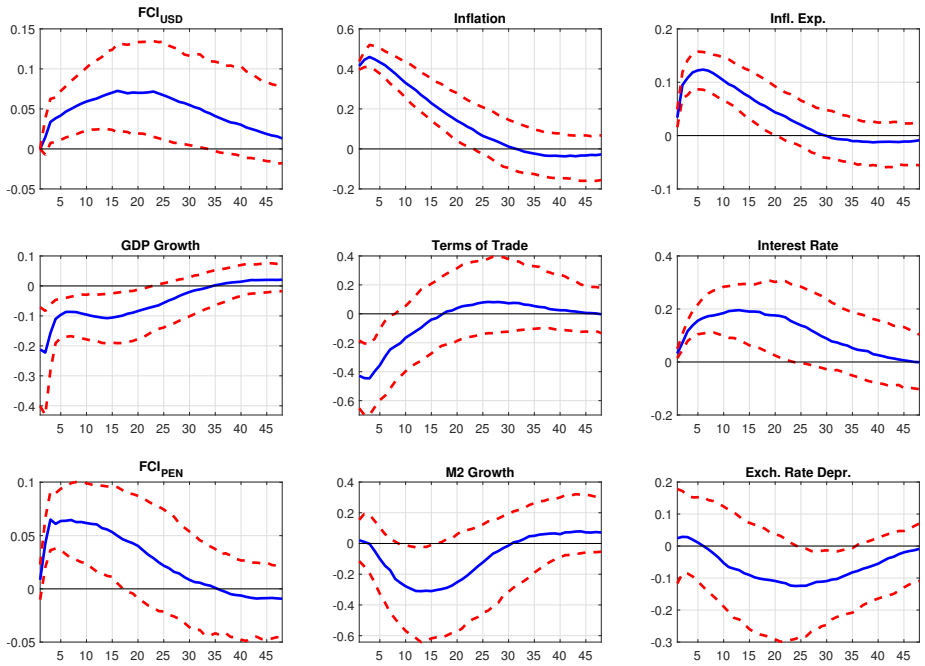

Figure 8: **Aggregate Supply Shock (median value and 68% C.I.)**

Aggregate demand shocks (see Figure 9) produce tighter financial conditions in both currencies, and a statistically significant effects in all the restricted variables. This can be explained since part of the demand impulse may be related with dollarized activities or industries.

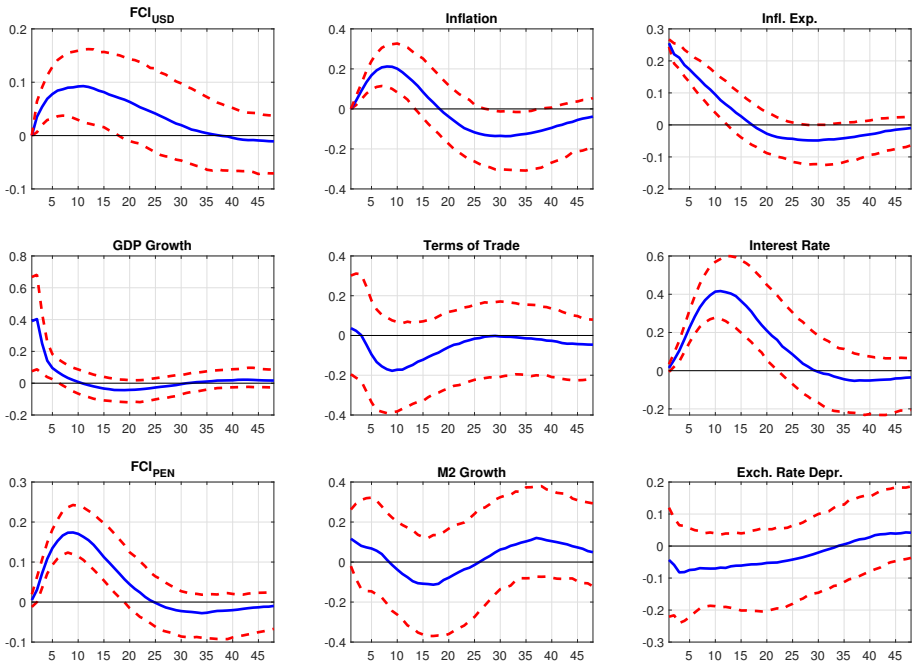

Figure 9: **Aggregate Demand Shock**

Money demand shocks (see Figure 10) produce tighter financial conditions in domestic currency, and a statistically significant effects in all the restricted variables, which reflects a pure demand for liquidity effect, which might also affect the exchange rate and the inflation expectations.

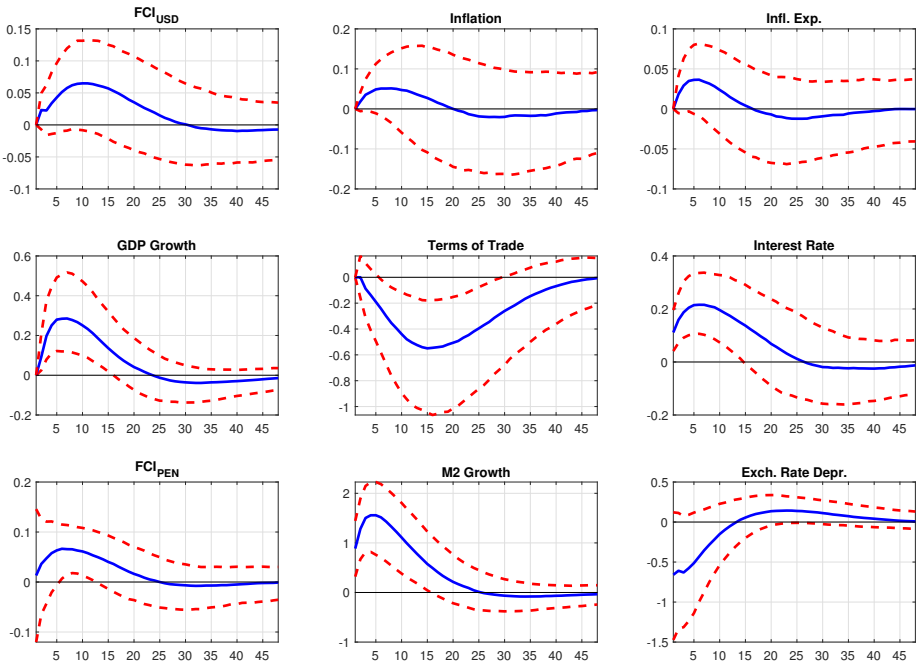

Figure 10: **Money Demand Shock**

3.4 Historical Decomposition

The estimated indexes respond to macroeconomic and financial shocks in a consistent manner, and the historical decomposition for the period 2005-2024 shows, in the case of financial conditions in soles (see Figure 11), that these are determined not only by monetary policy actions, but also by macroeconomic factors such as aggregate supply and demand, as well as by inflation expectations and the demand for liquidity in soles. In particular, the peak of 2008-09 associated with the Global Financial Crisis is explained by a surge in money demand and inflation expectations, and monetary policy actions partially compensated this effect. Moreover, the relative tightening in 2013-2015 (after the taper tantrum) is explained by exchange rate and inflation expectation shocks, where again monetary policy compensated these effects. After the outbreak of the Covid-19 pandemic there was a massive flexibilization of financial conditions due to monetary policy actions and also because of a fall in aggregate demand and inflation expectations. Then, starting in 2021 we observe the reversion of these effects, and at the end of the sample we register a relatively more neutral financial conditions.

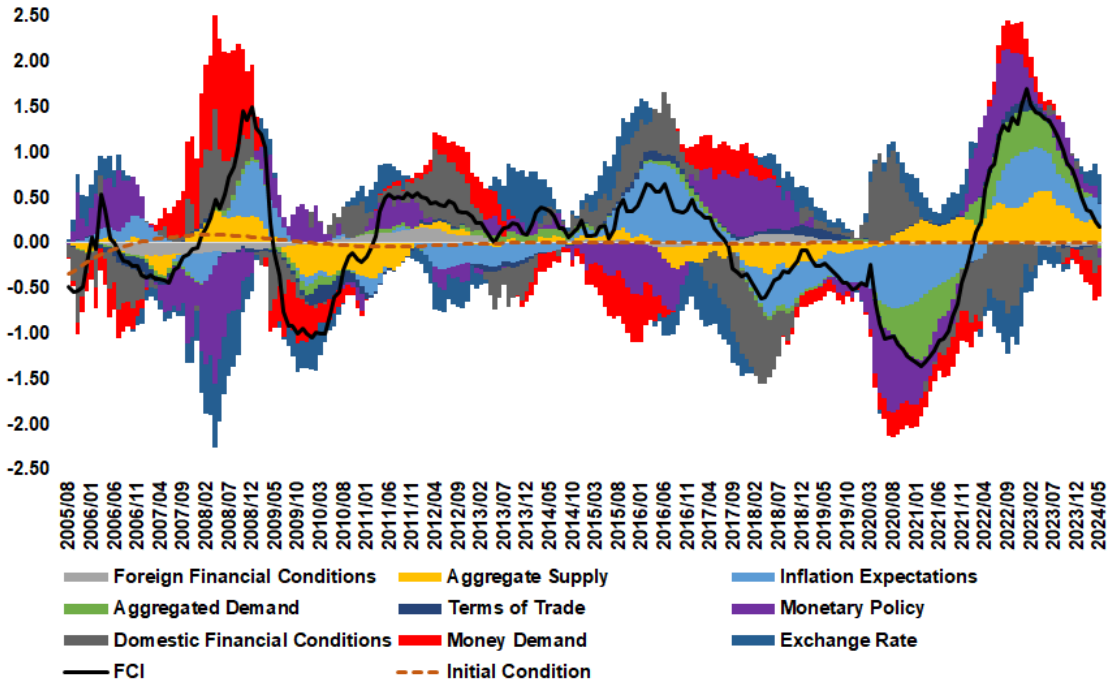

Figure 11: **Historical Decomposition of Financial Conditions Index in Domestic Currency (2005-2024)**

On the other hand, although financial conditions in foreign currency (see Figure 12) are also determined by aggregate supply and demand factors, in this case there is a significant contribution from exchange rate shocks, money demand shocks, and the exogenous idiosyncratic component of this index, which would reflect the global monetary policy stance. Likewise, domestic monetary policy does not contribute significantly to the evolution of these financial conditions in foreign currency. The main peak in 2008-09 was also explained by money demand shocks, as well as a persistent idiosyncratic shocks. Regarding the end of the sample, the tighter financial conditions in foreign currency are explained by persistent supply shocks and inflation expectations one. Finally, idiosyncratic shocks explain mainly associated with the Fed policy stance also explain a fraction of these financial conditions.

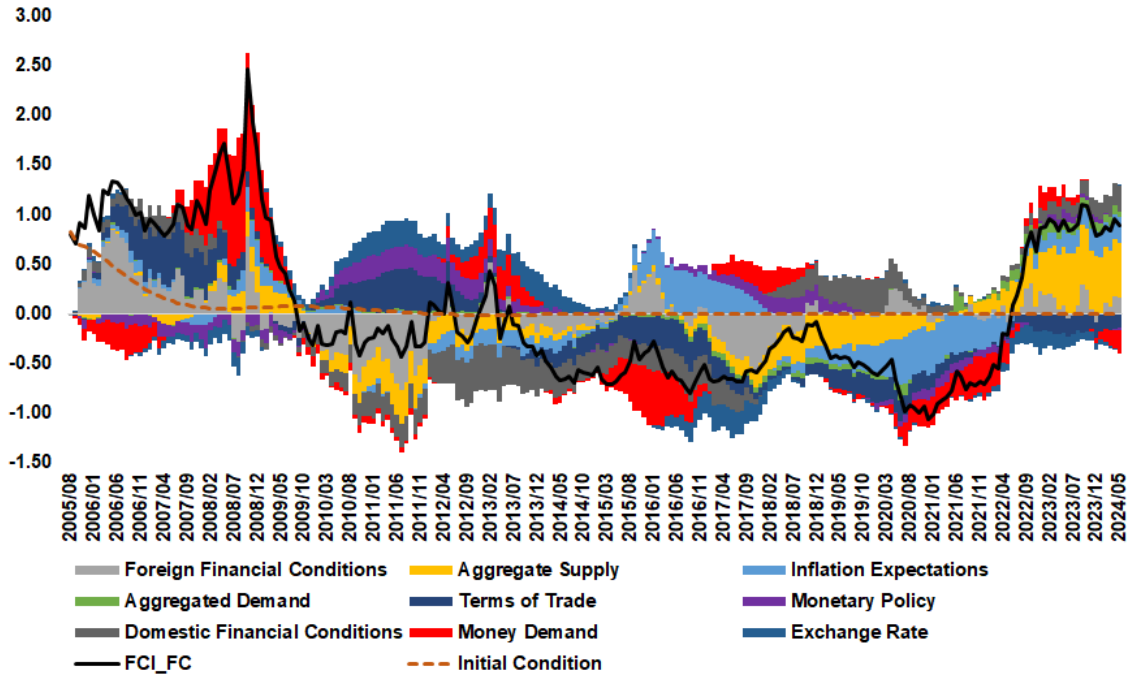

Figure 12: **Historical Decomposition of Financial Conditions Index in Foreign Currency (2005-2024)**

4 Concluding Remarks

In this paper we have estimated and presented new indicators for measuring financial conditions for the Peruvian economy (2005-2024). Since Peru is an economy with partial financial dollarization, we present two indicators: one for the case of local currency (soles or PEN) and an additional one for the case of the foreign currency (USD). In both cases, the indicators are obtained through the principal component analysis (PCA) methodology under an a priori selection of relevant variables. The evolution of both indicators reflects greater synchronization in periods of global crises, such as the GFC of 2008-09 or the Covid-19 pandemic. However, there is room differentiated financial conditions per currency, and this is a result of the strength of the Peruvian sol (PEN) acquired in recent years, especially after the adoption of the Inflation Targeting scheme and the implementation of an independent monetary policy, and also for the gradual reduction of financial dollarization.

The estimated indexes respond to macroeconomic and financial shocks in a consistent manner, and the historical decomposition shows that, in the case of financial conditions in soles, these are determined not only by monetary policy actions, but also by macroeconomic factors such as aggregate supply and demand, as well as by inflation expectations and the demand for liquidity in soles. On the other hand, although financial conditions in foreign currency are also determined by aggregate supply and demand factors, in this case there is a significant contribution from exchange rate shocks and the exogenous idiosyncratic component of this index, which would reflect the global monetary policy stance. Likewise, domestic monetary policy does not contribute significantly to the evolution of these financial conditions in foreign currency.

In short, the estimated indexes contain relevant information about the Peruvian financial system and the cost of funding in both currencies. Likewise, these indicators have the purpose of summarizing relevant information and serving as an additional signal that reflects current financial market conditions. In addition, these indicators are very easy to update since they are built using data that is almost immediately available. Finally, it is important to highlight that,

unlike a methodology such as the Kalman Filter, in the case of principal component analysis the results are not subject to significant revisions in their history as time progresses and more information is available. This makes the exercise preserve its narrative and be robust against future updates, something that may be of interest to other practitioners and interested readers.

A Additional Figures

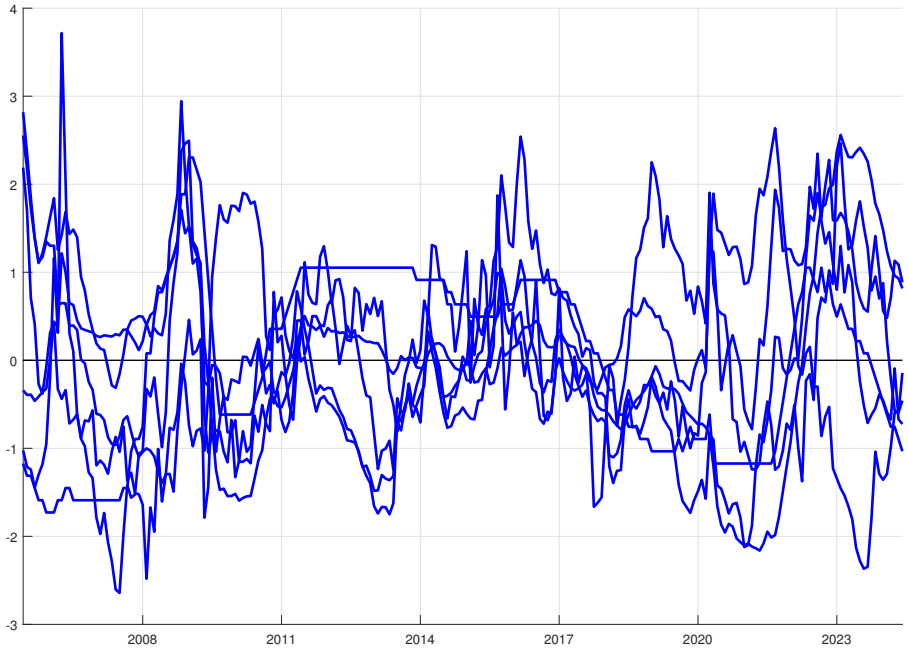

Figure A.13: Standardized Financial Conditions Data (PEN) (2005-2024)

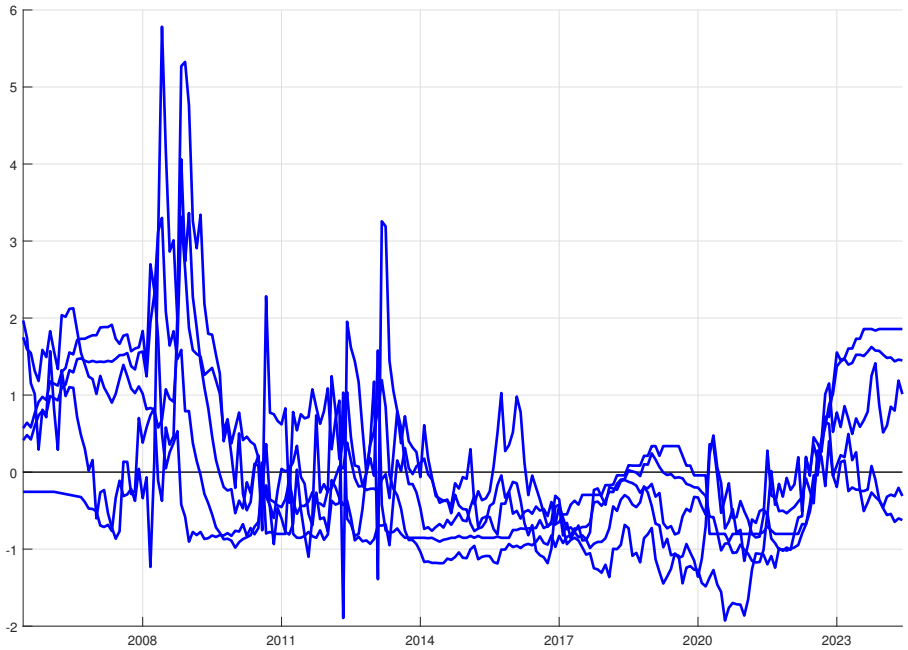

Figure A.14: Standardized Financial Conditions Data (USD) (2005-2024)

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