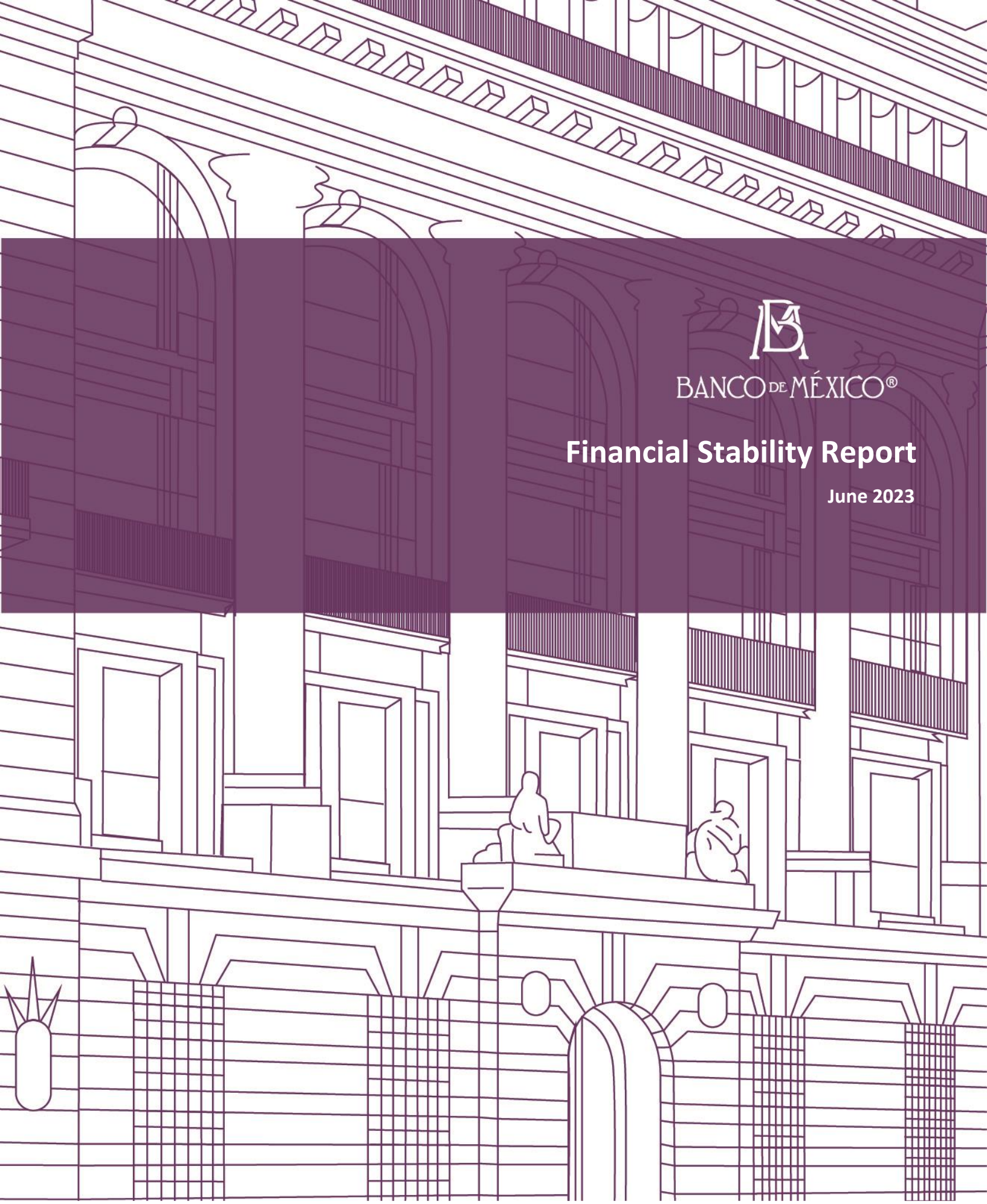


BANCO DE MÉXICO®

Financial Stability Report

June 2023

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NOTICE

This document is provided for the reader's convenience only. Discrepancies may possibly arise between the original document in Spanish and its translation to English. For this reason, the original and unabridged Financial Stability Report in Spanish remains the only official document.

Unless otherwise stated, this document has been prepared with information available as of the first quarter of 2023 for macroeconomic and financial institution variables, and as of June 12, 2023 for market information. Data is preliminary and subject to review.

Abbreviations and acronyms that correspond to names in Spanish (or any other language) and references to this *Report* have been written in italics, whereas those that correspond to names in English appear in round print. The meanings of all abbreviations and acronyms appear at the end of the document. The term "billion" represents 1,000,000,000, while "trillion" equals 1,000,000,000,000 (a thousand billion), as commonly used in English.

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Definition of financial stability and scope of the Financial Stability Report

In line with its purposes of promoting the sound development of the financial system and fostering the proper functioning of the payments system, Banco de México monitors the performance of the Mexican financial system and its participants, as well as the main risks and vulnerabilities that could affect its stability and, therefore, its proper functioning.

A stable financial system is one in which financial institutions, markets and their infrastructures facilitate the exchange of funds between savers, borrowers, and investors, with adequate risk management, thus contributing to the proper functioning of the economy and achieving sustainable economic growth. Financial stability also implies that the financial system is able to withstand shocks while also contributing to maintain an environment of macroeconomic stability and growth. An adequate functioning of the financial system also contributes to Banco de México's primary objective of ensuring price stability as it promotes a more efficient operation of monetary policy's transmission channels.

A stable financial system is a necessary but not sufficient condition for achieving a more balanced and sustainable growth, since, as international experience confirms, periods of financial instability have a very high cost for society. For this reason, it is necessary for financial authorities to remain vigilant of developments in the financial system and its interaction with economic activity, as well as its risks, in order to avoid the accumulation of vulnerabilities that could generate systemic problems or amplify or cause negative shocks in the economy. The analysis and monitoring carried out by Banco de México regarding the stability of the financial system is available to the public every six months through the Financial Stability Report. Identifying and monitoring risks that could affect the stability of the financial system, as well as their timely disclosure, are essential to mitigate them and, thereby, reduce vulnerabilities and enhance the resilience of the system.

Executive summary

The Mexican financial system, and particularly commercial banks, continue to be in a solid and resilient position despite the complex global environment during the first half of 2023, which has been characterized by greater uncertainty and volatile global financial markets. This environment was partly due to difficulties experienced by some banking sector institutions in developed countries, more persistent global inflationary pressures than expected and the response implemented by the main central banks, as well as continued tightening of overall financial conditions.

Although during the fourth quarter of 2022 economic activity in Mexico decelerated compared to the dynamism registered in the first three quarters of that year, the economy expanded during the first quarter of 2023. Whether economic growth will remain positive remains uncertain.

The International Monetary Fund's (IMF) global growth forecasts were revised marginally downwards for 2023 and 2024. These adjustments are related to the possible adoption of tighter monetary policies to combat inflation, a further tightening of financial conditions, a prolonged military conflict between Russia and Ukraine, and the potential risk of a fragmentation of global production chains. In this environment, they expect global inflation to continue to be above central banks' targets.

The monetary policy challenges around this could increase uncertainty and volatility in financial markets. Therefore, given the risk of prolonged inflationary pressures, a worsening of geopolitical tensions and tighter financial conditions, it will be important to monitor the evolution of the financial system.

Since our last report, international financial markets have been affected by the persistence of global inflationary pressures and the continuing tightening cycle of monetary policy in most countries, as well as by the period of financial stress caused by the problems in the US and European banks, and to a lesser extent by the budget debate regarding the United States government debt ceiling. However, it should be noted that, in recent weeks, markets have recovered and stabilized, due to reduced concerns about the materialization of a systemic event in the global banking sector.

The effects of financial market turmoil between March and May 2023 on emerging market economies have been limited so far. Stock market performance was characterized by positive returns and, since December 2022, the currencies of this group of countries have appreciated, with the Mexican peso standing out as one of the best performing currencies among emerging market currencies. This behavior is due, among other factors, to the prudent conduct of fiscal and monetary policies, the balance of external accounts, significant remittance flows, the interest rate spread compared to other economies, the lower volatility of the Mexican peso compared to that observed in other currencies and, overall, to a relatively more favorable macroeconomic position than that of other economies.

During the first three months of 2023, Mexican aggregate risk indicators, such as the Mexican Financial Markets Stress Index (IEMF, for its acronym in Spanish) and the domestic Financial Conditions Index (ICF, for its acronym in Spanish) increased slightly, due to volatility in global financial markets during that period. Nevertheless, uncertainty in the markets decreased and these indicators showed some improvement in recent weeks. On the other hand, the aggregate risk of the financial system, as shown in the heat map, decreased during the first quarter of 2023 with respect to that observed in the previous *Report*. Uncertainty persists regarding the future evolution of financial markets, and additional episodes that could lead to a new tightening in financial conditions cannot be ruled out. In this situation, capital flows to emerging market economies, including Mexico, could be affected, and financing costs for firms and households could increase.

Certain vulnerabilities and risks for the domestic financial system have increased at the margin. In terms of policy, during the first five months of 2023, mixed results have been observed in the level of the Mexican Economic Policy Uncertainty Index (EPU), which shows an increase from the lowest levels observed during the first quarter of 2023.

Credit dynamics have remained moderate. The financing gap, has worsened, registering eight consecutive quarters of negative values. In particular, during the first quarter of 2023, total financing to the non-financial sector of the economy, in real annual terms, remained at low levels and similar to those observed in 2015. Specifically, financing to the non-financial private sector, continued to contract, although at a slower pace than in the previous six months.

Meanwhile, financing for household consumption increased significantly compared to the end of 2022, while household leverage remained at similar levels. During the period covered by this *Report*, consumer credit granted by commercial banks and their subsidiary sofomes registered positive annual growth rates in all segments, with the highest growth in credit cards. Meanwhile, total mortgage loans grew marginally in real annual terms, which contrasts with the decline observed in the previous *Report*.

Finally, total financing to non-financial private firms in Mexico continues decreasing in real terms, although the rate of contraction is slower than that observed in the previous *Report*. In particular, external financing from outside of Mexico to this sector once again contracted in the second quarter of 2023 versus the same quarter in 2022, which means that it has been decreasing for ten consecutive quarters. It is worth noting that few firms will have external debt obligations maturing during the he next two years. Meanwhile, domestic financing grew compared to the same period last year, mainly due to the increase in the portfolio of large companies, although in recent months the portfolio of smaller companies has also grown.

Regarding the public sector's financial position, at the end of 2022, the budget deficit registered a lower deficit than estimated in the 2022 Economic Package. Both revenues and budgetary expenditure were higher than programmed. As for state-owned enterprises, at the end of March 2023, Pemex registered a quarterly profit lower than that observed in the last quarter of 2022. Meanwhile, the Federal Electricity Commission (CFE, for its acronym in Spanish), at the end of March 2023, registered a profit three times higher than that observed in the same quarter of the previous year. This is explained by higher revenues due to higher electricity demand, lower operating costs, and an increase in foreign exchange gains derived from the appreciation of the Mexican peso against the US dollar.

With respect to capital flows, during the last quarter of 2022, capital outflows were more than offset by capital inflows in the first quarter of this year. Mexico has maintained solid macro financial fundamentals and continuing to do this will contribute to preserving investors' confidence and minimizing the effects of a possible decline in the supply of external financing.

With respect to the banking sector, commercial banks registered an expansion in their credit portfolios and increase in securities' transactions since the previous *Report*. However, the value of commercial banks' loan portfolios continues to be lower than the amount raised from their funding sources. The recovery of the credit portfolio, as well as the increase in funding costs, was reflected, in aggregate, as an increase in commercial banks´ net interest margin, although with differences among institutions.

During the first quarter of 2023, commercial banks' liquidity, credit, contagion and market risks remained stable and limited. In particular, during the first quarter of 2023, both the capitalization and liquidity position of the Mexican banking system have remained, overall, far above regulatory minimums. Similarly, it should be noted that, despite the increase in uncertainty during March, due to the events in the US and European banking systems, no increase in risk contagion was observed. Thus, the banking sector has continued to contribute to the overall financial system's resilience and sound position. Nevertheless, it will be important to monitor the evolution of these banks' positions as conditions evolve.

Development banks and other development financial institutions remain financially sound, despite having a lower balance of financing and a higher constitution of preventive reserves. The favorable evolution of the main balance sheet and financial statement items stands out; in particular, these banks maintained positive net profits and an adequate capitalization position during the period covered by this Report.

The other non-bank financial intermediaries' sector (OIFNB, for its acronym in Spanish) continues to face challenges, particularly related to tighter financial conditions. This tightening has affected both the cost and access to new financing for these entities. In particular, the situation in the non-regulated sector poses complex challenges, including the refinancing of their debt in a context of greater risk aversion among investors due to the default of some entities in the sector with international bond liabilities in the past few years. This sector's assets represent a small fraction of the financial system and these entities have a low level of interconnection with the country's banks and other financial intermediaries. Hence, they do not constitute a systemic risk at this time.

This *Report* analyzes the following macro-financial risks to financial stability: i) a greater and longer lasting tightening of financial conditions; ii) lower-than-

expected global economic growth, with a downward trend; iii) the occurrence of a systemic event that affects the global financial system; iv) a weakening of aggregate demand; and v) adjustments of credit ratings for both Mexican sovereign debt and Pemex.

Stress tests were also conducted to evaluate the resilience and loss absorption capacity of Mexican banking institutions under extreme adverse, but possible, scenarios. As part of the stress tests conducted in this Report, four sets of macroeconomic scenarios consistent with the macrofinancial risks presented in this document are considered, as well as four sets of historical scenarios qualitatively similar to crisis episodes that the Mexican economy has faced. The results suggest that Mexico's banking system has sufficient capital levels to face simulated adverse scenarios. Nevertheless, some banks, representing a low percentage of total assets in the system, would conclude the stress horizon with more limited capital levels. Similarly, concentration risk would generate additional pressures on the system's capitalization level. With respect to the leverage ratio of the system, at the aggregated level, these would remain above regulatory minimums.

In addition to the risks analyzed in the stress tests, there are others related to financial institutions' operations, such as business continuity risk. In recent years, in general, this risk has been closely monitored by supervisors of the financial system and particularly, by Banco de México. The financial market and payment systems infrastructures that Banco de México manages and operates have maintained high levels of operability, with no incidents reported in either their technological infrastructure or in their operating processes. Meanwhile, cyber-risks remain among the major risks for the global financial system. Thus, financial entities and authorities have adopted different measures to monitor cybersecurity risks and threats, in Mexico and globally. This *Report* includes the monitoring of the Cyberattack Risk Index in Mexico and the Cyberattack Risk Perception Index for the Financial Sector.

In addition to these risks, Banco de México has been actively working on making Mexico's financial system participants include climate-related risks in their risk management practices. Economic and financial effects associated with climate change, as well as risks associated with the transition to a lower-carbon economy, may lead to substantial future losses for financial institutions and could represent a risk for the financial system in general. Banco de México is also continually improving and developing tools and conducting analysis related to climate change.

Finally, Banco de México will monitor the evolution of Mexican financial markets and will continue to take actions, if necessary, in compliance with the legal framework and in coordination with other financial authorities, to preserve the stability of the financial system and the proper functioning of the payment systems.

I. Introduction

The Mexican financial system faced a context of greater uncertainty and a highly volatile environment in global financial markets. This can be explained, in part, by the difficulties experienced by some institutions in the banking sector of developed countries, the discussions surrounding the US government debt ceiling, and the fact that financial conditions continued tightening due to the increase in reference rates of the main central banks in response to global inflationary pressures, which were more persistent than expected. In addition, concerns prevail that the recovery process of the world economy will be delayed by a greater than anticipated slowdown.

Between March and May 2023, events took place in the US and European banking systems that significantly increased risks to the stability of the global financial system. However, the authorities of the jurisdictions directly involved acted rapidly and decisively to strengthen public confidence and the reasonably orderly functioning of their respective markets and banking systems, which mitigated the negative effects on other financial systems and, in general, on financial conditions, which showed a relaxation.

Although it is still too early to know the regulatory implications that this stress episode may have on the global banking system, some of the main lessons learned have already been identified. Among them, institutions must maintain an adequate management of traditional financial risks, mainly liquidity and interest rate risks. Institutions must also be subject to regulation that limits their risks and allows them to identify their vulnerabilities in a timely manner. Finally, institutions must also have supervisory practices that can be adjusted with agility as intermediaries increase their size, complexity and, in general, their systemic impact.

Although the global financial system has remained resilient under these episodes, risk aversion has increased, which could have an impact on the cost of financing the economy and could lead to a recomposition of portfolios towards lower-risk assets. Similarly, vulnerabilities in some financial institutions could manifest themselves again as a result of tighter financial conditions. Among them, a deterioration in banks' balance sheets in the face of higher funding costs and tighter credit conditions. Also, in view of greater uncertainty in economic growth, some institutions could face a deterioration in their loan portfolios.

Domestically, the direct exposure of Mexican banks to foreign banks that presented difficulties is limited and there are no exposures that imply impairments to their balance sheets. Furthermore, the banking system has capital and liquidity levels that comfortably exceed regulatory minimums and would allow absorbing shocks to the system in the aggregate.

During the fourth quarter of 2022, economic activity in Mexico exhibited a slowdown with respect to the dynamism observed in the first three quarters of the year, but continued its gradual recovery process in its annual comparison so that it would have already been at levels similar to those of the fourth quarter of 2019, prior to the health emergency. Subsequently, economic activity expanded again at a dynamic rate during the first quarter of 2023, similar to those recorded between the last quarter of 2021 and the third quarter of 2022. The outlook going forward, however, remains uncertain.

In general, commercial banks have a favorable condition and performance. Some non-bank financial intermediaries have faced difficulties associated with the higher cost and lower availability of their funding sources. Although it is possible that these difficulties could continue, this sector has a small share and is relatively poorly interconnected with the financial system as a whole, and thus this situation does not represent a potentially systemic risk.

Going forward, there are still some challenges for the financial system. On the one hand, uncertainty and volatility in financial markets could increase, and on the other hand, there is a risk of prolonged inflationary pressures, a worsening of geopolitical tensions, and a further tightening of financial conditions, in a context where monetary conditions are expected to remain tight for a prolonged period, with possible implications for both international and domestic financial markets, as well as for the growth of the global economy.

Notwithstanding the above, and considering the context, Banco de México will continue to take the actions required by its powers, in strict compliance with the legal framework and in coordination with other financial authorities, to promote the orderly functioning of markets, the stability and healthy development of the financial system, as well as the proper functioning of the payments system.

II. Macrofinancial conditions

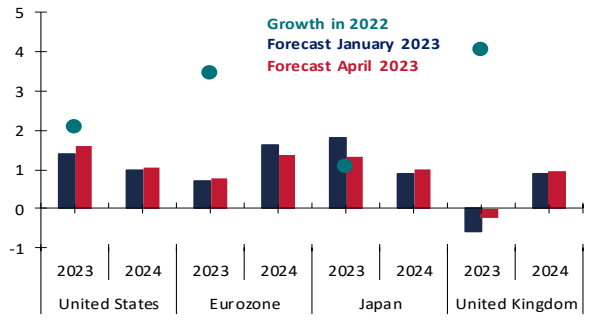
II.1. International economic environment

Global economic activity moderated its growth in the fourth quarter of 2022 and showed some recovery in the first quarter of 2023, although with heterogeneity across countries and sectors. This was due to lower energy price pressures, fewer distortions in global

supply chains, as well as reduced mobility restrictions in China. This performance took place despite the turbulence in international financial markets caused by the problems faced by some banks in Europe and the United States in March.

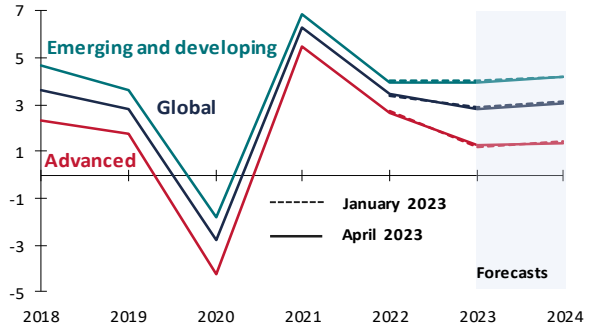
The growth forecasts for the global economy by the International Monetary Fund (IMF) were marginally revised downward for 2023 and 2024 (Graph 1 and Graph 2). These adjustments are related to the possible adoption of tighter monetary policies to fight inflation, greater tightening of financial conditions, the prolongation of the armed conflict between Russia and Ukraine, and the potential risk of a fragmentation in global production chains.

Graph 1
Growth in 2022 and forecasts for 2023 and 2024
Annual variation in percent



Data as of April 2023.
Source: IMF, World Economic Perspectives January and April 2023.

Graph 2
GDP growth forecasts
Annual percentual change



Data as of April 2023.
Source: IMF, World Economic Outlook, January and April 2023.

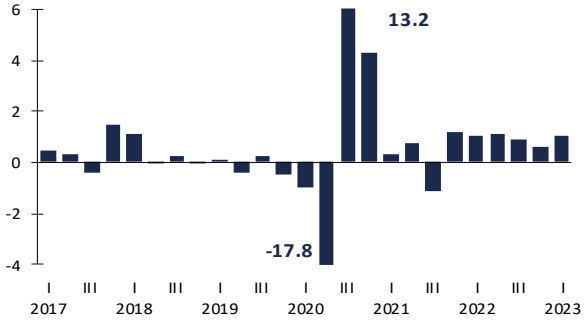
Headline inflation began to decline in most advanced and emerging economies in the fourth quarter of 2022 and first quarter of 2023, highlighting lower energy and food price pressures. Nonetheless, headline inflation remained at elevated levels and above their central banks' targets. The core component of inflation has shown a greater resistance to decline.

During the period covered by this *Report*, the US Federal Reserve increased the target range for the federal funds rate by 50 basis points at its December 2022 meeting and by 25 basis points at its January, March and May 2023 meetings. In its latest monetary policy statement, the Federal Reserve kept its projections for the reference rate virtually unchanged compared to those of December.

II.2. National economic environment

In the fourth quarter of 2022, economic activity slowed down, registering a seasonally adjusted quarterly growth of 0.5%, due to a lower dynamism of secondary activities and, to a greater extent, of tertiary activities. In the first quarter of this year, GDP registered a quarterly increase of 1%, with tertiary activities exhibiting a reactivation and secondary activities recording slightly higher growth (Graph 3).

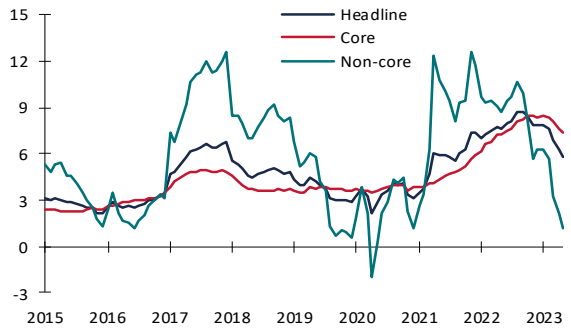
Graph 3
Gross Domestic Product[a.e./]
Quarterly variation in percent



Data as of first quarter of 2023.
Source: INEGI.
a.e./ Seasonally-adjusted figures.

Annual headline inflation averaged 8.01% in the fourth quarter of 2022 and decreased to 7.46% in the first quarter of 2023, due to lower non-core inflation and, to a lesser extent, to lower core inflation. In the first half of May, headline inflation stood at 5.84% (Graph 4).

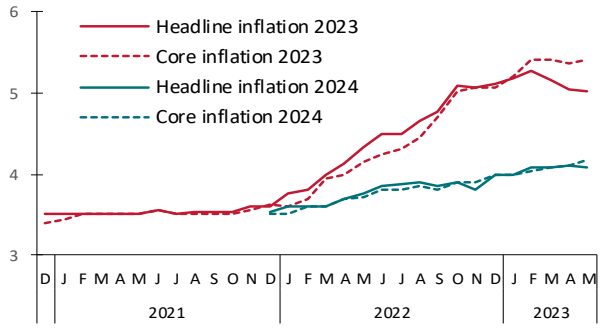
Graph 4
National consumer price index
Annual variation in percent



Data as of May 2022.
Source: INEGI.

Banco de México's headline inflation projections, as published in the Monetary Policy Statement of May 18, 2023, stood at 4.7% and 3.1% for the end of 2023 and 2024, respectively. The medians of headline inflation expectations in the Survey of Private Sector Economic Specialists' Expectations of May stood at 5.02% and 4.07% for the end of 2023 and 2024 (Graph 5).

Graph 5
Inflation expectations[1/]
Percent



Data as of May 2022.
Source: Banco de Mexico, Survey of Private Sector Economic Specialists' Expectations.
1/ Median of annual inflation expectations.

During the period covered by this *Report*, Banco de México's Governing Board increased the reference rate from 10.00% to 11.25%. This adjustment follows increases of 50 basis points at its December 2022 and February 2023 meetings and one of 25 basis points in March. At its May meeting, the Board decided to maintain the target for the Overnight Interbank Interest Rate at 11.25%. The Governing Board considered the challenges posed by the tightening of global financial conditions, the uncertain environment, the persistence of accumulated inflationary pressures, the possibility of greater effects on inflation, as well as the monetary policy stance achieved in the current upward cycle. It reiterated that, going forward, it will closely monitor inflationary pressures and the factors that influence the expected trajectory of inflation and its expectations, in order to determine a reference rate consistent with convergence to the inflation target.

II.3. Financial markets

The behavior of financial markets during the period covered by this *Report* was determined by two factors. First, the persistence of inflationary pressures at a global level, together with the continuation of the restrictive monetary policy cycle in most countries; and, second, the period of financial stress caused by the problems in US and European banks. In the last few weeks, the discussions on the government debt ceiling in the United States represented an additional factor of uncertainty that temporarily affected the behavior of markets. However, it should be noted that, in recent weeks, markets have stabilized and recovered to a certain extent, as well as volatility levels have decreased due to less concern about the materialization of a systemic risk in the global banking sector.

In terms of inflation, during this period there has been a notable divergence between headline inflation, which has begun to decline but remains above central bank targets, and core inflation, which has shown greater persistence. This inflationary dynamic, present in both developed and emerging countries, has led to expectations of a more restrictive monetary policy stance for a longer period.

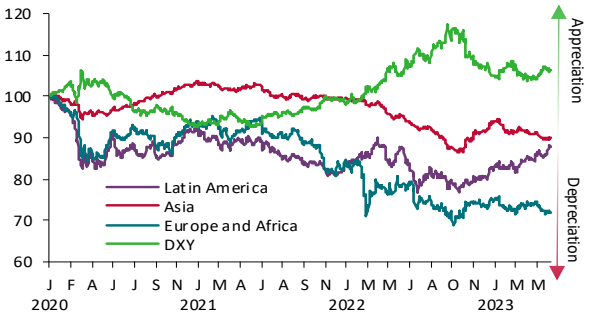
On the other hand, the collapse of *Silicon Valley Bank* in the United States at the beginning of March caused a marked global risk aversion sentiment, which was accentuated by the uncertainty surrounding the viability of *Credit Suisse*. The closure of other regional banks in the United States heightened fears of a systemic banking crisis. However, the measures implemented by different authorities were timely and contained a possible contagion to other entities in the financial sector. However, a certain degree of uncertainty still persists regarding the soundness of certain banks in developed countries, in a context of high interest rates.

In this environment, global financial markets have shown greater volatility and uncertainty, where interest rate movements continue to be driven mainly by monetary policy expectations in different countries, stock indexes have adjusted upwards, while the dollar has depreciated.

The context described above has had a significant effect on the financial markets of emerging countries. Since December 2022, the currencies of this group of

countries have shown a positive performance (Graph 6), with the Mexican peso standing out as one of the best performing currencies.

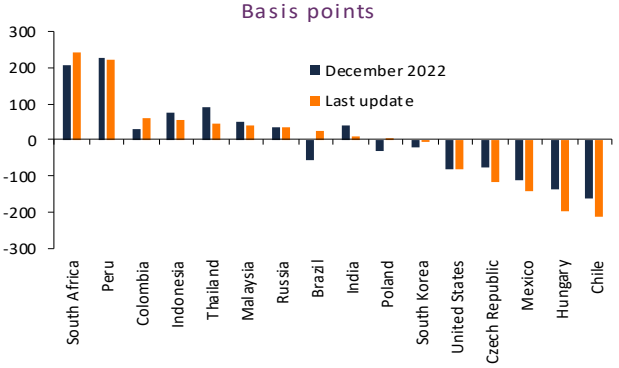
Graph 6
Foreign exchange indexes performance 1/2/
Index (January 2020 = 100)



Data as of June 2023.
Source: Banco de México with data from Bloomberg.
1/ Latin America incluides Peru, Brazil, Colombia, Chile and Mexico. Asia includes Philippines, South Korea, China, Malaysia and India. Europe and Africa includes a Poland, Hungary, Russia, Czech Republic and South Africa.
2/ DXY refers to the US Dollar Index calculated by the Intercontinental Exchange (ICE) as a weighted average of the nominal exchange rates of six currencies: Euro, Japanese Yen, British Pound, Canadian Dollar, Swedish Krona and Swiss Franc.

In the fixed income market, yield curves have continued trending upwards, with more pronounced increases in the short end of the yield curves, which respond to the expectation that monetary policy will remain in restrictive territory for a longer period than anticipated. Thus, in some economies, yield curves showed a flattening dynamic, while in others, the inversion was exacerbated (Graph 7).

Graph 7
Spread between the 10-years and 2-years yields for selected emerging economies
Basis points



Data as of June 2023.
Source: Banco de México with data from Bloomberg.

Finally, the performance of the stock markets was characterized by movements with a positive bias (Graph 8), accompanied by several episodes of volatility, derived in part from fears of an economic recession in some developed countries, which could also have an impact on emerging economies.

Graph 8
Performance of equity indexes
Index (January 2020 = 100)

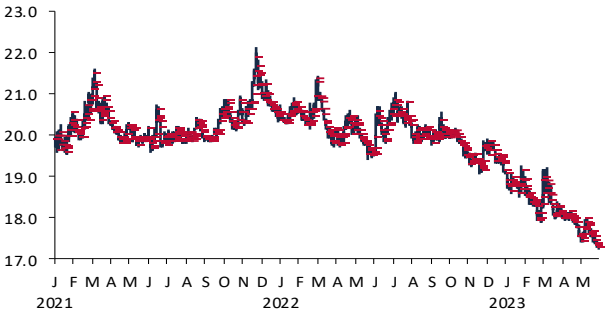


Figures as of June 2023.
Source: Banco de México with data from Bloomberg.

II.3.1. Foreign exchange market

The Mexican peso has appreciated significantly since December 2022; this has been associated with factors such as: the prudent conduct of fiscal and monetary policies, balanced external accounts, significant remittance flows, the interest rate differential versus other economies, the lower volatility of the peso compared to that observed in other currencies and, in general, a relatively more favorable macroeconomic position than that of other economies. In particular, the greater development of the Mexican foreign exchange market, reflected in greater liquidity and depth with respect to emerging market peers, allows movements of the Mexican peso to be limited even with a high trading volume, thus generating trading conditions associated with lower realized and implied volatility, as well as an implied distribution with less heavy tails. However, the Mexican peso continues to show a high sensitivity to the global environment, so its performance has not been exempted from brief episodes of volatility. In this context, the Mexican peso traded in a range between 17.28 and 19.86 pesos per dollar during the period covered by this *Report* (Graph 9). Going forward, the Mexican peso's performance could be affected by new episodes of risk aversion, generated by factors such as a possible recession in the US economy, as well as the resurgence of problems in the banking or non-bank financial intermediary sectors at a global level.

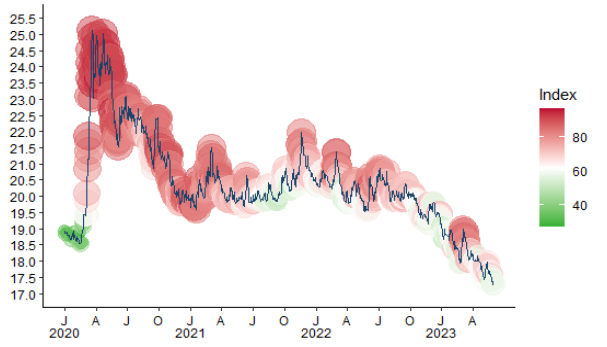
Graph 9
Mexican peso daily trading range 1/
Foreign exchange mexican peso-US dollar



Data as of June 2023.
Source: Bloomberg.
1/ The red lines indicate the closing exchange rate, while the blue bars indicate the trading range.

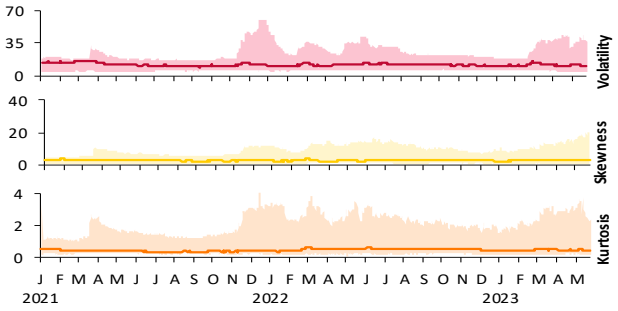
The foreign exchange market showed good conditions of liquidity, depth and agile transactionality (Graph 10). Prospective trading conditions also showed an improvement (Graph 11), highlighting in particular the decrease in volatility in all maturities, a factor that has contributed positively to risk-adjusted carry strategies.

Graph 10
Mexican peso trading conditions index 1/
Mexican pesos per US dollar; Index



Data as of June 2023.
Source: Calculations by Banco de México with data from Bloomberg and Refinitiv.
1/ The index is computed as the average of the percentiles of 1-month implicit volatility and skewness, volume and observed spreads. Percentiles are computed since 2018. Red (green) circles mean a greater (lesser) deterioration of the trading conditions in the FX market.

Graph 11
3-month implicit trading conditions on FX options for Mexico and selected emerging economies 1/
Percent

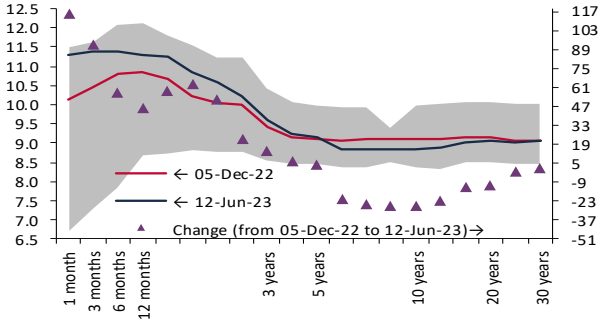


Data as of June 2023.
Source: Bloomberg.
1/ The emerging countries included in the shaded area (range between the maximum and minimum values) are Brazil, Chile, Colombia, the Philippines, Hungary, India, Indonesia, Malaysia, Poland, South Africa, and Turkey. The solid line represents the value of Mexico. The implicit skewness is measured through risk reversal strategies at 25 deltas. Kurtosis is measured with Butterfly strategies at 25 deltas.

II.3.2. Fixed income market

As of December 5, 2022, the M Bond yield curve has shown differentiated movements by term, with significant increases in the short part of the government securities yield curve, and decreases in the medium and long part (Graph 12). Thus, the yield curve continues to be inverted, and during the period, the spread between the 30- and 3-year terms reached a historical (negative) level close to -200 basis points. This behavior could be explained by the expectation that Banco de México's reference rate will remain at high levels and restrictive terrain for a prolonged period, as well as by the exit of foreign investors in short-term M bonds.

Graph 12
M Bonds' yield curve 1/
Left axis: Percent
Right axis: Basis points

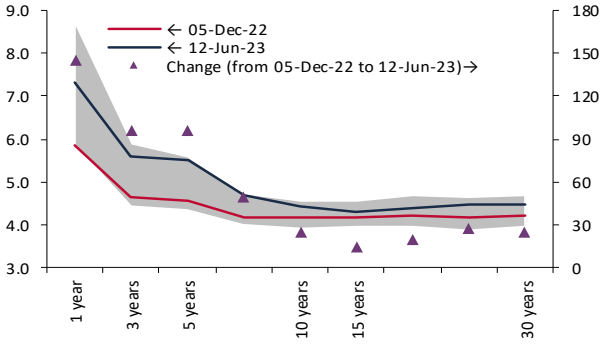


Data as of June 2023.
Source: Banco de México with data from PIP.
1/ The grey area is the yield curve range since December 5, 2022.

The real rate instruments curve showed increases in all maturities, and of greater magnitude than nominal rate

instruments (Graph 13). Thus, compensation for inflation and inflationary risk has decreased during the period, especially in the medium and long terms.

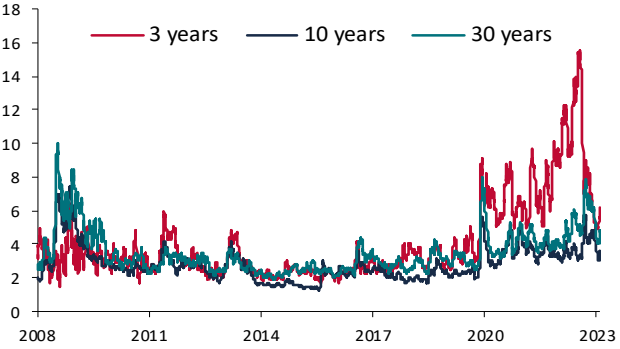
Graph 13
Udibonos yield curve[1/]
Left axis: Percent
Right axis: Basis points



Data as of June 2023.
Source: Banco de México with data from PIP.
1/ The grey area is the yield curve range since December 5th, 2022.

The movements in the government securities yield curve occurred in a context in which the operating conditions of this market slightly deteriorated. The bid-ask spread for the medium- and long-term sector increased, while the short term showed a significant correction (Graph 14). Although trading volume has recovered, liquidity conditions have decreased as a result of the episode of risk aversion due to concerns about systemic contagion in the banking sector during March.

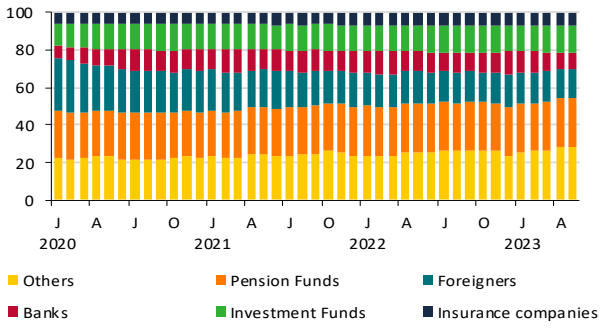
Graph 14
M Bonds' bid-ask spread for selected maturities
Basis points (10-days moving average)



Data as of June 2023.
Source: Banco de México.

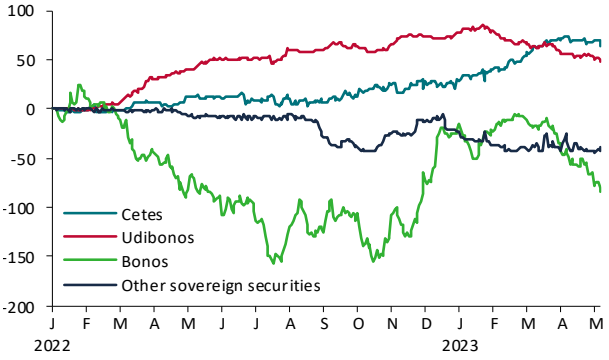
External sector flows to peso-denominated assets recorded significant inflows during December 2022 and have shown marginal changes with no definite direction in recent months (Graph 15). In particular, at the end of 2022 foreign investors increased their positions in medium- and long-term M Bonds, while during the first half of 2023, they have gained interest in building positions in *Cetes*, given the high level of short-term rates in Mexico (Graph 16).

Graph 15
Mexican sovereign debt holdings by sector, as a percentage of the total amount outstanding [1/]
Percentage



Data as of June 2023.
Source: Calculations by Banco de México with data from Indeval.
1/ Securities considered are Cetes, M Bonds, Inflation-linked bonds, and Bondes. The sector "Others" include securities purchased by Banco de México, repos with Banco de México, guarantees received by Banco de México, and other national residents.

Graph 16
Sovereign securities' investment flows by foreigners since 2022
Billion pesos



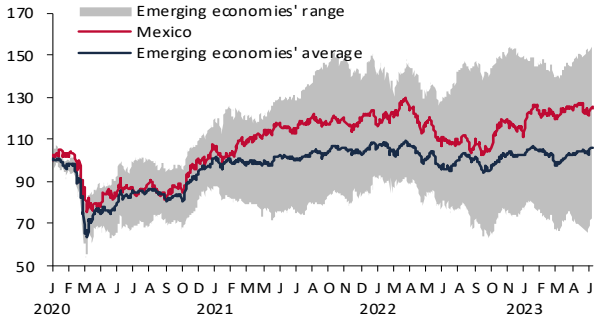
Figures as of June 2023.
Source: Banco de México with data from Indeval.

II.3.3. Equity market

Since the last publication of this *Report*, equity markets in Mexico have shown a positive movement (Graph 17). The Mexican Stock Exchange (BMV, for its acronym in Spanish) Price and Quotations Index (IPC, for its acronym in Spanish) has recovered in recent months, influenced by a more positive outlook for economic growth in Mexico during the year, as well as by the expectation of investment flows due to the relocation of production chains from other countries to Mexico

(nearshoring). The sectors with the most favorable performance have been materials and industrials, while telecommunication companies have shown a negative performance.

Graph 17
Equity indexes' cumulative performance for selected emerging economies 1/
Index (January 2020 = 100)



Figures as of June 2023.
Source: Banco de México with data from Bloomberg.
1/Emerging countries included are Brazil, Chile, Colombia, Philippines, Hungary, India, Indonesia, Malaysia, Poland, and South Africa.

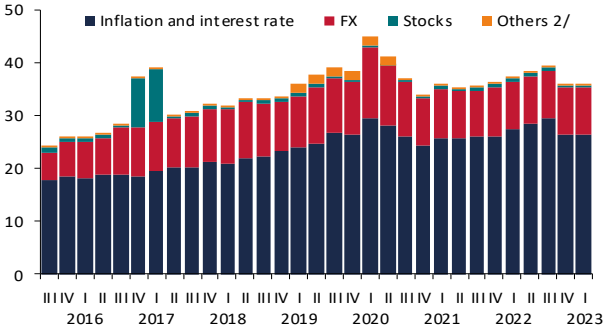
It is worth noting that the initial public offering (IPO) activity in Mexico remains low, and some companies continue being interested in deregistering from the Mexican Stock Exchange. However, the proposed reforms to the Securities Market Law and the Investment Funds Law could provide incentives for more companies in Mexico to access capital markets in a more agile manner.

Finally, regarding foreign investors positions in this market, during the first half of 2023, a negative accumulated flow was observed, focused on companies in certain sectors, such as the consumer sector.

II.3.4. Derivatives market

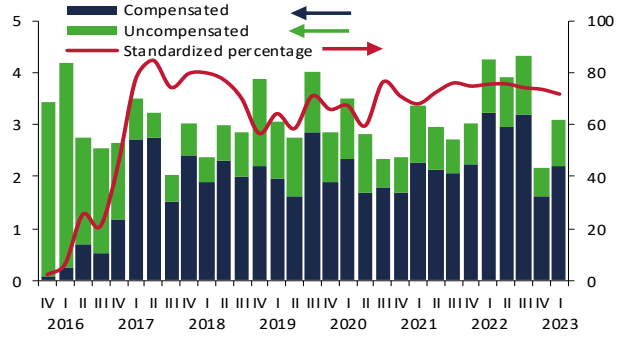
During the period of reference of this *Report*, the derivatives market in Mexico decreased 8.7% in the outstanding amount of its transactions at notional value (Graph 18). This reduction, observed in the last quarter of 2022 and which remained unchanged in the first quarter of 2023, is mainly explained by the lower amount of 28-day *TIIE* swap transactions. One element to consider in this drop is the uncertainty in the derivatives market due to agents' expectations regarding the duration of the monetary policy tightening cycle. The decrease observed in these operations contrasts with the growing trend that had been registered since September 2021. It is worth noting that the amount traded in standardized swaps linked to the 28-day *TIIE* decreased by 1.2 trillion pesos between September 2022 and March 2023 (Graph 19).

Graph 18
Outstanding notional amount by type of underlying 1/
Trillions of pesos



Data as of March 2023.
Fuente: Banco de México.
1/ As of the Financial Stability Report June 2021, Cross Currency Swaps (CCS) are clasificated as Foreign Exchange underlying asset.
2/ Includes debt, other derivatives and commodities.

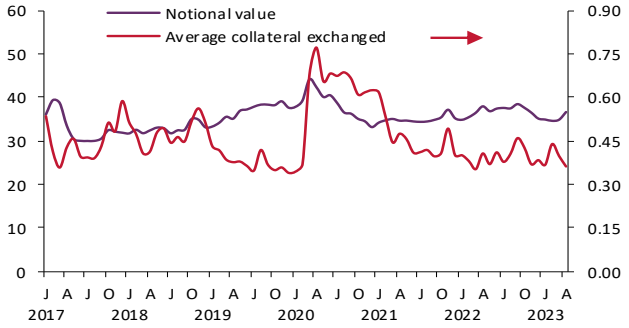
Graph 19
Turnover notional amount of standardized swaps
Left axis: Trillions of pesos
Right axis: Percentage



Data as of March 2023.
Source: Banco de México.

As a consequence of the decrease in outstanding derivative transactions at notional value, the average amount of collateral exchanged has trended downwards, such that at the end of April 2023 the decrease in collateral was 15.24% with respect to the last publication of this *Report* (Graph 20).

Graph 20
Portfolio notional value and ratio of the collateral to the outstanding notional amount
Left axis: Trillions of pesos
Right axis: Percentage



Data as of April 2023.
Source: Banco de México.

With respect to the assets used to guarantee derivative transactions, amendments to the Rules for Conducting Derivative Transactions were published in March 2023, in order to include in the national regulation, the best practices and international standards related to the determination of collateral requirements for initial and variation margins in this type of instruments (see Box 1).

Box 1: Margin Requirements in Mexico for Non-centrally Cleared Derivative Transactions [1]

I. Background

The 2008 Global Financial Crisis showed a significant accumulation of risks in the OTC derivatives market, in which the detection of this behavior was late due to the opacity of the market. In 2009, in order to reduce the risks associated with this market, the G20 agreed to implement various mechanisms, such as the clearing of standardized derivatives in central counterparties, and higher capital requirements for derivative transactions not cleared or settled in central counterparties. In 2011 it was also agreed to adopt bilateral margins for this type of transactions, i.e., the exchange of collateral between the participants in the transaction, in order to reduce the potential loss in the event of a counterparty default for those derivative transactions that are not centrally cleared. Thus, the purpose of incorporating margin requirements is to strengthen the resilience of financial intermediaries and the financial system in the aggregate, reduce the systemic risk that could be generated when the risks of these transactions are not adequately managed and promote centralized clearing.

In 2013, the Basel Committee on Banking Supervision (BCBS) and the Board of the International Organization of Securities Commissions (IOSCO) published an international standard regarding best practices in the implementation of Initial Margin (IM) and Variation Margin (VM) requirements. For IM, the international standard established a phased adoption, to take place between September 2016 and September 2022.[2]

It should be noted that, as of December 2022, several jurisdictions (Australia, Canada, the United States, the United Kingdom and Switzerland, to name a few) had a legislative framework in place that incorporates margin trading requirements, with more than 90% of obliged transactions complying with them, according to the "Progress Report on OTC Derivatives Market Reforms".[3]

Given the relevance of incorporating these margin requirements in derivative transactions, as well as the convenience of adopting international best practices, and the fact that the jurisdictions that make up the Basel Committee on Banking Supervision (BCBS), of which Mexico is a member, are committed to adopting the standards issued, in March 2023 Banco de México issued the corresponding regulation. This box describes the main elements of this regulation and presents some of the impacts it will have on the financial system and its stability.

What are margins in a derivative transaction?

The term Margins refers to MI and MV, which are applicable to derivative transactions that are not cleared and settled in clearing houses. Both are collateral exchanged between the counterparties to the transaction, with a specific purpose. In the case of the IF, the collateral is intended to protect the parties to the transaction, in the event of default by any of them, from potential losses resulting from future changes in the value of the transaction. On the other hand, the MV is the exchange of assets between the parties to the transaction, in order to guarantee the value of the derivative, thus reflecting the variation in their current exposure due to daily changes in the market price, so that the size of such exposure is limited.

II. Margin Requirement in Mexico for Non-centrally Cleared Derivative Transactions

On March 14, 2023, Banco de México, considering the BCBS-IOSCO international standard, amended *Circular* 4/2012, "Rules for the conduct of derivative transactions"[4] in order to incorporate the Margin requirement for derivative transactions that are not cleared and settled in clearing houses. This regulation determines the bilateral margin requirements for derivative transactions, which will reduce the accumulation of uncollateralized exposures and consequently strengthen the resilience of the Mexican financial system. It will also allow market participants to be consistent with the requirements already applicable to their foreign counterparties, thus avoiding regulatory arbitrage problems.

The margin requirement is specifically applicable to credit institutions, brokerage firms and the *Financiera Nacional de Desarrollo Agropecuario, Rural, Forestal y Pesquero* (FND), hereinafter referred to as entities, and to investment funds.[5] However, the margin requirement is exempted for transactions between the entities or investment funds and the following counterparties: the Federal Government, governments and central banks with certain ratings as issuers of long-term debt securities, certain international organizations and IPAB.[6]

Initial Margin Requirements

The new rule requires entities and investment funds to exchange IM on their non-centrally cleared OTC derivative transactions with certain counterparties, depending on the type of counterparty and its level of operation. Specifically, entities or investment funds must deliver and require IM to their counterparties on non-

[1] The comments herein seek to highlight the main elements of the aforementioned regulation. However, they should not be considered as a substitute for the regulation; therefore, at all times, the parties obliged to comply with it must observe the provisions of the corresponding circular.
[2] Margining of derivative transactions is the mechanism for covering the risk of default of a counterparty by absorbing losses through the collateral provided by the defaulting entity. For margin to be an effective risk mitigant it must: (i) be accessible when needed, and (ii) be constituted in such a way that it can be settled quickly and at a predictable price even under conditions of financial stress.
[3] OTC Derivatives Market Reforms: Implementation progress in 2022 - Financial Stability Board (fsb.org)
[4] Bank of Mexico Circular 2/2023, published on March 14, 2023, amending Circular 4/2012.
[5] Prior to the incorporation of the Margin requirement, Circular 4/2012 already contemplated that credit institutions, brokerage firms, investment funds, general deposit warehouses and sofomes, could guarantee their derivative transactions through cash deposits, credit rights in their favor or the securities in their portfolio; this practice is retained as an option for those counterparties not obliged, according to the rules, to exchange Margins.
[6] Specifically, provided that such organizations, as well as more than half of the governments or central banks that comprise them, have ratings granted by at least two securities rating agencies authorized by the CNBV, greater than or equal to the N4 rating level of the "Long-Term Global Scale Credit Ratings Table" of Circular 39/2020 of Banco de México.

centrally cleared OTC derivative transactions in the following cases:

1) The counterparty to the transaction is another entity or investment fund, regardless of the size of its position.
2) The counterparty is a foreign financial institution that has the obligation to exchange margins in accordance with its applicable regulations.
3) The counterparty is a foreign financial entity or a domestic or foreign non-financial entity, which presents an average notional amount in force for March, April and May of the previous year, higher than the threshold for the exchange of IM established in Annex 6 of *Circular* 4/2012, which is currently equivalent to 20 billion UDIS.

In this regard, it should be noted that the exchange of margins is not mandatory in derivative transactions arranged with siefores or sofomes. However, entities and investment funds may voluntarily agree to exchange IM with these counterparties, for which they must request the corresponding authorization from Banco de México.

The only non-centrally cleared derivative transactions exempt from the calculation of IM are foreign exchange *swaps*, only with respect to the settlement associated with the exchange of the notional and *forward* transactions on foreign exchange settled in kind.

Mexican regulation allows the calculation of IM through two methodologies: the standardized model or an internal model. The internal model used for this purpose must be authorized by Banco de México, and the methodology included must determine the potential future exposure of non-centrally cleared derivative transactions, considering a conditional value at risk (*CVaR*), with a one-tailed confidence level of 99 percent. [7]

In this regard, the estimate of the stressed model should consider historical information, for a minimum of 3 years and a maximum of 5 years, including a period of at least 9 months within the 24 months between 2008 and 2009, or another period that reflects stress conditions. It should also consider information for a rolling period between 1 and 3 years immediately prior to the time of measurement, and the sources of risk identified for each underlying.

Entities or investment funds that do not use an internal model for the calculation of IM amounts must use the standardized model defined in *Circular* 4/2012. Said model considers for its calculation the notional amount, factors per underlying and remaining term (defined in Annex 4 of *Circular* 4/2012) and the market value of derivative transactions.

Variation Margin Requirement

The MV exchange seeks to hedge the current exposure of derivative transactions to price movements in the market. In particular, the MV requirement contemplates the exchange of collateral of the counterparty that results in losses due to changes in the market value of the derivative contract. This is irrespective of the amount outstanding in derivative transactions subject to the requirement. It should be noted that the only exception to the MV requirement is *forwards* on foreign exchange that are settled in kind.

On the other hand, symmetrically to the treatment given to the exchange of IM, entities and investment funds may also agree with their counterparties to voluntarily exchange VM with any other financial entity upon agreement of the parties involved in the transaction, based on the rules applicable to Margins in *Circular* 4/2012.

Eligible Collateral and Treatment of Swapped Margins

The amendments incorporate the types of eligible collateral to cover margin requirements and the applicable margin requirements. Eligible assets include: cash deposits, securities. It should be noted that, for purposes of margin calls, the entities and investment funds must value the collateral by applying a discount, determined by the corresponding margin requirements. On the other hand, securities issued by the counterparty of the transaction or by an entity of the same consortium or business group are not eligible as collateral.

Regarding the treatment of exchanged Margins, the reuse of assets constituted as IM is strictly prohibited; neither is it allowed for MV, except in the case of cash deposits. This happens because with the exchange of IM an additional risk of loss is assumed on the collateral provided to the counterparty, and this risk may even eliminate the benefits of the collateral received, in the event that the counterparty uses the margin provided again in another future collateral.

The institutions authorized to manage and custody the assets received as collateral for the exchange of IM are: authorized clearing houses or foreign institutions acting as recognized central counterparties; other financial market infrastructures; a foreign financial institution; or the entities themselves. In addition, the rule requires separate accounts for the administration, custody and segregation of the IM exchanged.

In any case, both MI and MV must be subject to a legal regime and a collateral maintenance structure that allows access to the collateral received in case it is in the custody of a third party, and ensures that assets other than cash are transferable without any legal restrictions, except for the expenses applicable to the maintenance of custody accounts.

Settlement and Transfer of Margins

On the one hand, entities and investment funds must update the calculation of the IF amounts, based on an internal model or the standardized model, no later than one business day after: i) the conclusion of a new transaction; ii) the incorporation or elimination of a transaction to the set of clearing transactions;[8] iii) the early settlement of a transaction; iv) the modification of

[7] In the event that an internal model is used to calculate the IM, authorization must be requested from Banco de México. Requests for authorization may be submitted individually by each Entity or Investment Fund or as an association through the Association of Banks of Mexico, A.C., or the Mexican Association of Stock Market Institutions, A.C.

[8] The netting set refers to the set of non-centrally cleared OTC derivative transactions that are subject to the same master netting agreement.

the notional amount, term or underlying of a transaction; or v) that the calculation of IF has not been made in the previous ten business days.

On the other hand, such institutions shall exchange, bilaterally with each counterparty, the IF that is equal to the amount of the IF amount that exceeds the Initial Margin Threshold, the latter defined in Annex 6 of *Circular* 4/2012, which is equivalent to 125 million UDIS. In other words, the IF to be exchanged with a counterparty will be the result of the sum of the calculations of the IF amounts minus the 125 million UDIS.

Unlike the IF, in the case of MV there is no exchange threshold, i.e., MV will be equal to the amount of MV calculated on a daily basis. However, in order to reduce transfer costs, a minimum transfer amount is defined, from which each institution must start exchanging Margins with its respective counterparty.

According to the Margin requirement architecture, institutions must exchange Margins with each counterparty from the moment when the cumulative sum of the IM amounts and the calculated VM amounts exceeds the equivalent of the minimum transfer amount, defined as 1,250,000 UDIS.

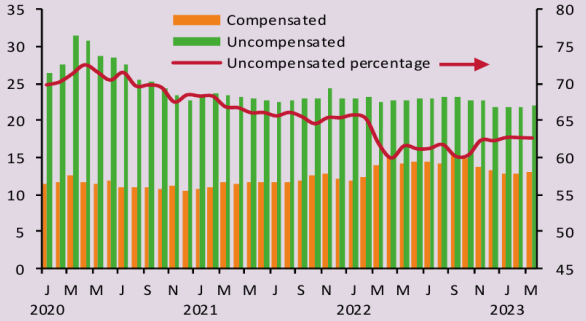
Substitute Compliance

In the amendment to the rule, the conditions under which entities and investment funds may determine margin requirements with their foreign counterparties were included, applying the legislation applicable to those counterparties instead of the Mexican rules. The above, with the prior authorization of Banco de México.[9]

III. Impact of the Margin requirement on the derivatives market in Mexico

As of March 2023, 60% of the outstanding notional amount of derivative transactions was not centrally cleared. Margin requirements will allow to cover part of the counterparty risk (Graph 1).

Graph 1
Outstandig notional amount
Right axis: OTC outstanding notional amount percentage
Left axis: Trillions of pesos



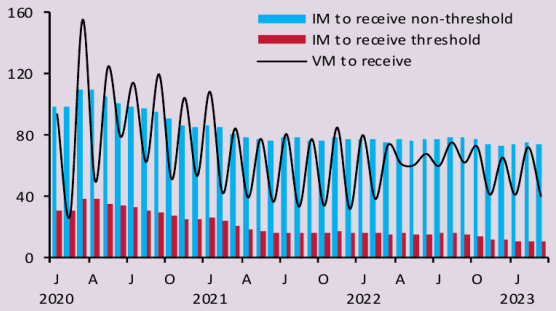
Data as of March 2023
Source: Banco de México

An exercise was performed to estimate the Margins assuming that the rule would have entered into force in January 2020, calculating the IF according to the standardized model. In general, the similarity between the amounts of IM to be received and delivered is observed. Meanwhile, the IF exchanged (i.e., the excess over the IF Threshold) shows a similar behavior to the IF amount, but at a lower level (Graph 2).

In general, when considering the total of IM and DC to be received, it is observed that, in most of the period analyzed, DC have a higher relative contribution than IM. The latter is possibly due to the fact that MV contemplates a greater number of derivative transactions than IF, given that MV is independent of the level of operations that institutions have with their counterparties (Graph 3).

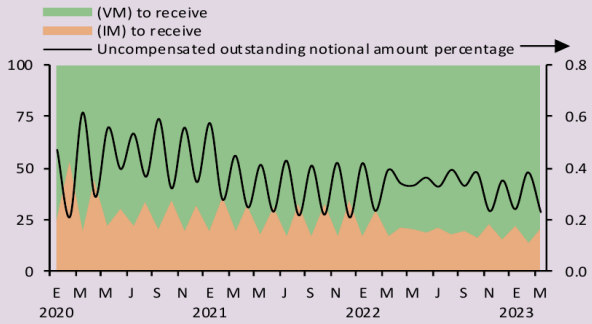
[9] The request for approval of the substitution of rules must include evidence, which allows evaluating that the guidelines applied in the foreign jurisdiction, regarding the Margin requirement, are of a public nature and are equivalent to those established in the Mexican regulation.

Graph 2
Initial Margin (IM) and Variation Margin (VM)
Billions of pesos



Data as of March 2023
Source: Banco de México

Graph 3
OTC derivatives operations margins centrally uncompensated
Percentage



Data as of March 2023
Source: Banco de México

Initial Margins Scheme Implementation Exercise

a) In order to evaluate the impact that IM requirements could have on the banking system, a simulation exercise was carried out considering a contagion scheme,[10] which propagates the default of an institution through the banking system, under two distributions of possible losses: one with the IM exchange assumption and the other without such assumption. On the other hand, the tail dependence was analyzed under a t-Student copula, between the loss distributions for the institution that would hypothetically initiate the contagion process and the banking system.[11]

A decrease was observed in the mean and dispersion of the exposures in the loss distribution of the banking system generated under the scheme, with respect to the distribution where this criterion is not implemented. On the other hand, a decrease in the dependence on tails was found under the implementation of an IM scheme with respect to a scenario without its consideration, under the same assumption of the beginning of the contagion process. This decrease, both in the dispersion of exposures and in the dependence on tails, reflects that the implementation of a Margin scheme allows a reduction in the risk of the impact on the banking system in the event of a default by a banking institution, as a consequence of its exposures in non-centrally cleared derivative transactions.

Final Considerations

The implementation of IF requirements at the international level has been carried out gradually and has implied a change in the way counterparty risk is managed in derivative transactions that are not centrally cleared and settled. These adjustments reduce counterparty risk and, at an aggregate level, the risk of contagion within the market in the event of a participant's compliance; therefore, their adoption will strengthen the resilience of the market and the stability of the financial system.

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[10] Swap transactions with standardized characteristics on the TIIE between banking institutions were considered; simulations were performed using the Vasicek model for the risk factors underlying these transactions.

[11] The right tail dependence λ_U used in this comparison, is defined, for two random variables X y Y with cumulative distribution functions F y G respectively, as follows: $\lambda_U = \lim_{t \to 1^-} P\{Y > G^{(-1)}(t) \mid X > F^{(-1)}(t)\}$.

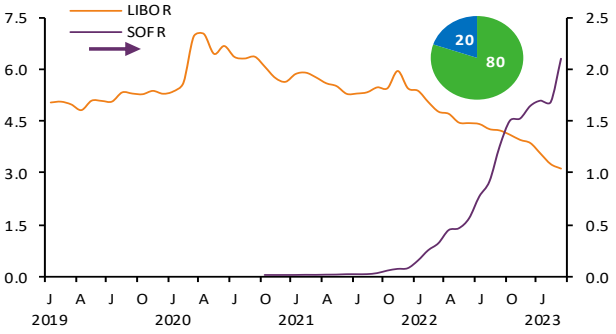
As part of the transition process to the new reference rates, the outstanding notional amount of Secured Overnight Financing Rate (SOFR) swaps increased by more than 65% during the reference period of this *Report*, while the amount corresponding to swaps on LIBOR decreased by around 20% (Graph 21). It is important to highlight that, at the end of March 2023, around one fifth of the total outstanding notional amount of IRS on LIBOR rates moved to SOFR. However, most of the outstanding transactions on LIBOR have a maturity date after June 30, 2023, date on which said reference rate would cease to be published and, therefore, it would not be possible to perform their valuation. Although significant progress has been made internationally in the transition process for existing contracts, this process is not yet complete. therefore, in order to avoid affecting the functioning of the market, the Financial Conduct Authority of the United Kingdom (FCA) announced in April 2023 that the deadline for publishing a synthetic LIBOR rate would be extended to September 30, 2024.

Graph 21

Outstanding notional amount by type of rate [1/]

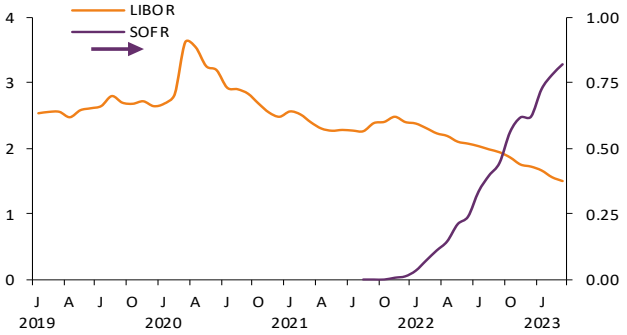
a) Interest rates swaps (IRS) [2/]

Trillions of pesos



b) Cross Currency Swaps, CCS

Trillions of pesos



Data as of March 2023.

Source: Banco de México.

1/ As of the Financial Stability Report of June 2023, IRS on LIBOR versus another variable rate, other than TIIE, are incorporated as part of the LIBOR series.

2/ The pie chart shows in blue the percentage of rate LIBOR operations transfered to SOFR during April 2023, while as shows in green the percentage of outstanding operations rate LIBOR non-transfered to new reference rates on March 2023.

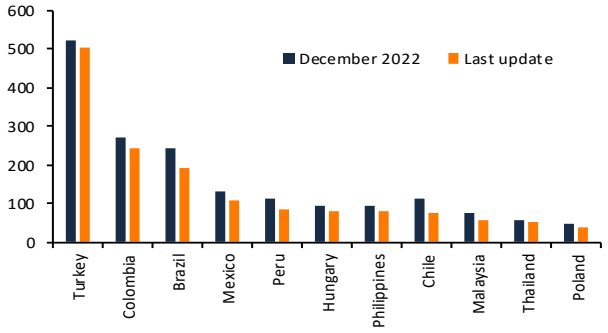
On April 14, 2023, the Chicago Mercantile Exchange (*CME*) converted Euro dollar futures and options (whose final settlement price is determined using the 3-month LIBOR) to SOFR. Meanwhile, on April 21, it carried out the first conversion of LIBOR dollar swaps to SOFR.[1] This means that each LIBOR dollar swap cleared that applies will be converted into short positions in SOFR's LIBOR or Overnight Index Swaps (OIS).

II.3.5. Risk premia

Global credit risk premia, measured by the price of the credit default swap (CDS), have shown a stable behavior during the period covered by this *Report*, with decreases for the group of emerging countries (Graph 22).

[1] Each swap replacement will retain the key economic terms of its corresponding LIBOR swap pre-conversion. Meanwhile, the SOFR OIS will default to certain economic aspects of the standard market contract. This conversion was applicable for all swaps cleared on USD LIBOR, except for zero-coupon swaps and swaption maturities; such cases, along with any remaining USD LIBOR swaps, will be addressed in a secondary conversion to take place on July 3, 2023.

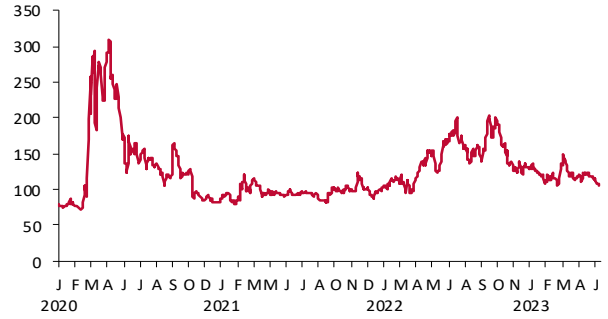
Graph 22
CDS for selected emerging economies
Basis points



Data as of June 2023.
Source: Calculations by Banco de México with data from Bloomberg.

Thus, the 5-year term CDS of Mexico's sovereign debt has decreased (Graph 23), in line with the rest of the emerging economies.

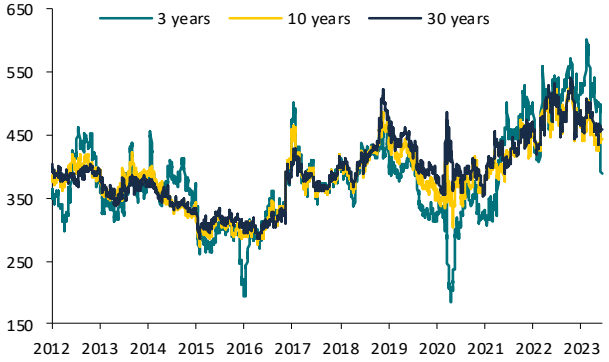
Graph 23
5-year Mexico's CDS
Basis points



Data as of June 2023.
Source: Bloomberg.

The compensation for inflation and inflationary risk has declined especially in the medium and long term, and is close to 450 basis points, while in the short term it reached levels above 600 basis points during the first months of the year, and recently began to decrease (Graph 24).

Graph 24
Sovereign breakeven inflation rate
Basis points



Data as of June 2023.
Source: Calculations by Banco de México with data from PIP.

II.4. Macro-financial risks

In a context of greater uncertainty and an environment of high volatility in global financial markets, associated with the aforementioned elements, financial conditions continue to be tight. In addition, there are concerns that the recovery process of the world economy may be delayed by a greater-than-anticipated slowdown.

Nevertheless, the Mexican financial system maintains a solid and resilient position, with a banking system that has capital and liquidity levels that comfortably exceed regulatory minimums. Although vulnerabilities in the Mexican financial system are limited, a severe external shock could generate certain complications and affect its proper functioning, and thus it is important to remain attentive to the risks faced.

In this context, this *Report* considers the following macro-financial risks to financial stability: i) a greater and longer-lasting tightening of financial conditions; ii) a lower-than-anticipated global economic growth trending downwards; iii) the occurrence of a systemic event affecting the global financial system; iv) the weakening of aggregate demand; and v) new adjustments in credit ratings for the sovereign and *Pemex*.

II.4.1. Further and longer-lasting tightening of financial conditions

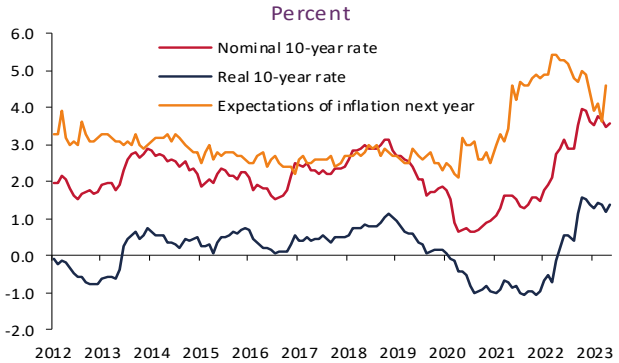
During the first half of 2023, international financial markets have experienced episodes of high volatility and uncertainty, partly associated with the difficulties undergone by some banking institutions in the United States and Europe. In this environment, monetary policy forecasts in the main advanced economies presented a high degree of uncertainty, particularly during March, and this situation is expected to prevail in the following

months. On the one hand, a lagged effect of monetary policy on inflation can be observed, while certain financial vulnerabilities derived from a possible deterioration in the valuation of bank assets in advanced countries have become visible, leading in turn to a loss of confidence on the part of investors. On the other hand, the expectation of a slowdown in global economic activity by 2023 prevails, while inflation rates are still elevated with respect to those observed in 2019.

Thus, the risk of global financial conditions remaining tighter and for longer than expected persists, with implications for global financial markets. This could lead to increases in risk premiums and generate disorderly adjustments in investors' portfolios, as well as events that could jeopardize global financial stability, affecting capital flows to emerging economies, including Mexico. In addition, certain liquidity pressures in international financial markets could intensify.

It is relevant to note that, in tighter financial conditions, the task of central banks can become more difficult, especially in an environment where inflationary pressures are proving to be more persistent than expected (Graph 25). The impact on financial conditions, both domestic and external, would also increase financing costs for companies, households and governments, to the detriment of medium-term economic growth and with possible implications for growth, which could exacerbate certain vulnerabilities in some economies, such as high levels of debt, both public and corporate, and the high valuation of some assets.

Graph 25
Interest rates of 10-Year treasury bonds and expectations of inflation in the USA



Data as of May 2023.
Source: Federal Reserve and Universty of Michigan.

II.4.2. Lower-than-anticipated global economic growth with a downward trend

The global economic recovery has been heterogeneous across countries and sectors, while the growth outlook of international organizations continues suggesting a slowdown in world economic activity in 2023 (Graph 2). This weakening would be mainly associated with the effects of restrictive monetary conditions and, more recently, with the tightening of credit conditions in several economies.

US financial authorities have pointed out that, given the stress in the banking sector experienced between March and May 2023 in the United States, a reduction in credit availability could be observed, as well as a greater tightening of standards for granting housing, commercial and consumer credit. This may have an effect on the demand for credit and therefore on growth prospects.

In addition, the war in Ukraine and increasing economic fragmentation continue to be a detrimental factor for global economic activity.

In this environment, the near-term risk of a more pronounced economic slowdown in advanced economies and a more moderate recovery for emerging economies in 2023 has increased.

Furthermore, there are still risks to the growth of the global economy in the medium term, which could reflect the effects of the different shocks it has faced in recent years, although possible structural implications for the potential growth of some countries cannot be ruled out.

In view of the above, credit risk for financial institutions could increase, which, depending on the concurrence of other factors, could represent a threat to the stability of the financial systems of some jurisdictions.

II.4.3. Occurrence of a systemic event affecting the global financial system

Partly as a consequence of the macro-financial risks mentioned above, it is possible that the probability of the occurrence of a global systemic event has increased since the publication of the last *Report*. In particular, episodes of stress in banking systems of advanced countries, whose interconnection with the global financial system is significant, could constitute a source of systemic risk.

Should these events materialize, they would have significant adverse implications in a number of areas. Most immediately, increased risk aversion and market volatility would negatively impact global and domestic

financial conditions. In turn, as a result of its adverse effects on the granting of credit and, in general, on the intermediation of resources and the provision of risk coverage by the financial system, this could contribute to a weakening of global economic activity, both on the demand and supply sides. In addition, due to the nature of both the initial shock and its transmission channels, the implications of this type of events on economic activity tend to be more profound and long-lasting, as described in previous *Reports.*

Altogether, the systemic events themselves and their potential consequences would operate to the detriment of global financial stability, although the severity of the effects could depend on their specific characteristics, as well as on the policy response and the conditions under which they occur and develop.

II.4.4. Weakening of aggregate demand

Domestic economic activity has continued to register some dynamism in the first months of 2023, showing resilience in the face of a complex external scenario. However, projections for its growth rate have deteriorated and have become more uncertain, in line with the global outlook.

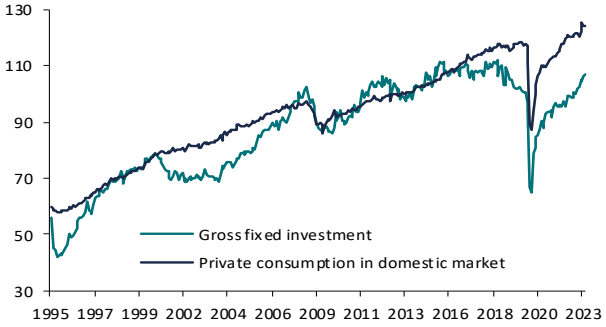
A lower dynamism of economic activity, combined with high headline inflation rates (despite having gradually decreased at the margin), could have negative implications for real income in the economy. In view of the aforementioned, there is a risk that the dynamics of domestic demand, particularly in private consumption and investment, could decline significantly and that these dynamics could last for a prolonged period.

In addition, physical investment spending is of particular importance for the long-term performance of the economy, since a scenario in which investment is low and insufficient for a long period affects the level and growth rate of potential output. The Mexican financial system could face a decrease in its intermediation income, given the associated lower demand for financing, and at the same time, there could be an increase in credit risk due to possible effects on the repayment capacity of borrowers, given the slower growth of the economy and the foreseeable lower social and economic profitability of productive projects.

Graph 26

Gross fixed investment and private consumption [1/]

Index (2013=100)



Data as of March 2023.
Source: INEGI.
1/ Seasonally-adjusted figures.

II.4.5. New credit rating adjustments for the sovereign and *Pemex*

Since the publication of the last *Report*, sovereign debt and *Pemex* rating agencies have kept their credit ratings and outlooks unchanged (Graph 27).

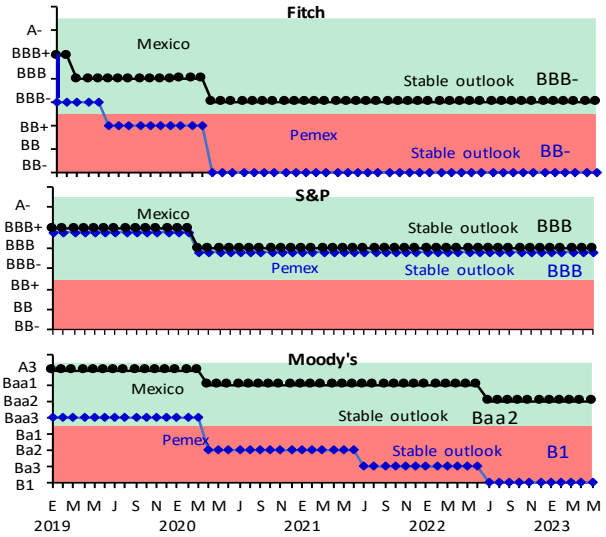
As for the sovereign credit rating, the agencies point out that, although government debt as a proportion of GDP is expected to increase slightly in the coming years, prudent fiscal management is expected to continue and, in general terms, stable macroeconomic fundamentals are expected to be maintained. However, these agencies indicate some risks, which are not the central scenario, but could lead to deteriorations in the sovereign credit profile, highlighting among them the possibility of unexpected setbacks in macroeconomic management, including on the fiscal front, in case additional extraordinary support to *CFE* and, particularly, to *Pemex*, is necessary.

In a scenario in which credit ratings for these entities' debt are downgraded, either in their level or in their outlook, the associated risk premiums would be expected to increase. Since federal government bonds are a relevant reference for domestic credit and debt markets, adjustments in this risk premium would have a generalized impact on the cost of financing in the economy, which in turn would represent a deterioration in the country's macro-financial risk profile.

Given these risks, and in light of the experience of recent months, it is worth emphasizing the importance of Mexican sovereign debt maintaining its investment grade rating by rating agencies. Indeed, within the group of emerging economies, those with investment grade ratings have been able to better weather the turbulence in international financial markets associated

with the recent events in the US and European banking systems.

Graph 27
Evolution of Mexico's and Pemex's credit ratings in foreign currency 1/
Fitch, S&P and Moody's scales



Data as of May 2023.
Source: Fitch, S&P y Moody's scales.
1/ The green areas denote the ratings that are included within the investment grade, whereas the red areas refer to speculative-grade credit ratings.

III. Update of challenges to the economic environment

Global economic slowdown and corporate credit risk

A global economic slowdown could reduce demand for Mexican exports. This might decrease the profitability of economic sectors with a higher percentage of their sales abroad and, as a result, increase the credit default of companies in those sectors. Therefore, the exposure of the corporate credit portfolio to the risk of a global economic slowdown across various banks is analyzed.

Regarding the commercial banks' sector as a whole, the portfolio with exposure to the risk of a global economic slowdown is moderate, standing at 16%.[2] However, there is a group of banks whose portfolio is more susceptible to this risk, both as a percentage of their total loan portfolio and as a percentage of their net capital. Furthermore, when calculating the proportion of SME lending that is vulnerable to the risk of a slowdown, these banks also have the highest percentage.

However, the exposure levels of these banks as well as of commercial banks decrease when opportunities associated with nearshoring are considered.[3] In particular, the portfolio that could be affected by this risk for the total system decreases to 9.8% when excluding credit granted in regions experiencing higher growth potentially benefiting from business relocation. This decrease is more pronounced for banks with more credit vulnerable to the global economic slowdown (Graph 28). Therefore, the risks of such a slowdown could be mitigated by Mexico's nearshoring process.

Graph 28
Credit portfolio as a percentage of total number of companies 1/
Percent



Data as of March 2023.
Source: Banco de Mexico, CNBV and INEGI.
1/ Banks with zero proportion of their portfolio in exports or nearshoring in any case were eliminated.

Evolution of uncertainty

During the first five months of 2023, a mixed performance has been observed in the level of uncertainty associated with economic policy, according to the economic policy uncertainty index, calculated based on timely information obtained from Twitter, which shows an increase in the last update, from the minimum levels registered during the first quarter of 2023 (Graph 29).

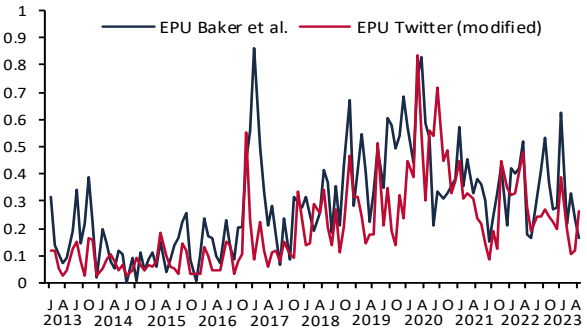
[2] The exposed portfolio is that granted to the quintile of subsectors that export the most as a ratio of their GDP.

[3] To consider nearshoring opportunities, the exposure associated with states that in 2021 absorbed the most foreign demand for industrial space is removed.

Graph 29

Economic Policy Uncertainty Index [1/]

Uncertainty level



Data as of May 2023.

Source: Banco de México.

1/ The methodology proposed by Baker et al., 2016, was considered to calculate the Economic Policy Uncertainty index based on tweets. In particular, the aggregated number of tweets including terms related to uncertainty, and policy or economy, is calculated. The series obtained is divided by the total number of tweets in each period and then is rescaled between 0 and 1, based on the January 2008 to May 2023 period. As of April 20, 2023, the tool for extracting information from Twitter was replaced. The Twitter accounts used are: @eleconomista, @El_Universal_Mx, @reformanegocios, @Milenio, @Reforma, @ElFinanciero_Mx, @lajornadaonline, @elsolde_mexico, @Reporte_Indigo, @LaRazon_mx, @Excelsior, @diario24horas, @sdpnoticias, @LaCronicaDeHoy, @CapitalMexico, @Forbes_Mexico, @heraldodemexico y @EFEMexico.

According to the information obtained, during 2023, the main issues that have contributed to the level of the indicator are the persistence of inflation and high interest rates, as well as forecasts of a global economic slowdown and the possibility of a recession in the United States. The uncertainty generated by the closure of two regional banks in the United States and the recent discussion of legal reforms in Mexico also stand out.

IV. Policy measures implemented to preserve the sound development of the financial system

During the period covered by this *Report*, the financial authorities carried out actions to continuously improve the regulatory framework, including the adoption of best practices and international standards, in order to maintain a robust and updated regulatory framework. In this context, the financial authorities carried out several regulatory modifications in the areas of market risk, credit, concentration, sustainable taxonomy and derivatives markets.

Regulation under the supervision of *SHCP* and the *CNBV*

In relation to the risk of concentration of exposures that banking institutions maintain with their customers and with companies or individuals that depend on them to meet their credit commitments, the standard applicable to banking institutions known as the Large Exposure Regime was implemented. The purpose of these rules is to establish the measures and limits applicable to credit institutions to identify and control the levels of concentration of exposures to counterparties or groups of counterparties that may be related to each other. The definition of exposures considers the existence of a control relationship or economic interdependence in their activity. The regulation seeks to strengthen the risk of concentration framework and adjust exposure limits, as well as to be consistent with international standards on the matter.[4]

With respect to the determination of capital requirements for market risk, the *CNBV* modified the treatment to be applied by credit institutions regarding their assets subject to guarantees denominated in local currency, and whose yield is referenced to nominal interest rates, in order to stipulate that such risk must be capitalized by whoever retains both the economic benefits and the risk of fluctuations in their price, unless otherwise agreed.[5]

With respect to credit risk, the standards related to the valuation, recognition and disclosure of financial instruments, known as *IFRS9*, were incorporated into the accounting criteria applicable to financial technology institutions. These amendments specify, among other aspects, the treatment of the portfolio, its valuation and presentation in financial statements in order to have transparent and comparable information with other countries.[6]

In March 2023, the *SHCP* published the "Sustainable Taxonomy", a classification system that identifies and defines activities, assets or investment projects with positive environmental and social impacts, based on established goals and criteria. The objective is to provide certainty and transparency to financial markets, encourage investment in sustainable activities, and provide better monitoring of financing flows for sustainability, with precise and consistent definitions (see section V.5.3. Environmental risks and sustainability of investments).[7]

[4] RESOLUTION amending the General Provisions applicable to credit institutions, published in the DOF of April 17, 2023.

[5] RESOLUTION amending the General Provisions applicable to credit institutions, published in the DOF of January 13, 2023.

[6] RESOLUTION amending the General Provisions applicable to financial technology institutions, published in the DOF of January 20, 2023.

[7] Sustainable Taxonomy of Mexico

Regulation under the supervision of Banco de México

In order to strengthen the transparency of the over-the-counter derivatives market, the adoption of the unique product identifier (*UPI*) and the unique transaction identifier (*UTI*) was established, which will improve the identification of transactions and their main characteristics. This will contribute to a better aggregation of derivative exposures and to identify potential risk concentrations to such exposures.[8]

On the other hand, in order to promote better counterparty risk management and reduce systemic risk in the Mexican derivatives market, margining guidelines were established in accordance with international best practices that will allow to determine bilateral initial and variation margin requirements for *OTC* derivative transactions that are not cleared and settled in foreign clearing houses or entities that provide central counterparty services.[9]

Banco de México remains attentive to the evolution and operating conditions of Mexico's financial markets and to the proper functioning of the financial system. If necessary, the central bank will continue to take the necessary actions in a timely manner according to its powers.

V. Financial system risks

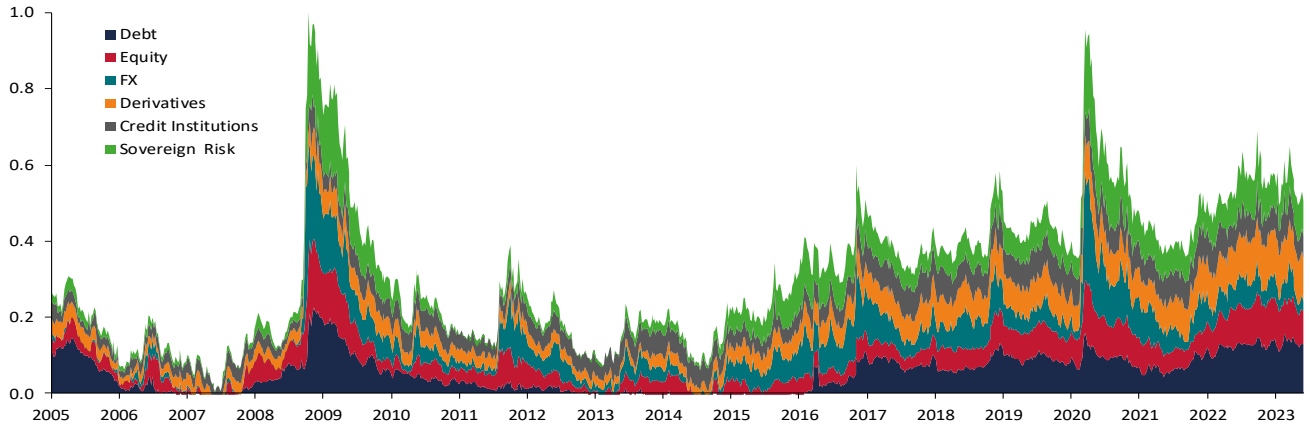
V.1. Aggregate risk indicators

During the first months of 2023, the Financial Markets Stress Index (*IEMF*) increased due to the uncertainty in financial markets associated with expectations of higher interest rate hikes for a longer period and, to a greater extent, to the impact on the volatility of global financial markets due to the observed episodes of instability in the US banking system and in some European banks. Subsequently, between April and May, uncertainty in the markets decreased, reaching levels even lower than those observed prior to the aforementioned events. Although there was a slight upturn at the end of May, due to uncertainty over the US government debt ceiling, this dissipated at the beginning of June. Thus, since the last *Report*, the decrease in the index is mainly explained by lower stress in the foreign exchange and stock markets (Graph 30). Other financial market stress indices calculated for various countries, such as the one published by the US Office of Financial Research (*OFR*),[10] also show that, for both advanced and emerging countries, an increase was observed following the March event, and subsequently, a decrease. With the exception of the US index, the rest of the indices have not recovered the level prior to the event mentioned (Graph 31).

Graph 30

The Financial Market Stress Index [1/]

a) Stress level 2005-2022

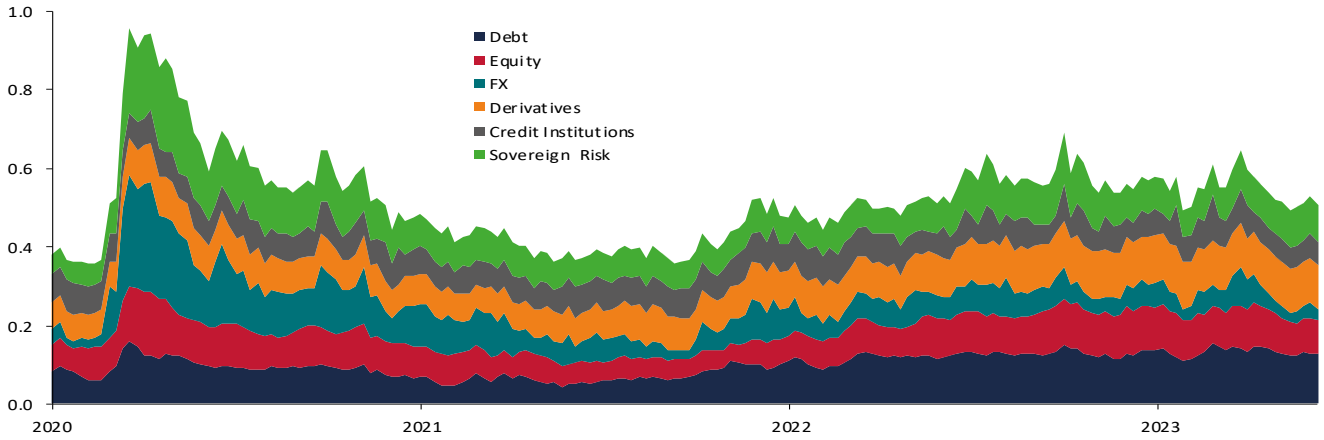


[8] Banco de México Circular 19/2022 and Circular 20/2020 , published December 14, 2022.

[9] Banco de México Circular 2/2023, published March 14, 2023.

[10] The OFR Financial Stress Index is a daily indicator of stress in financial markets that is constructed from 33 market variables, such as yield spreads, valuation measures and interest rates. This indicator is not available at the individual level for emerging countries such as Mexico.

b) Stress level 2020-2023

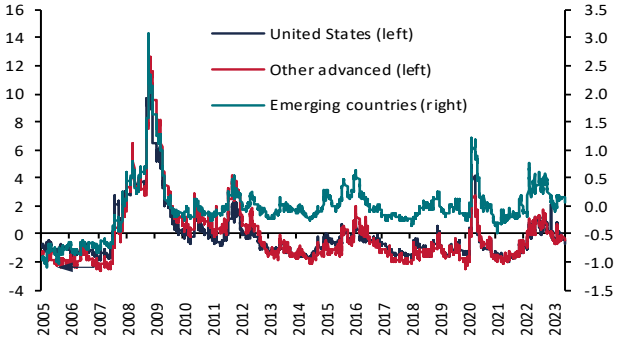


Data as of June 9, 2023.
Source: Banco de México.
1/ The index was estimated using a principal component analysis on 36 standard variables of Mexican financial markets grouped into 6 categories (debt market,securities market, FX market, derivatives market, credit institutions and country risk). Total components yields the index scaled at interval [0,1]. A higher number represents higher financial stress.

Graph 31

Financial Stress Index for others countries or regions[1/]

No unit



Data as of June 9, 2023.
Source: Office of Financial Research (OFR).
1/ The Financial Stress Index is a daily market-based snapshot of stress in global financial markets. The FSI shows stress contributions by three regions: United States, other advanced economies, and emerging markets.

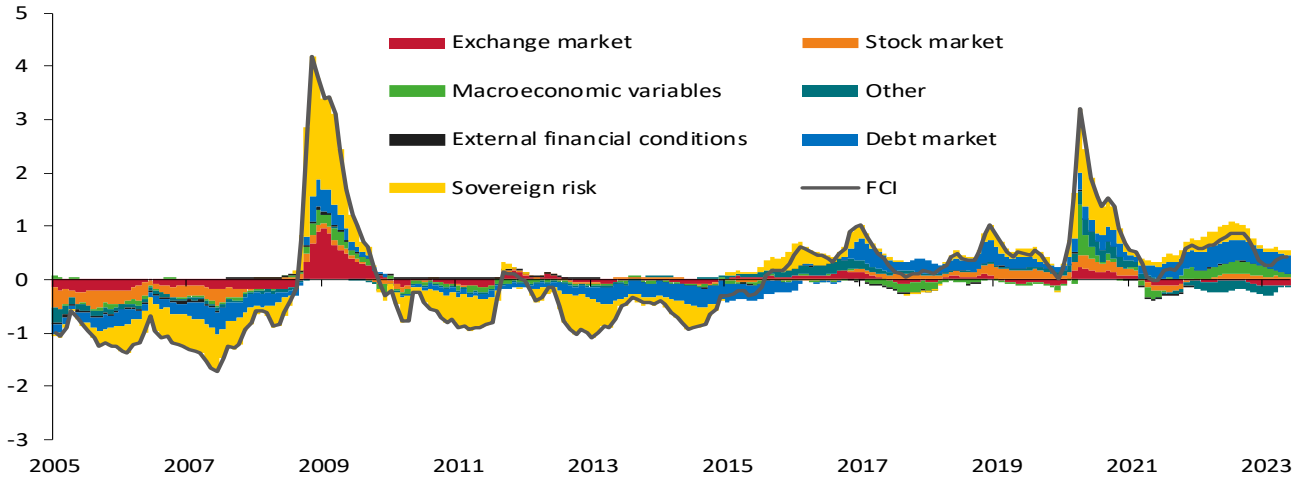
Additionally, financial conditions in Mexico, as measured by the Financial Conditions Index (FCI), continue tightening since the last *Report*. In particular, this behavior is explained by a persistent tightening of debt market and macroeconomic variables. Likewise, from March to May there was a slight increase in the index due to greater volatility in financial markets, as a result of the situation in the US and European banking systems, and later due to uncertainty regarding the US government's debt ceiling (Graph 32). The financial conditions indices of other countries show that in May 2023 financial conditions in Brazil, Chile, Mexico, Poland, the U.S. and the Euro zone continued tightening.[11]

[11] Financial conditions indices are calculated by Goldman Sachs. This index is a daily indicator that is calculated as the weighted average of a set of financial variables (i.e., risk-free rates, exchange rates, variables related to equity valuation and credit spreads). The weights used correspond to the impact or contribution that each variable has on GDP. In terms of methodology, this index is retrospective, while the FCI prepared by Banco de México is prospective.

Graph 32

Financial Conditions Index [1/,2/]

Standard deviations

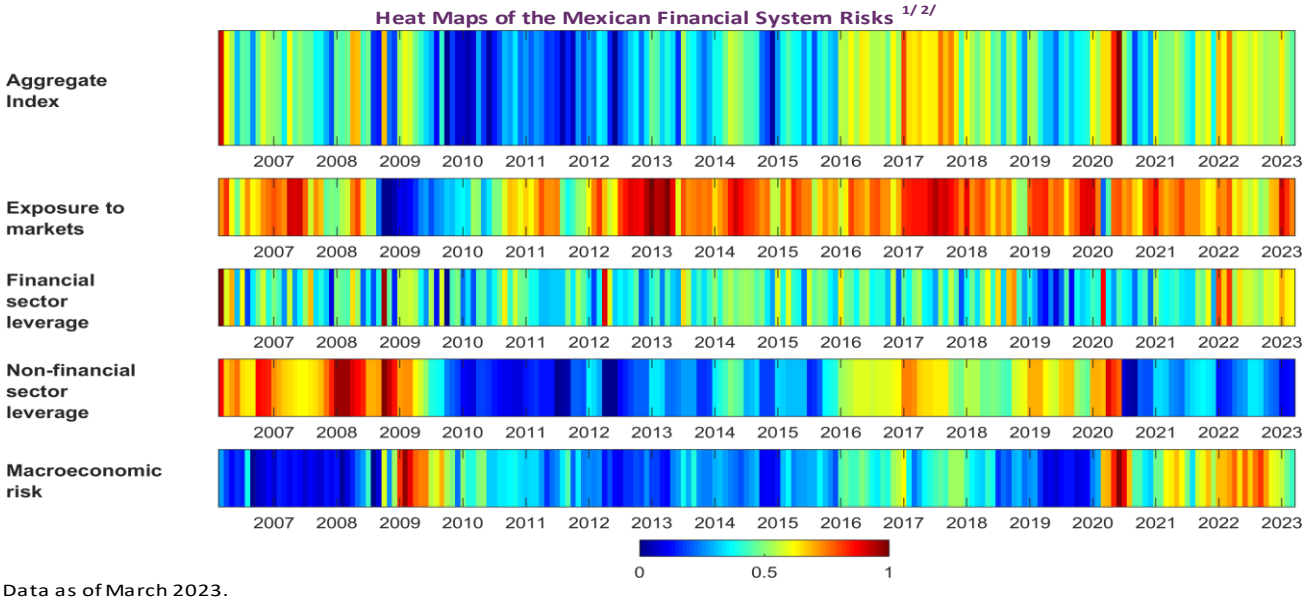


Data as of May 2023.
Source: Banco de México.
1/ For a description of the methodology see Box 2: Financial Conditions and Growth Risk, Financial Stability Report, December 2019.
2/ The contributions of each FCI variable are estimated using Kalman Filter.

The aggregate risk of the financial system, illustrated through the heat map, decreased slightly during the first quarter of 2023 with respect to that observed in the previous *Report*. Market exposure risks increased, while financial sector leverage risks remained at a similar level. The increase in the market exposure category, which measures risk appetite, is due to the inversion of Mexico's government yield curve, higher capital flows and a decline in global volatility. Non-financial sector leverage and macroeconomic risks decreased during the same period. The lower macroeconomic risks are explained by the lower perception of sovereign risk and a decline in inflation expectations (Graph 33).

Graph 33

Heat Maps of the Mexican Financial System Risks [1/ 2/]



Data as of March 2023.
Source: Banco de México.
1/ Refer to Box 3 for a description of the methodology: Heat Maps of Mexican Financial System Risks, Financial System Report 2018. The Exposure to Markets category relates to the Risk Appetite category of the Financial System Report 2018.
2/ The disaggregated map is provided in Annex 1.

The results of the semiannual survey on the perception of systemic risk are also described.[12,13] Said survey highlights that the deterioration in growth prospects of the global economy is the external financial risk most mentioned by institutions; while the risk of higher-than-expected inflation and political, geopolitical and social risks continue to be the most mentioned in the category of domestic financial and non-financial risks, respectively. In addition, institutions expect foreign exchange market risk to increase in the next six months.

As main sources of risk for institutions, the following stand out (Table 1):

- The most frequently mentioned external financial risk is the deterioration in growth prospects for the global economy, while the second most frequently mentioned risk is higher-than-expected inflation. In third and fourth place are the risks of deteriorating external market conditions and disorderly changes in foreign interest rates, respectively. In this edition, volatility in commodity prices was the fifth most mentioned risk.

- The most frequently mentioned domestic financial risk was once again higher-than-expected inflation, followed by the deterioration of the country's economic growth outlook. The third and fourth most mentioned risks were the deterioration of public finances and the financial and economic fiscal policy, respectively. Finally, the fifth most mentioned risk is the deterioration of the sovereign credit rating.

- In this edition of the survey, the top two sources of non-financial risks are again political, geopolitical and social risks, followed by cyber and technological risks. In third and fourth place are insecurity and violence, as well as the deterioration of the rule of law and impunity. Finally, the risk associated with COVID-19 ranked fifth and was mentioned by only 35% of the participating institutions.

Table 1

Main sources of financial system risks Percent of total institutions		
	May 2023[1/]	November 2022[2/]
External financial risks		
Deterioration of the global economic growth outlook	82	75
Inflation higher than expected	81	81
Deterioration of foreign market conditions*	63	64
Disorderly changes in foreign interest rates	55	65
Volatility in commodity prices	54	54
Domestic financial risks		
Inflation higher than expected	79	76
Deterioration of the domestic economic growth outlook	74	72
Deterioration of public finances	63	60
Fiscal, financial and economic policies	60	50
Deterioration of sovereign credit rating	53	54
Non-financial risks		
Political, geopolitical and social risks	94	87
Cybersecurity and IT risks	82	83
Violence and insecurity	71	66
Deterioration of the rule of law and impunity	52	54
COVID-19 (new wave)	35	45

1/ In this survey 108 institutions participated.
2/ In the previous survey 109 institutions participated.
* Exchange rate volatility, depreciation and lack of liquidity.

In the section of the survey related to the probability of occurrence of an event that could jeopardize the stability of the financial system in the short, medium and long term (0 to 6 months, 6 to 12 months, 1 year or more, respectively)[14] highlights the following (Graph 34):

- The proportion of institutions that consider that there is a high probability of such an event occurring in the short and medium term decreased with respect to the previous semester, while for the long term it increased (Graph 34).

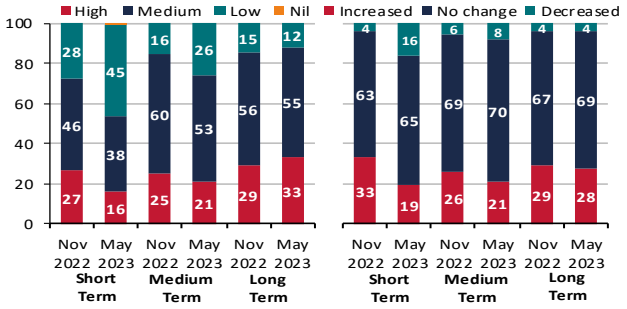
- For all the time periods considered, the percentage of institutions that consider that the probability of a systemic event has increased has decreased, despite the observed episodes of instability in the US banking system and in some European banks.

[12] The survey is conducted by Banco de México among risk management directors of various financial institutions. This semester it was conducted from May 3 to May 26, 2023. For more information see Box 6. Semiannual survey on systemic risk perception, *Financial Stability Report December 2019*, Banco de México, pp 94-95.

[13] The survey consists of a series of questions grouped into four categories: i) main sources of financial (domestic and external) and non-financial risks; ii) the perception of the occurrence of a high impact event that could affect the proper development of the financial system in different terms; iii) the institutions' expectations regarding the main idiosyncratic risks they face; and iv) aspects related to their risk management. The survey was sent to 124 financial institutions (afores, insurance companies, commercial banks, development banks, brokerage firms and investment funds).

[14] Institutions were asked whether the probability of occurrence was high, medium, low or zero for each time frame.

Graph 34
Probability of the ocurrence of a systemic event
Percentage of answers [1/]

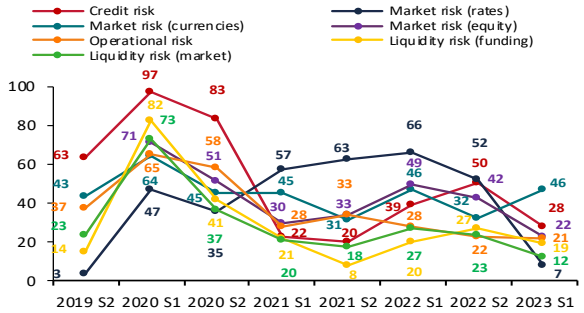


Source: Banco de México.
1/ Some numbers may not add up 100% due to round-off.

Finally, with respect to the evolution of the institutions' expectations about the main risks they face, the following stand out (Graph 35)[15]:

- There was an increase in market risk (foreign exchange) with respect to the previous survey.
- Market risk (rates) was the one that decreased the most.
- Operational risk remained at nearly the same level as in the previous survey.

Graph 35
Expectations regarding the evolution of risks in the following six months [1/]
Percent



Data as of May 2023.
Source: Banco de México.
1/ The chart shows the difference between the percent of institutions that expect the risk increase and the institutions that expect the risk decrease.

Macro-financial Vulnerabilities Index

Macro-financial crises are usually preceded by the existence of vulnerabilities in an economy. To gauge these vulnerabilities, some international organizations began using early warning indicators after the global financial crisis.[16] By measuring vulnerabilities, such indicators can provide a timely warning of the increased likelihood of a future macro-financial crisis.[17]

Early warning indicators are estimated for Mexico's financial, real, external and public sectors.[18] An indicator signals vulnerability in a sector when it exceeds a threshold determined on the basis of the historical behavior of macro-financial variables in a set of emerging economies in the years prior to macro-financial crises.[19] However, it is important not to make a mechanical interpretation of the results: (i) macro-financial crises often precede vulnerabilities not in one, but in multiple sectors of the economy; and (ii) even if this occurs, the probability of a crisis occurring in a country will also depend on the magnitude of the negative shock faced by its economy.

The results suggest that vulnerabilities in Mexico are not significant in any of the considered sectors, since the values of all the indicators are below their thresholds

[15] To show such evolution, a diffusion index is used. Such index is calculated as the difference between the percentage of institutions that expect risk to increase and the percentage of those that expect it to decrease. An increase in the level of the index is interpreted as a higher expectation of risk.

[16] See IMF Methodological Manual (2012). *The IMF-FSB Early Warning Exercise: Design and Methodological Toolkit*. Strategy, Policy, and Review Department. International Monetary Fund.

[17] The following are considered macro-financial crises: abrupt capital outflows, financial stress and sudden fiscal adjustments. The 2012 IMF Methodological Manual definitions are used for abrupt capital outflows and abrupt fiscal adjustments, and the 2012 Laeven and Valencia definitions are used for identifying financial stress.

[18] Eleven variables are used as indicators for emerging economies with available information. These variables include current account balance, reserve coverage ratio, exports growth, real effective exchange rate, fiscal balance, change in government revenue, Capital Adequacy ratio (CAR), Return on Assets (ROA), Non-Performing Loan Rate (NPL or IMOR, for its Spanish acronym), loan-to-deposit ratio and real GDP growth.

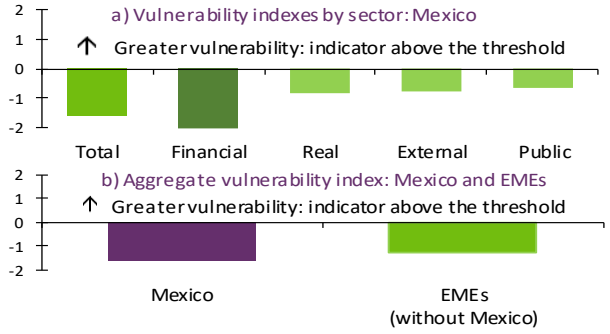
[19] The aggregate indicators are obtained by weighted averaging of the distance of each indicator from a threshold, considering the significance of each indicator in crisis prediction.

(Graph 36). The financial sector, whose variables have the greatest capacity to anticipate a crisis, is precisely the one exhibiting the least vulnerabilities, reflecting the high degree of soundness of this sector in Mexico. This is partly due to the fact that the banking system in general maintains high levels of capitalization, profitability or Return on Assets (ROA), and loan-to-deposit ratios.

Furthermore, in terms of the aggregate indicator, which reflects the vulnerabilities faced by the overall economy, i.e., across all sectors, Mexico is better positioned than the rest of the considered emerging economies.

Graph 36

Macrofinancial vulnerability indexes



Source: Banco de México, Haver Analytics, IMF (World Economic Outlook and Financial Soundess Indicators). The group of emerging economies includes Brazil, Indonesia, Turkey, Thailand, the Philippines, South Africa, and Colombia.

V.2. Financial position of households, companies and the public sector

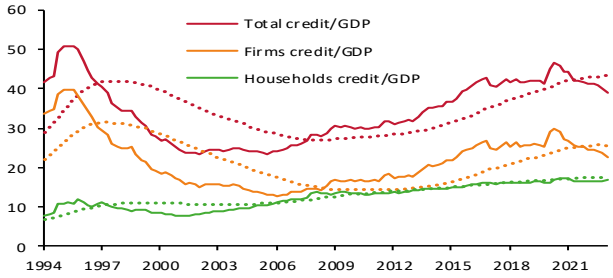
As of March 2023, total financing as a share of GDP has slowed. Both total financing and financing to companies are at levels similar to those at the end of 2015. The financing gap has linked eight quarters in negative levels and is at levels similar to those of 2006, and the gap in credit to households and businesses has widened (Graph 37a and Graph 37b).

Graph 37

Credit to non-financial system private sector [1/]

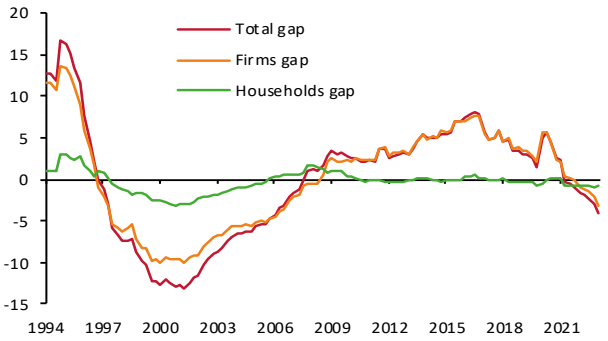
a) Share of GDP

Percent



b) Credit-to-GDP gap [1/]

Percent



Data as of March 2023.

Source: Banco de México.

1/ It's the difference between observed credit-to-GDP ratio and its long term trend.

Total financing to the non-financial sector of the Mexican economy declined in real annual terms during the first quarter of 2023 (Table 2). Financing to the public sector fell slightly due to lower bank and international indebtedness, as well as a favorable exchange-rate effect. Financing to the non-financial private sector continued to contract, although at a slower pace than in the previous *Report.* The contraction in financing from abroad was partially offset by growth in financing from commercial banks. Consumer financing grew significantly while financing for housing increased marginally (Graph 38).

Table 2

Financial Stability Report

June 2023

Total Financing to Non-Financial Sectors of the Mexican Economy

a) Figures at March 2023

	Thousands of million Mexican Pesos	Per cent of sector	Per cent of GDP	Real annual percent change [Real annual percent change of balance is USD]		Per cent of financing denominated in Mexican pesos
				1Q23 vs 1Q22	1Q22 vs 1Q21	
Public sector [1/]	**14,767**	**100**	**50.4**	**-0.7**	**0.0**	**72.5**
Securities	**13,230**	**89.6**	**45.1**	**1.0**	**1.4**	**76.8**
Issued in Mexico	10,159	68.8	34.6	7.7	7.0	100.0
Issued abroad	3,071	20.8	10.5	-16.2 [-1.2]	-10.8 [-1.6]	0.0
Bank credit	**378**	**2.6**	**1.3**	**-14.2**	**-8.7**	**17.1**
Commercial bank	109	0.7	0.4	-14.2	-9.0	59
Foreign banks	269	1.8	0.9	-14.2 [1.2]	-8.5 [0.9]	0.0
Other [2/]	**1,159**	**7.8**	**4.0**	**-13.2**	**-9.3**	**42.0**
Private sector	**11,164**		**38.1**	**-2.0**	**-2.7**	**77.0**
Non-financial companies	**6,275**	**100**	**21.4**	**-5.8**	**-4.9**	**59.2**
Securities	**2,083**	**33.2**	**7.1**	**-12.7**	**-7.1**	**31.3**
Issued in Mexico	638	10.2	2.2	6.8	-4.7	98.1
Issued abroad	1,445	23.0	4.9	-19.2 [-4.7]	-7.8 [1.7]	1.7
Bank credit	**3,989**	**63.6**	**13.6**	**-2.6**	**-3.6**	**76.6**
Commercial bank [3/]	3,026	48.2	10.3	2.7	-2.3	78.4
Development bank	450	7.2	1.5	-0.4	-13.1	64.1
Foreign credit [4/]	513	8.2	1.7	-26.5 [-13.3]	-2.0 [8.1]	0.0
Other [5/]	**203**	**3.2**	**0.7**	**11.7**	**-3.0**	**98**
Households	**4,889**	**100**	**16.7**	**3.3**	**0.5**	**100**
Consumer credit	**1,564**	**32.0**	**5.3**	**10.1**	**0.6**	**100**
Commercial bank [3/]	1,281	26.2	4.4	10.2	1.1	100
Development bank	44	0.9	0.2	-7.4	-10.8	100
Other [5/]	**239**	**4.9**	**0.8**	**13.0**	**0.6**	**100**
Mortgages	**3,325**	**68.0**	**11.3**	**0.3**	**0.4**	**100**
Commercial bank	1,269	26.0	4.3	4.0	2.8	100
Development bank	12	0.2	0.0	-9.6	-6.9	100
Other [6/]	**2,044**	**41.8**	**7.0**	**-1.7**	**-0.9**	**100**
Memo: Non-regulated financial entities that grant financing by destination sector [7/]	**1,510**	**100**	**5.1**	**0.7**	**-13.2**	**88.8**
Non-financial companies	1,135	75.2	3.9	-4.1	-8.2	87.1
Consumer credit	339	22.5	1.2	27.0	-28.8	99.6
Mortgages	10	0.7	0.0	-5.4	-8.4	100.0
Public Sector	25	1.7	0.1	-33.9	-26.4	13.9
TOTAL	**27,441**		**93.6**	**-1.2**	**-1.9**	**75.3**

Preliminary figures at March 2023

Source: Banco de México (CF 297), CNBV, SHCP, Condusef and BMV

Note: For non-regulated entities for which data stock echange is not available as they are in debt restructuring or liquidation processes, data from the Credit Bureau or Cundusef is used instead.

1/ Considers the gross debt balance of the public sector based on the SHCP methodology. Includes financing received by the Federal Government, public enterprises and the development bank.

2/ Includes financing granted by international financial bodies, Pidiregas, the SAR savings fund,ISSSTE, Pemex and CFE obligations.

3/ Includes the portfolios of regulated sofomes for having equity links with banking institutions.

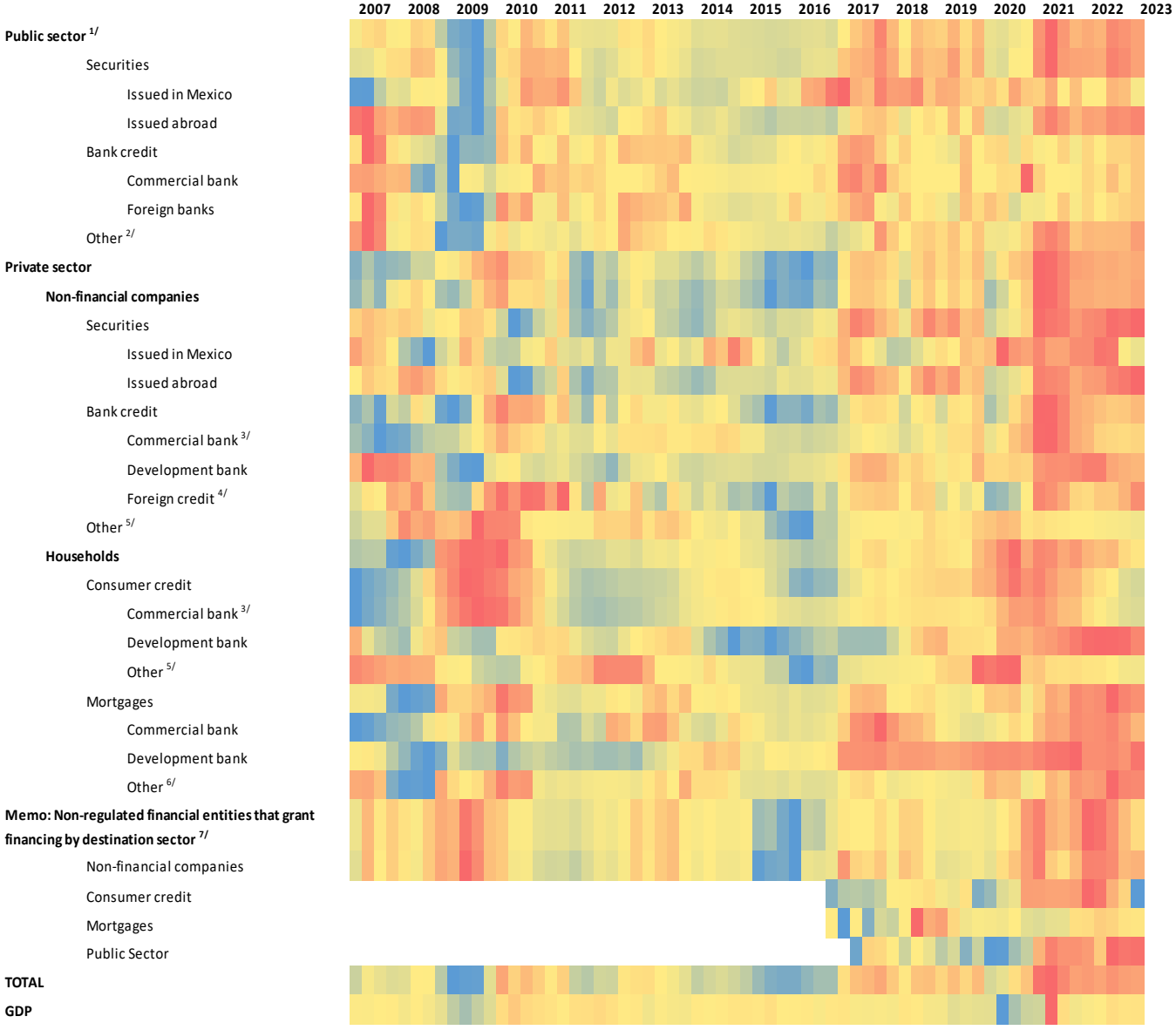
4/ Excludes financing from foreign suppliers.

5/ Includes financing granted by the Infonacot, as well as by regulated non-banking financial entities, such as socaps, sofipos, regulated sofomes for issuing debt, bonded warehouses and credit unions.

6/ Includes financing granted by the Infonavit, the Fovissste, as well as by regulated non-banking entities.

7/ Includes financing granted by non-regulated sofomes, corporate debt issuers engaged in granting financing (e.g., automotive), credit granted by listed department stores to their customers and in the case of private non-financial companies, financing from suppliers (listed companies only).

b) Historical figures: real annual percent change



Figures at March 2023

Source: Banco de México (CF 297), CNBV, SHCP, Condusef and BMV.

Note: The heat map shows the percentiles of the distribution of the real annual growth rate of financing. The highest percentiles are shown in blue and the lowest in red. The color of each indicator or row is based on the history of each series, which covered from Jan 07 to Mar 23, with the exception of those shown in gray, whose history is not available. In addition, for non-regulated entities for which data stock echange is not available as they are in debt restructuring or liquidation processes, data from the Credit Bureau or Cundusef is used instead.

1/ Considers the gross debt balance of the public sector based on the SHCP methodology. Includes financing received by the Federal Government, public enterprises and the development bank.

2/ Includes financing granted by international financial bodies, Pidiregas, the SAR savings fund,ISSSTE, Pemex and CFE obligations.

3/ Includes the portfolios of regulated sofomes for having equity links with banking institutions.

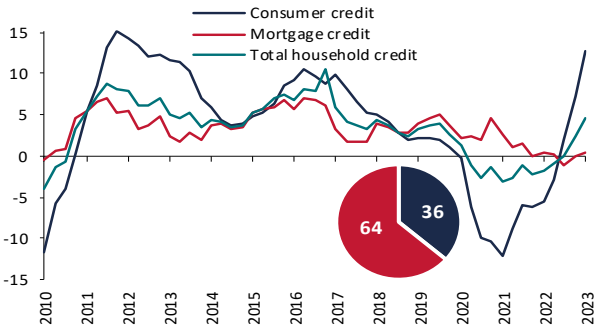
4/ Excludes financing from foreign suppliers.

5/ Includes financing granted by the Infonacot, as well as by regulated non-banking financial entities, such as socaps, sofipos, regulated sofomes for issuing debt, bonded warehouses and credit unions.

6/ Includes financing granted by the Infonavit, the Fovissste, as well as by regulated non-banking entities.

7/ Includes financing granted by non-regulated sofomes, corporate debt issuers engaged in granting financing (e.g., automotive), credit granted by listed department stores to their customers and in the case of private non-financial companies, financing from suppliers (listed companies only).

Graph 38
Household credit growth [1/]
Real annual percent change

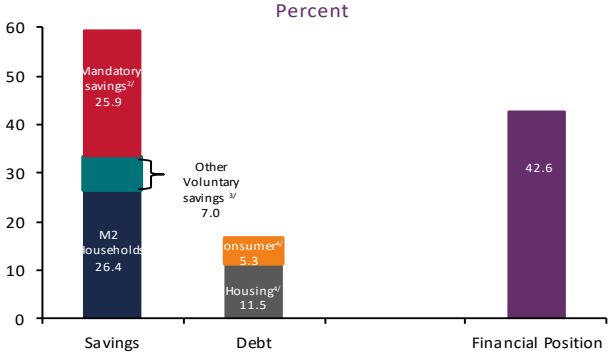


Data as of March 2023.
Source: Banco de México, BMV and Condusef.
Note: The percentages shown here consider the figures relating to non-regulated entities that grant financing and that are included at the bottom of Table 2 (Memo); therefore, the differ from those registered in the upper part of the same table. In addition, for non-regulated entities for which data stock echange is not available as they are in debt restructuring or liquidation processes, data from the Credit Bureau or Cundusef is used instead.
1/ Includes the loan portfolio of commercial banks and regulated non-bank entities such as regulated sofomes, socaps, sofipos and credit unions, as well as non-bank non-regulated entities such as non-regulated sofomes and debt-issuing financial companies such as financial leasing companies or financial arms of automotive companies. For mortgages it also includes those granted by Infonavit and Fovissste and for consumer credit includes credit granted by Infonacot. The growth series are adjusted to consider the beginning of availability of the data on financing by non-regulated entities and regulated sofomes that issue debt in the period in which they appear in the sample (2015-2016).

V.2.1. Households

Since the onset of the COVID-19 pandemic, the financial position of households improved, and at its peak, it grew by nearly 10 points as a proportion of GDP. This was because savings rose faster than indebtedness. This growth in savings slowed during 2022, although a slight rebound was observed in the first quarter of 2023. Since June 2021 household indebtedness as a share of GDP has remained virtually unchanged. Graph 39 shows the most recent values of this indicator.

Graph 39
Households financial position[1/]
Share of GDP
Percent



Data as of March 2023.
Source: Banco de México.
1/ Totals may not add up to 100% due to rounding. Share of four quarters average nominal GDP.
2/ Includes housing and pension funds.
3/ Includes public securities, private securities, issued by states, municipalities, OyEs and Fonadin, as well as other banks liabilities held by households.
4/ Includes credit granted by commercial banks, development banks, non-bank savings and loans entities, credit unions and regulated financial companies.

Total borrowers' debt balances, at constant prices, have remained at the same levels over the last two quarters (Graph 40a), while leverage, measured as the proportion of monthly income allocated to debt repayment, remained at March 2023 at levels similar to those prevailing a year earlier, with higher leverage being observed in lower-income borrowers[20] (Graph 40a and Graph 40b).[21]

[20] Income is obtained from regulatory reports. To separate higher-income borrowers from lower-income borrowers, a threshold of 20,000 Mexican pesos was used, which approximates the median monthly income of the sampled files.

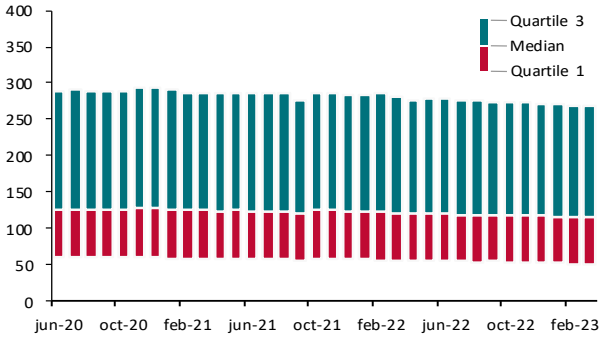
[21] Balances and leverage were estimated with a panel sample of the total number of files registered in the Credit Bureau that have at least one bank loan, with historical information on all loans contracted by the person associated with the sampled file. The information includes the evolution of balances and payments due with sample sizes close to 5,000, 5,000, 16,000 and 19,000 observations for loans associated with mortgage, automobile, personal and credit card loans, respectively. Ninety-six percent of bank loans are granted by banks that report to the Credit Bureau.

Graph 40

Distribution of leverage of a sample of households

a) Outstanding debt amount of borrowers with at least one bank loan [1/,2/]

Thousands of pesos



Data as of March 2023.

Source: Credit Bureau.

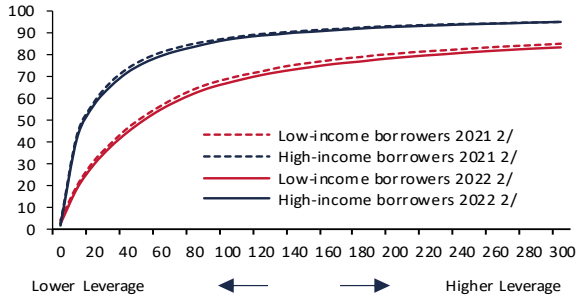
1/ Estimate using information from a sample of Credit Bureau files.

2/ Constant prices (March 2022 base).

b) Monthly payments to monthly income of borrowers with at least one bank loan [1/]

Vertical axis: percent of the number of borrowers

Horizontal axis: monthly payments as a percentage of income reported



Data as of March 2023.

Source: Credit Bureau.

1/ Estimate using information from a sample of Credit Bureau files.

2/ "Low-income borrowers" and "high-income borrowers" are considered as those whose income is lower than the median income and greater than median income, respectively.

Consumer credit

Total consumer financing grew significantly in real terms. By type of lender, the portfolio granted by commercial banks and their related sofomes, as well as that of other non-bank intermediaries and department stores, showed strong dynamism.[22]

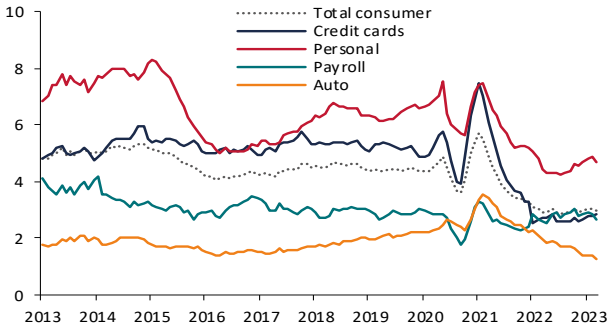
During the fourth quarter of 2022 and the first quarter of 2023, consumer credit granted by banks and their subsidiary sofomes continued with the recovery observed in the previous semester, with the aggregate balance of the system registering positive annual growth rates in all its segments. A notable aspect was the growth in the credit card portfolio, explained by the increased use of credit cards by borrowers, and the growth in auto credit, which as of the fourth quarter of 2022 began to increase in real terms for the first time since the outbreak of the COVID-19 pandemic (Graph 41).

Graph 41

Non-performing loan ratio and adjusted non-performing loan ratio of consumer loan portfolio

a) Non-performing loan ratio

Percent



Data as of March 2023.

Source: CNBV.

1/ Includes sofomes regulated for having equity links with a bank.

From February 2022 to February 2023, the leverage of commercial bank borrowers with consumer credit[23] shifted to lower levels in the payroll and auto credit segments, while, in the case of credit cards and personal loans, the leverage increased during that period, with a significant increase in the case of credit cards (Graph 42).

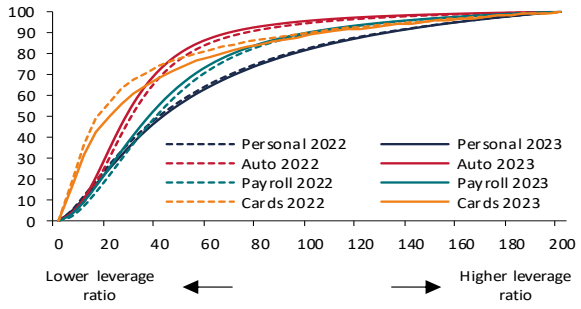
[22] The sofipos portfolio increased significantly in December 2022 due to the entry of a sofipo subsidiary of a Brazilian digital bank, which specializes in granting credit cards. At the end of 2022, its assets represented 40% of the total sofipos sector. The entry of this entity generated an annual increase of 54.7% in real terms in the sector's total portfolio at the end of December 2022, which contrasts with the 4% increase in the sector's portfolio excluding this entity. The new sofipo has a non-performing loan rate above the sofipo sector average.

[23] Leverage is measured as the proportion of income that covers the payment due on all loans that an individual has registered with credit reporting companies. This analysis is performed with the income information available in the regulatory reports of revolving and non-revolving consumer bank loans.

Graph 42

Household leverage ratio by type of consumer bank credit

Vertical axis: Percent of cumulative portfolio
Horizontal axis: Household leverage ratio as a percentage of income reported



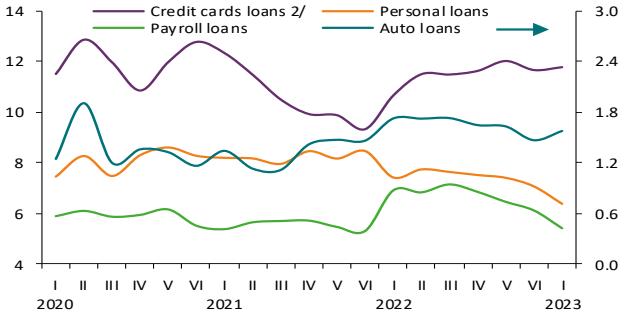
Data as of February 2023.
Source: Banco de México.

During 2022 and the beginning of 2023, there was a recovery in the granting of consumer credit, which was accompanied by a marginal deterioration in the risk profile of new borrowers in some types of loans. Indeed, there was an increase in the Probability of Default (PD) levels of credit card and auto loan portfolios, although the latter remains at low levels. On the other hand, new personal and payroll loans have improved in terms of the risk profile of borrowers, by showing a decrease in their PD (Graph 43). Thus, although some types of loans have shown a marginal deterioration in the risk profile of their new borrowers, consumer loan portfolio as a whole shows a limited level of risk.

Graph 43

Default probability for granted consumer loans [1/]

Percentage



Figures as of first two-month period of 2023.
Source: Banco de México.
1/ Includes loans from banks and from sofomes regulated for having equity links with a bank.
2/ Default probability of total loans portfolio at the end of period.

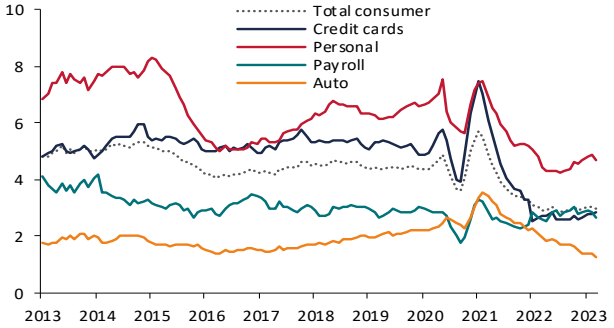
The non-performing ratio levels of total consumer portfolio of banks and their related sofomes slightly rebounded starting on the fourth quarter of 2022, a behavior that is explained by the increase in the non-performing ratio of the credit card portfolio and, to a greater extent, in that of personal loans. Of the main segments of the consumer portfolio, auto loans are the only whose delinquencies continue declining. The increase in the non-performing ratio of consumer loan portfolio during the period is mainly due to the increase in past-due loans. The reduction in the non-performing ratio of the auto loan segment was mainly due to the reduction in its past-due loans and, to a lesser extent, to the increase in its up-to-date loan portfolio (Graph 44a and Graph 44b).

Graph 44

Non-performing loan ratio and adjusted non-performing loan ratio of consumer loan portfolio

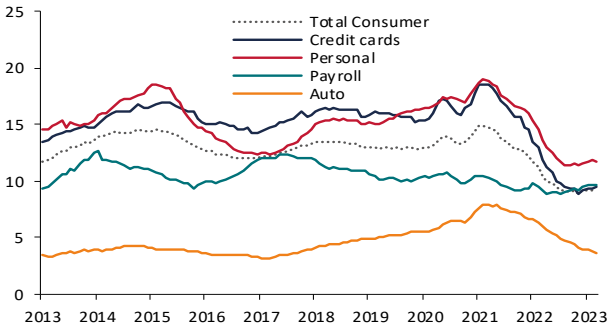
a) Non-performing loan ratio

Percent



b) Adjusted non-performing loan ratio

Percent

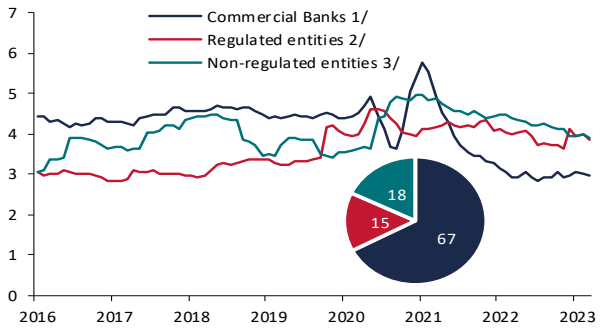


Data as of March 2023.
Source: CNBV.
1/ Includes sofomes regualted for having equity links with a bank.

The non-performing ratio of consumer loan portfolio granted by non-regulated non-bank financial intermediaries and Infonacot decreased slightly since the last *Report*, and is explained by higher credit granting. Non-performing loans from regulated non-bank sources increased slightly due to the sofipos sector, particularly, to the entry of a digital company

specialized in granting credit cards, which joined the sofipos sector (Graph 45).[24]

Graph 45
Non-performing loan ratio of consumer portfolio
Percent



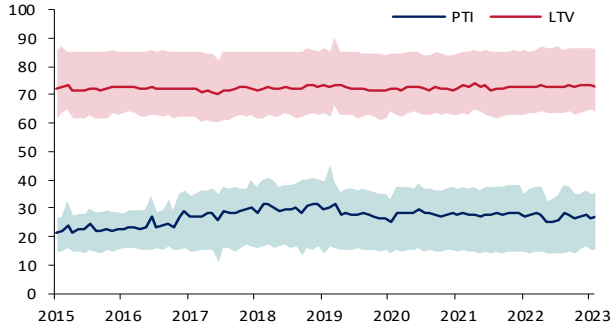
Data as of March 2023
Source: Banco de México (SIE), CNBV, BMV and Condusef
1/ Includes the loan portfolio of regulated sofomes having an equity linked with a bank, whether subsidiaries of the latter or not.
2/ Includes the credit portfolios of the development bank and of non-banking regulated financial intermediaries, such socaps, sofipos and sofomes regulated for issuing debt and the Infonacot.
3/ Includes credit portfolio of non-regulated sofomes, debt-issuing financial companies such as financial leasing companies or financial arms of automotive companies, as well as credit cards granted by listed department stores. The Credit Bureau is the information source of the delinquency ratio for department stores credit cards. The fall observed in 2018 is due to the fact that one sofom changed its status from regulated to non-regulated entity.

Mortgage loans

Total housing financing registered marginal growth in real annual terms, which contrasts with the decline observed in the previous *Report.* By type of lender, the portfolios of commercial banks and their related sofomes, as well as those of Fovissste, grew at a higher real annual rate than in the last *Report*, while financing granted by Infonavit continued contracting in real terms.

As for mortgage loans granted by commercial banks, during the fourth quarter of 2022 and first quarter of 2023, both the proportion of income allocated to mortgage payments (PTI) and the ratio of loan amount to property value (LTV), in general, remained at stable levels (Graph 46).

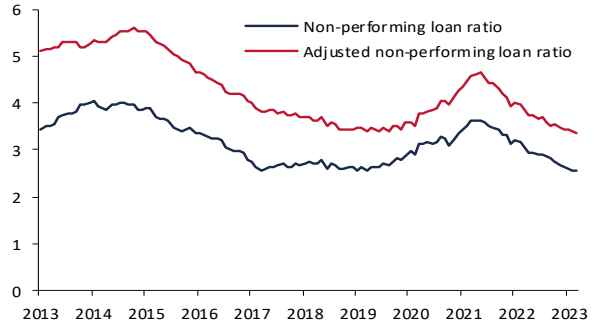
Graph 46
Loan-To-Value (LTV) and Payment-To-Income (PTI) of mortgage loans 1/, 2/
Percent



Preliminary data as of March 2023.
Source: CNBV.
1/ Recently-granted commercial bank mortgage loans.
2/ The shaded area represents the interquantile range of the respective metric.

The non-performing loan rate of the bank housing loan portfolio has continued its decline that began in June 2021, reflecting the decrease in its non-performing portfolio and the increase in its performing portfolio (Graph 47). This decrease in the non-performing loan rate is partly explained by the better performance of defaults in the most recent vintages (Graph 48).

Graph 47
Non-performing loan ratio and adjusted non-performing loan ratio on bank mortgage loans 1/
Percent



Data as of March 2023.
Source: CNBV.
1/ Total commercial bank mortgage loans.

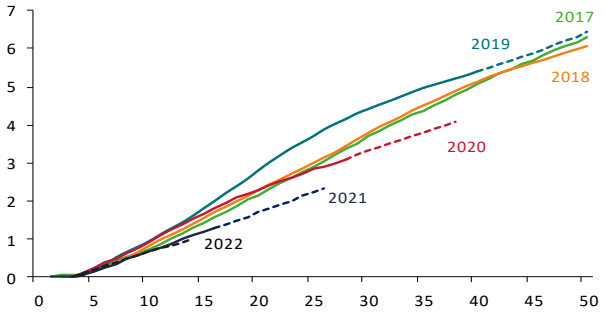
[24] The company is NU Mexico, a digital company specializing in credit cards, which acquired the sofipo *Akala* in December 2021 and concluded in December 2022 the merger of the two entities, leaving the business in Mexico only as a sofipo under the *Nu Mexico Financiera* brand.

Graph 48

Mortgage credit vintage [1/, 2/]

Vertical axis: Cumulative default rate in percent

Horizontal axis: Months elapsed



Data as of March 2023.

Source: CNBV.

1/ Commercial bank mortgage loans.

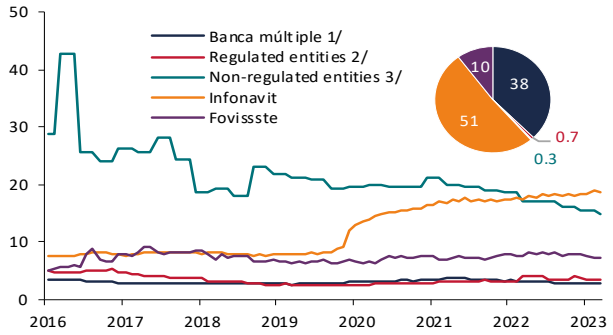
2/ The dotted lines represent an estimate based on the date of the latest available data.

In March 2023, Infonavit's mortgage portfolio non-performing loan rate registered one of its highest levels on record (since 2007).[25] The deterioration in this indicator is explained by an increase in past-due portfolio of loans denominated in both pesos and in minimum wages, as well as by a contraction in portfolio origination. In the same month, the non-performing loan rate of Fovissste's housing portfolio decreased with respect to previous months, a situation associated with the increase in the balance of outstanding housing portfolio due to the higher origination of traditional mortgage loans (Graph 49).

Graph 49

Non-performing loan ratio of mortgage portfolio

Percent



Data as of March 2023.

Source: Banco de México (SIE), CNBV, BMV and Condusef.

1/ Includes the loan portfolio of regulated sofomes having an equity linked with a bank, whether subsidiaries of the latter or not.

2/ Includes the credit portfolios of the development bank and of non-banking regulated financial intermediaries, such socaps, sofipos and sofomes regulated for issuing debt.

3/ Includes credit portfolio of non-regulated sofomes.

Breakdown of change in non-performing loans by gender

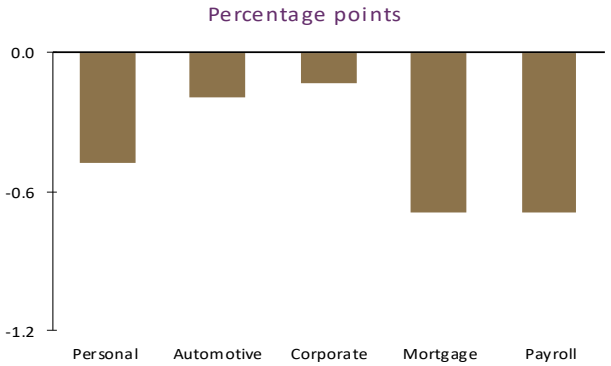
Women tend to face more barriers in accessing credit than men.[26] Thus, women who surpass these barriers are likely to have a better credit risk profile. In Mexico, as well as in other countries, the rate of non-performing loans among women is lower than for men for loans with similar financing characteristics (Graph 50).[27] In order to study the behavior of the non-performing loans rate, this section analyzes annual changes in default between women and men.

[25] It should be noted that, in December 2019, Infonavit made a significant reclassification of loans from performing to past due and raised the level of IMOR that had been observed without making the correction retroactively over time. For this reason, the IMOR levels that would be consistent with this classification for the period prior to December 2019 are not known.

[26] For example, Demirguc-Kunt et al. (2013) find that there are significant gender gaps in account ownership and use of savings and credit products, even after controlling for differences in individuals' characteristics, such as income and education.

[27] See D'Espallier et al. (2011) and Perrin and Weill (2022), who show that, at an international level, women exhibit higher compliance than men.

Graph 50
Difference between the Non-performing loan rate of women and men according to the credit portfolio

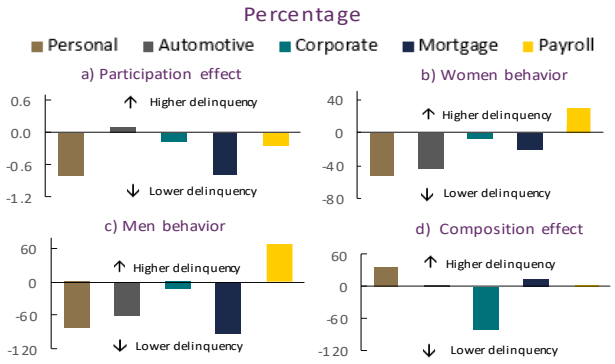


Source: Banco de Mexico.
Note: Information from December 2021.

The changes in non-performing loans rate are decomposed into: 1) increases in women's participation in the loan portfolio (*participation effect*).[28] Since women are less delinquent, a higher participation of women exerts downward pressure on the non-performing loans rate of a given portfolio; 2) changes over time in the non-performing loans rate of women and men, given an initial participation of women (*behavior effect*); and 3) changes in the proportion of loans with different financing characteristics (*composition effect*).[29]

The results suggest that a higher participation of women reduced the non-performing loans rate in personal, payroll, mortgage and corporate loan portfolios (Graph 51a).[30] This reduction was small because the increase in women's participation was limited in these four portfolios. Moreover, women's participation decreased in the automotive portfolio, and thus, in this case, the *participation effect* increased the level of delinquency. The results from the analysis show that an increase in women's participation in credit could improve the credit quality of the five portfolios.

Graph 51
Change in non-performing loans rate distinguishing between men and women[1/]



Source: Banco de Mexico.
1/ Negative values imply downward pressure on the non-performing loans rate. Difference in non-performing loans rate (IMOR) between December 2022 and December 2021.

The *behavior effect* reduced delinquency in most portfolios (Graph 51b and Graph 51c). For example, both women and men reduced their delinquencies in the mortgage and automotive portfolios, partly because the employment of formal workers with high salaries, who are those with access to these types of loans, increased more in regions where these portfolios are more represented. On the other hand, the *composition effect* tended to increase delinquency in most portfolios, partly due to a reallocation towards loans with a higher amount owed (Graph 51d).[31]

V.2.2. Non-financial private companies

Total financing to non-financial private companies in Mexico continues to decline in real terms, although the rate of contraction slowed with respect to that registered in the previous *Report.* By type of source, the external component now shows ten consecutive quarters of contraction. On the other hand, domestic financing registered positive growth in its three sources (bank, non-bank and debt issuance), a figure that contrasts with the contraction registered in the previous *Report* (Graph 52).

[28] Since annual changes are being studied, changes from 2022 are studied.

[29] The Oaxaca-Blinder methodology is used for the decomposition.

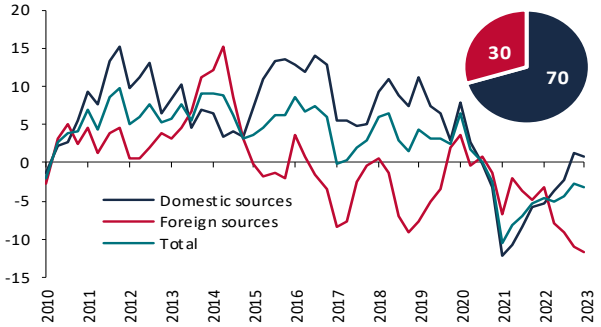
[30] For the corporate portfolio, only the gender of the loan applicant can be distinguished in the case of individuals with business activity.

[31] In other words, within the portfolio there was a reallocation towards higher amount loans. To understand the effects of this reallocation on delinquency, loans with the same interest rate and the same term, but different loan amounts are compared. It is found that, for the same rate and the same term, loans with higher loan amounts are associated with higher delinquency levels.

Graph 52

Total financing to private non-financial companies [1/]

Real annual percentage change



Data as of March 2023.

Source: Banco de México, BMV and SHCP.

Note: The percentages shown here consider the figures relating to non-regulated entities that grant financing and that are included at the bottom of Table 2 (Memo); therefore, the differ from those registered in the upper part of the same table. In addition, for non-regulated entities for which data stock echange is not available as they are in debt restructuring or liquidation processes, data from the Credit Bureau or Cundusef is used instead.

1/ Includes the loan portfolio of commercial banks and regulated non-bank entities such as regulated sofomes, socaps, sofipos and credit unions, ase well as non-bank non-regulated entities such as non-regulated sofomes and debt-issuing financial companies such as financial leasing companies or financial arms of automotive companies. Includes also debt securities issued both domestically and abroad. Also includes financing from suppliers for listed companies. The growth series is adjusted to take into account the start of availability of financing figures for non-regulated entities (2015-2016). The external financing figures are adjusted for FX effects.

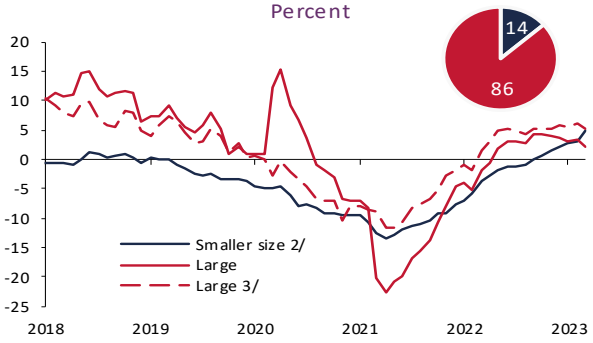
Although the cost of issuing international debt continued increasing since the previous *Report*, the current maturity profile gives companies with this type of debt some leeway, as few companies face maturities in the next two years.

The country's banks are the main providers of financing to companies. During the last three quarters, this portfolio has increased in real annual terms, a period in which credit was reactivated after the contraction associated with the pandemic (Graph 53). This growth is mainly explained by the increase in portfolio of large companies and by the growth in recent months of portfolio of smaller companies.

Graph 53

Real annual portfolio growth by company size [1/]

Percent



Data as of March 2023.

Source: CNBV.

1/ The pie chart shows the total percentage of the portfolio of each segment.

2/ Private-non-financial companies not listed on the Mexican Stock Exchange with maximum historical loans less than 100 million Mexican pesos.

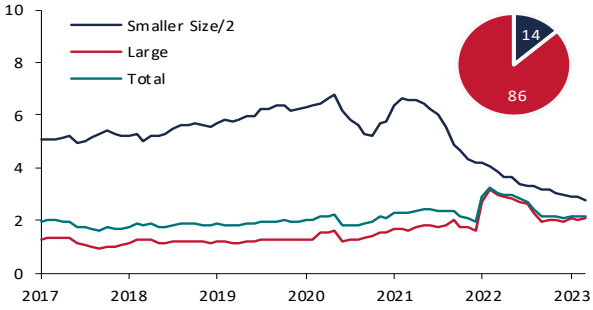
3/ Large companies excluding those that had a monthly increase in their balances of greater than 15% in March 2020.

The non-performing loan rate of portfolio granted by commercial banks to companies remained practically at the same levels during the fourth quarter of 2022 and the first quarter of 2023, after having decreased during the first three quarters of 2022. When analyzing the corporate non-performing loan ratio by borrower size during the period covered by this *Report*, a slight decrease in delinquency was observed for smaller companies (Graph 54).

Graph 54

Non-performing loan ratio by company size[1/]

Percent



Data as of March 2023.

Source: CNBV.

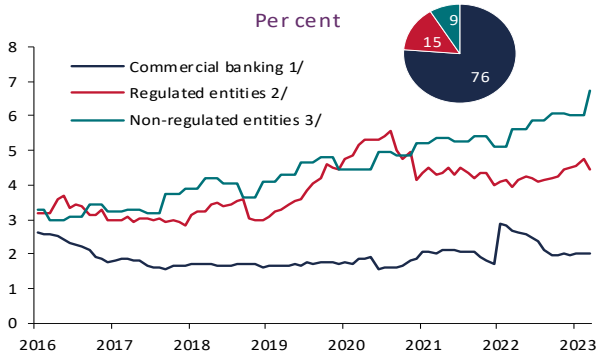
1/ The pie chart shows the total percentage of the portfolio for each segment.

2/ Private-non-financial companies not listed on the Mexican Stock Exchange with maximum historical loans less than 100 million Mexican pesos.

The non-performing corporate loan rate portfolio granted by non-bank financial intermediaries increased

with respect to that registered in the previous *Report*, mainly explained by the increase in the delinquency of non-regulated sofomes (Graph 55).

Graph 55
Non-Performing Ratio of Corporate Loans Portfolio

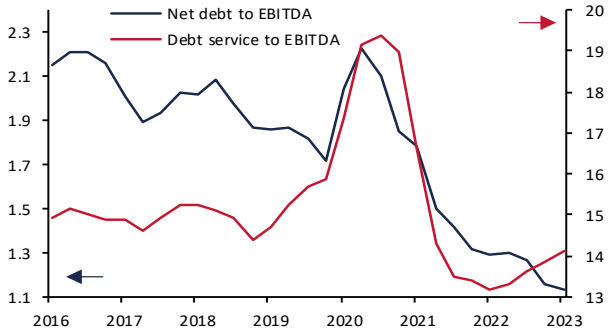


Figures at March 2023.
Source: Banco de México (SIE), CNBV, BMV and Condusef.
1/ Includes the credit portfolios granted by regulated sofomes for having an equity linked with a bank, whether subsidiaries of the latter or not.
2/ Includes the credit potfolios of non-banking regulated financial intermediaries, such as socaps, sofipos, credit unions, sofomes regulated for issuing debt, bond warehouses, development public trusts (FIRA, FOVI, FIFOMI) and government agencies (FND).
3/ Includes credit portfolio of non-regulated sofomes and debt-issuing financial companies, such as financial leasing companies or financial arms of automotive companies.

Non-financial private companies listed[32]

The annual operating earnings before interest, taxes, depreciation, and amortization (EBITDA) generation of listed private non-financial companies continued the contraction that began in the third quarter of 2022. Part of the reduction is explained by the effect of the appreciation of the peso on the listed companies' foreign currency revenues, which represent around 42% of their total revenues. On the other hand, although the debt balance of listed companies continued to decrease significantly during the first quarter of the year, debt service on interest payments increased (Graph 56). However, the increase in debt service is limited because companies have a debt structure that is not very sensitive to interest rate increases, and most of their debt is at fixed rates. The use of cash for debt repayment stabilized, while the use of cash for investment spending recovered.

Graph 56
Listed private non-financial companies' dndebtedness and debt service [1/]



Data as of March 2023.
Source: BMV and BIVA.
1/ EBITDA refers to earnings before interest, taxes, depreciation and amortization.

As for the maturity profile of the international debt of Mexican companies listed for the next two years, very few of them have maturities during this period. Therefore, it is expected that the tightening of international financial conditions will not affect the refinancing capacity of these companies significantly. However, in the event of an increase in volatility of the peso-dollar exchange rate, the financial statements of companies with foreign exchange exposure could be affected.

The exposure of the country's banks to listed non-financial private companies that exhibit some vulnerability is low relative to banks' net capital. Some small banks have a high credit concentration in certain economic sectors and, in the event of common shocks, the level of their net capital could deteriorate; however, the impact would be limited.

In this edition of the *Report*, the Vulnerability Index of Listed Companies (IVEL, for its acronym in Spanish) is incorporated (see Box 2). This indicator measures vulnerabilities of companies, both at the aggregate level and disaggregated by economic sector, using the latest available data. In the last quarter, the *IVEL* value decreased with respect to the previous two quarters due to the reduction in the leverage indicators of companies.

[32] Includes information of companies listed on the BMV and BIVA.

Box 2: Listed Firms' Vulnerability Index

I. Introduction

Financial vulnerabilities or imbalances of non-financial companies can affect financial stability.[1] A direct effect occurs when, in the event of an adverse shock, the most vulnerable companies default on the debt contracted with the country's financial institutions, potentially compromising their solvency and their capacity to provide credit to the economy. Corporate vulnerabilities can also have an indirect effect on the financial system through their impact on economic growth and their relations with other borrowers. This occurs when, in the face of a negative shock, the most leveraged companies have to face a reduction in spending and investment, which amplifies the initial effect of the shock on economic activity and on the financial institutions with which these companies, or agents linked to them, have liabilities.

In a context of tight financial conditions and greater risk aversion among investors, access to financing for non-financial companies may become more restrictive, especially for those with vulnerabilities. This may have an impact on the generation of new investment projects and may increase the refinancing risk of certain companies, potentially affecting the stability of the financial system. Given the relationship between the vulnerabilities of non-financial companies and financial stability, it is important to simultaneously monitor several of their financial indicators, such as leverage, debt service capacity and financing conditions.

This Box presents a Vulnerability Index of Listed Companies (*IVEL*, its Spanish acronym) on the Mexican Stock Exchange (*BMV*, its Spanish acronym) and the Institutional Stock Exchange (*BIVA*, its Spanish acronym). The objective is to summarize, in a single indicator, a set of non-financial corporate sector variables that provide quarterly information on the sector's potential vulnerability to adverse shocks. It also shows the relationship between this index and other variables that measure the credit risk of the corporate sector in Mexico. The methodology allows us to obtain information on the vulnerabilities of the companies listed at the sector level or by their economic activity. A database constructed from financial and accounting information of listed non-financial companies that report quarterly to the stock exchanges is used.

II. Methodology and data

The methodology for calculating the vulnerabilities index is based on that described by the European Central Bank (2020) and uses aggregate information that listed companies report in their financial statements to stock exchanges. The index is related to other corporate sector risk indicators such as the debt-at-risk index of Feyen et al., (2017) and indicators based on corporate default probability models, such as that of Duan et al., (2012).

This index summarizes the information contained in five categories of financial indicators, which concentrate information on the state of the companies' financial situation. These categories are: debt service capacity, leverage, refinancing, profitability and activity. The first three categories are related to the company's debt and seek to measure the company's leverage, the capacity to cover its obligations, as well as the potential refinancing risk. The last two categories are related to the company's activity: the first one measures the company's profitability and the second one includes some indicators of the company's operation that indicate whether the business is viable and has growth potential.

The *IVEL* is obtained by averaging the subindexes of the five vulnerability categories, giving equal weight to each one.[2] A higher index value reflects greater vulnerability. It should be noted that the difference of each variable with respect to its moving average of the last four years is calculated; therefore, a positive (negative) level indicates vulnerabilities above (below) those observed in the last four years. The Table 1 presents a summary of the variables, categories and signs assigned in the calculation of the *IVEL*.

The database includes all non-financial public companies listed in the Mexican stock market.[3] The information has a quarterly frequency from the first quarter of 2000 to the first quarter of 2023.

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[1] See *Committee on the Global Financial System* (2022) and Adrian et al. (2015).

[2] To calculate the index, the variables are standardized and the sign of the variables is modified if necessary so that a higher level of the variable reflects greater vulnerability. Let be x_{ijt} the variable i of category j in quarter t. It receives the following treatment:

$$\widetilde{x_{ijt}} = Signo_i \times \left(x_{ijt} - \mu_i\right) / \sigma_i$$

where $Signo_i$ takes the value of 1 or -1, as indicated in Table 1. μ_i y σ_i represent the mean and standard deviation of variable *i*.

Subsequently, the difference with respect to the moving average of the last four years is obtained:

$$\widetilde{x_{ijt}^{PM}} = \widetilde{x_{ijt}} - \sum_{h=t-16}^{t-1} \widetilde{x_{ijh}} /16$$

The transformed variables are averaged within each category to construct sub-indexes:

$$\text{Subíndice}_{jt} = \frac{1}{N_j} \sum_{i=1}^{N_j} \widetilde{x_{ijt}^{PM}}$$

To construct the aggregate index:

$$\text{Índice}_t = \frac{1}{5} \sum_{j=1}^{5} \text{Subíndice}_{jt}$$

[3] In total, information from 115 companies listed on the stock exchanges is used; however, in each period the average number of companies with available information is 85.

Table 1
Categories, variables and assigned sign [1/,2/,3/]

Debt service capacity	Leverage	Refinancing	Profitability	Activity
Interest paid / EBITDA (+)	Debt / Equity (+)	CP Debt / LP Debt (+)	Return on Assets (-)	Revenues / Total assets (-)
Cash / Total assets (-)	Debt / Income (+)	Cash / CP Debt (-)	UAFI / Income (-)	Days of accounts receivable [4/] (+)
Interest paid / Cash (+)	Net debt / EBITDA (+)	Operating Cash Flow / Debt CP (-)	Market capitalization / Stockholders ' equity (-)	Days of accounts payable [4/] (-)
Real annual revenue growth (-)		Weighted average cost of capital [4/] (+)		CAPEX / Cash Flow from Operations (-)

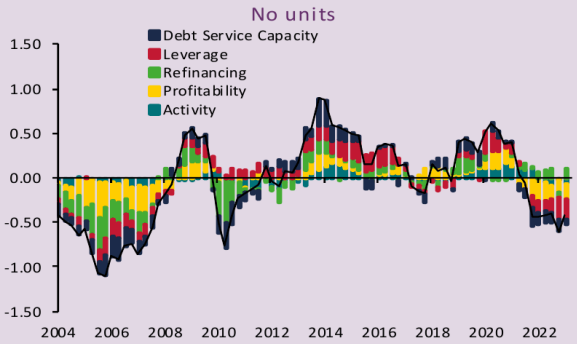
1/ The variables that come from the income statement or cash flow statement consider cash flows for the last 12 months.
2/ A positive sign means that a higher level of the indicator reflects greater vulnerability. A negative sign means that a higher level reflects lower vulnerability, so it is assigned a negative sign for the construction of the index.
3/ UAFI: income before financing and taxes.
EBITDA: earnings before interest, taxes, depreciation and amortization.
CAPEX: negative cash flow from investing activities.
4/ To aggregate these variables at the system level, an asset-weighted average is taken for each company. For the calculation of the rest of the variables, the sum of the items of all the companies is taken.

III. Results

In the Graph 1 shows the vulnerability index. It is noteworthy that the index reached its highest levels of vulnerability, first, during the 2008 global financial crisis. During this period, a deterioration in the profitability of companies was observed. Subsequently, the index registered high levels during 2014 and 2015, when different companies in the housing construction sector faced financial problems that were reflected in their debt service capacity. Finally, during the COVID-19 pandemic, vulnerabilities associated with the sector's leverage were observed.

Graph 1

Vulnerability Index for Listed Firms



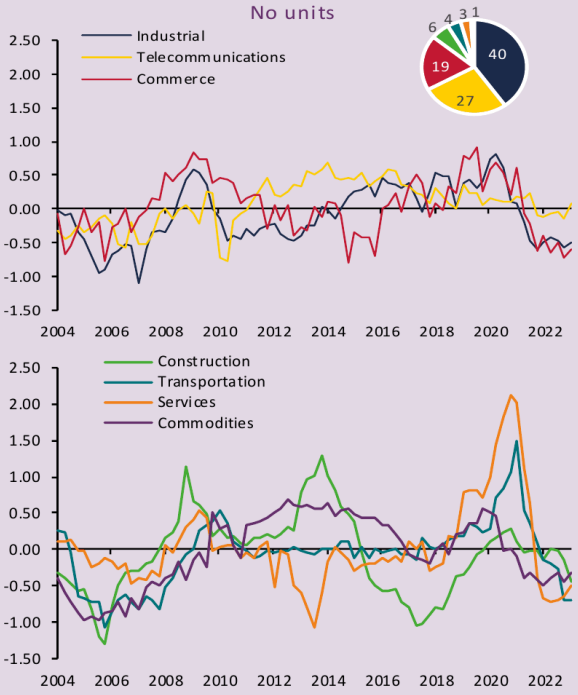
Data as of the first quarter of 2023
Source: Own calculations with data from Bloomberg.

It is noteworthy that, as of March 2023, the level of the *IVEL* was below its historical average and this is mainly due to the fact that corporate leverage has recently been reduced. Even so, the refinancing category indicates that this may be a source of vulnerability mainly due to an increase in the weighted average cost of capital.

In addition, the index can be calculated for each sector of economic activity, as shown in Graph 2. It can be seen that companies in the construction sector were the most affected during 2014, which was reflected in their high levels of debt and low cash generation. On the other hand, companies in the services sector were the most vulnerable during the COVID-19 pandemic due to a deterioration in their cash flow generation caused, in part, by the containment measures. It is also noteworthy that, as of the first quarter of 2023, all sub-indices are at a low level. Although the telecommunications sector shows the highest level of vulnerability, it is close to its historical average.

Graph 2

Vulnerability Index for Listed Firms by Sector [1/]



Data as of the first quarter of 2023
Source: Own calculations with data from Bloomberg.
1/ The circular graph represents the share of each sector in the total assets of listed firms as of the first quarter of 2023.

Finally, we explore the relationship of this vulnerability index with corporate credit risk indicators such as the number of net credit rating downgrades of Mexican non-financial firms (the difference between the number of downgrades and upgrades), the CEMBI value[4] , and the average probability of default of the Mexican corporate sector estimated by Bloomberg.

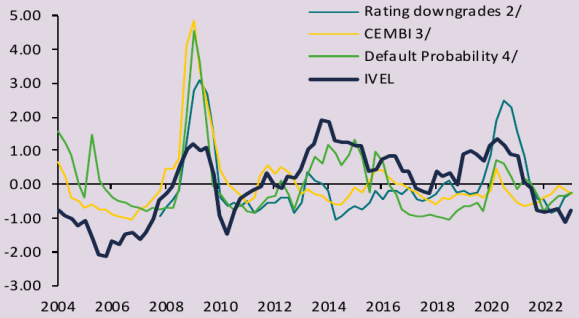
[4] The CEMBI is an indicator that measures the yield spread of the Mexican corporate sector's international debt.

In the in Graph 4 compare the *IVEL* with the aforementioned indicators and show that the level of the *IVEL* generally has a positive correlation with these indicators. It is noteworthy that the highest ratios are usually contemporaneous or slightly ahead of the *IVEL*; however, a limitation of the *IVEL* is that its availability may be less timely as it uses information from quarterly reports of the listed companies. Thus, the results suggest that the *IVEL* is a useful indicator and complements other aggregate risk indicators that are used on a recurring basis to report on the conjuncture and risks to financial stability.

Graph 3

Vulnerability Index for Listed Firms and other Indicators 1/

Standard deviations



Data as of the first quarter of 2023
Source: Own calculations with data from Bloomberg, S&P, Moody's and Fitch.
1/ To facilitate their comparison, all variables are standardized by subtracting their mean and dividing by their standard deviation.
2/ It represents the difference between the downgrades and upgrades in the credit ratings of Mexican companies announced by S&P, Moody's and Fitch.
3/ It represents the *Corporate Emerging Market Bond Index* for México published by JP Morgan.
4/ It represents the weighted average, by debt balance, of the default probability of listed companies based on Bloomberg's DRSK model.

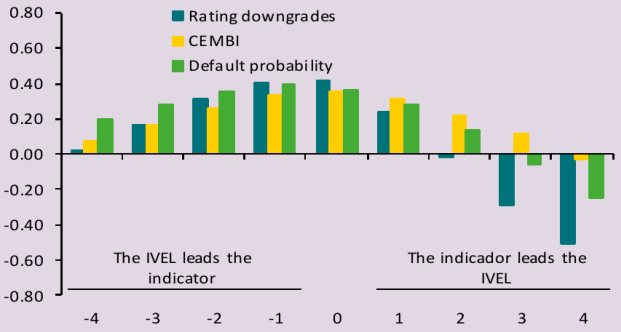
IV. Final considerations

Corporate vulnerabilities have several dimensions, so it is useful to summarize the most relevant financial indicators for companies as a whole. The Index of Vulnerabilities of Listed Companies presented in this Box makes it possible to identify episodes of high vulnerability of companies that could have an impact on the credit risk of the corporate sector and, therefore, on financial stability. Likewise, the *IVEL* allows the analysis of corporate vulnerabilities by source and economic sector with the objective of analyzing corporate risks in a practical and intuitive way. In addition, the index is correlated with other risk indicators of the Mexican corporate sector.

Graph 4

Vertical axis: No units

Horizontal axis: Number of quarters 1/



Data as of the first quarter of 2023
Source: Own calculations with data from Bloomberg, S&P, Moody's and Fitch.

1/ The level of each bar represents the value of the correlation of the specified indicator with the IVEL t quarters ahead, where t is plotted on the horizontal axis. If the bar reaches a maximum level with a positive t, the interpretation is that the indicator leads the IVEL. If the bar reaches a maximum level with a negative t, the interpretation is that the IVEL leads the indicator.

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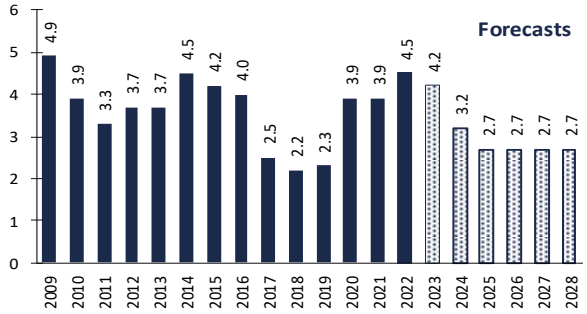
Feyen, E., Fiess, N., Zuccardi Huertas, I., & Lambert, L. (2017). *"Which emerging markets and developing economies face corporate balance sheet vulnerabilities: a novel monitoring framework,"* World Bank Policy Research Working Paper, (8198).

V.2.3. Public sector

V.2.3.1. Federal Government

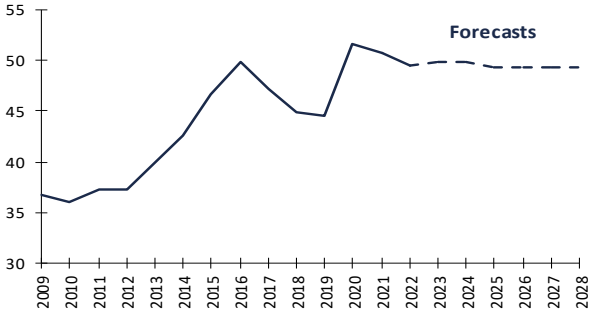
The public sector balance registered a deficit at the end of 2022 higher than that programmed in the Economic Package for that year. Within this balance, both public sector revenues and budgetary expenditures were higher than expected in the Federal Revenue Law (LIF, for its acronym in Spanish) and in the Federal Expenditure Budget (*PEF*, for its acronym in Spanish) for 2022. Thus, at the end of 2022, Public Sector Financial Requirements (RFSP, for its acronym in Spanish) recorded a deficit of 1.28 trillion pesos, equivalent to 4.5% of GDP. Meanwhile, the Historical Balance of Public Sector Financial Requirements (SHRFSP, for its acronym in Spanish) registered 14.1 trillion pesos, equivalent to 49.4% of GDP (Graph 57 and Graph 58).

Graph 57
Public Sector Financial Requirements 1/
Percent of GDP



Data as of April 2023.
Source: SHCP.
1/ Corresponds to the RFSP without a Banco de México operating surplus. Positive (+) figures represent a deficit, and negative (-) figures represent a surplus.. The data observed for 2009-2022 is taken from the Report on the Economic Situation, Public Finances and Public Debt, for the first quarter of 2023, the estimates for 2025-2028 are from the General Economic Policy Criteria and for 2023 and 2024 the update of the estimates of the General Economic Policy Pre-Criteria 2024 is used.

Graph 58
Public Sector Financial Requirements Historical Balance 1/
Percent of GDP



Data as of April 2023.
Source: SHCP.
1/Corresponds to the RFSP historical balance without a Banco de México operating surplus. Positive (+) figures represent a deficit, and negative (-) figures represent a surplus The data observed for 2009-2021 is taken from the Report on the Economic Situation, Public Finances and Public Debt, for the first quarter of 2022 and for the other years the estimate of the General Economic Policy Pre-Criteria for the year 2023 is used.

In the first quarter of 2023, the public sector balance had a lower deficit than as anticipated in the 2023 Economic Package. Both budgetary revenues and expenditures were below those programmed in the *LIF* 2023 and those foreseen in the *PEF* 2023, respectively. Meanwhile, the RFSP registered a deficit of 185.2 billion pesos and the SHRFSP stood at 14.0 billion pesos.[33]

By the end of 2023, the Federal Government anticipates a public balance deficit of 3.7% of GDP. To achieve this result, it expects budget revenues in 2023 to be 131.5 billion pesos lower than those projected in the 2023 LIF, while the budget spending in 2023 to be lower than that established in the 2023 *PEF* by the same amount. The RFSP is thus estimated to represent 4.2% of GDP and the SHRFSP to stand at 49.9% of GDP (Graph 57 and Graph 58).

V.2.3.2. State-owned productive enterprises

Petróleos Mexicanos (*Pemex*)

At the end of March 2023, *Pemex* registered a quarterly profit 54% lower than in the same quarter of the previous year. The lower profit level is mainly explained by a reduction in operating income, partially offset by the foreign exchange gain resulting from the appreciation of the peso against the dollar.[34] *Pemex*'s total debt balance in pesos, which includes suppliers, decreased 7% during the same period

[33] At the end of April, the public sector balance was -64.4 billion pesos. Budgetary revenues were 2,361.7 billion pesos and total net expenditure was 2,426.1 billion pesos. Meanwhile, RFSP were -115.9 billion pesos, while SHRFSP was 13.9 billion pesos. For more information, see "Información de Finanzas Públicas y Deuda Pública, Enero - Abril de 2023" by the Ministry of Finance (*SHCP*, for its acronym in Spanish).

[34] See Pemex's First Quarter 2023 Earnings Report.

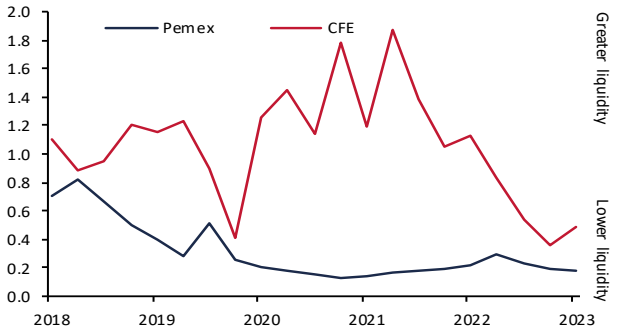
compared to the end of 2022.[35] In addition, the liquidity indicator decreased with respect to the previous quarter due to the reduction in the cash reserve during the same period (Graph 59).

In terms of *Pemex*'s debt maturity structure, as of March 2023 the company faces debt maturities of US$31.8 billion in 2023 and 2024 (29.5% of the total), of which the majority (72%) corresponds to bank debt, debt from bond issues in foreign currency (17%), and the rest from bond issues in domestic currency (11%) (Graph 60).[36] Additionally, during the first quarter of 2023, *Pemex*'s five-year CDS increased with respect to the previous quarter. Such increase began in February 2023.

Graph 59

Liquidity position of Pemex and CFE[1/]

Times

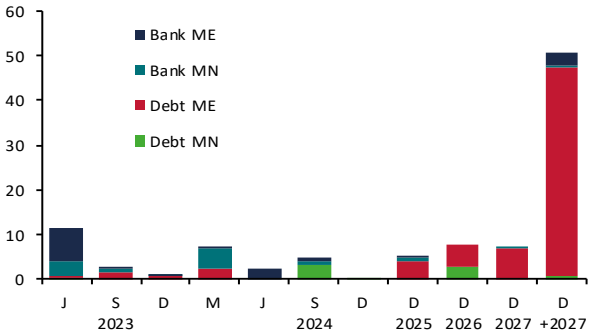


Data as of March 2023.
Source: BMV.
1/ It is defined as the result of dividing short-term cash and accounts receivable by the sum of 12-month liabilities with suppliers and 12-month financial debt.

Graph 60

Pemex debt maturities[1/], March 2023

Percent of the total debt



Data as of March 2023.
Source: BMV.
1/ At the end of March 2023, debt due to mature during the first quarter of the year was reported as current. That amount is included, for the purposes of the graph, within the amount to mature during the second quarter of 2023.

Between September 2022 and March 2023, risks of bank's exposure to *Pemex* remained limited, although direct exposure to *Pemex* increased, while exposure to *Pemex* suppliers decreased.

Federal Electricity Commission (*CFE*)

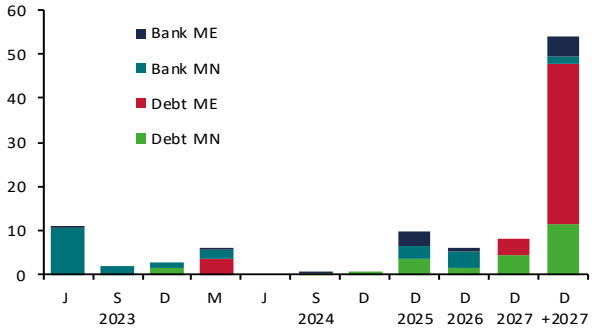
At the end of March 2023, *CFE* recorded a quarterly profit almost three times higher than that of the same quarter of the previous year. The profit is explained by higher revenues due to higher demand from domestic and industrial customers, lower operating costs associated with the use of energy and other fuels as inputs, as well as an increase in the foreign exchange gain resulting from the appreciation of the peso against the dollar. The peso balance of the company's debt decreased by 5.4% with respect to the previous quarter, due to a decrease in financing with suppliers and financial leases, as well as a favorable exchange rate effect.

In terms of *CFE*'s debt maturity structure, as of March 2023 the company faced debt maturities of US$5.4 billion during 2023 and 2024 (representing 22% of total debt), of which the majority (74%) corresponds to bank debt, debt from bond issues in foreign currency (16%), and the rest from bond issues in domestic currency (10%) (Graph 61).

[35] The balance of dollar-denominated debt remained unchanged from the previous quarter.

[36] According to *BMV* figures as of Q1-2023, Pemex's total debt balance amounts to US$107.8 billion.

Graph 61
CFE debt maturities [1/], March 2023
Percent of the total debt



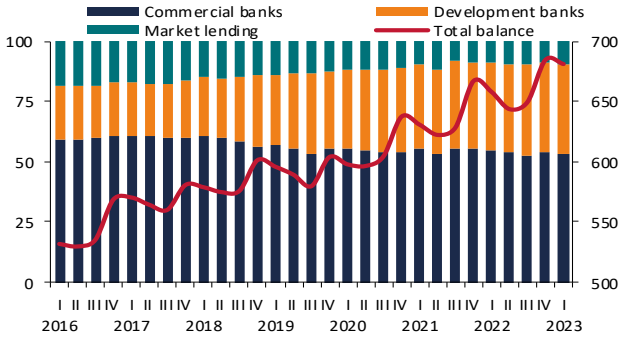
Figures as of March 2023.
Source: BMV.
1/ At the end of March 2023, debt due to mature during the first quarter of the year was reported as current. That amount is included, for the purposes of the graph, within the amount to mature during the second quarter of 2023. Debt interests from Pidiregas or with suppliers are not included.

The liquidity indicator improved with respect to the previous quarter due to a decrease in liabilities to suppliers and a higher cash reserve. As of March 2023, commercial banks' direct exposures to *CFE*, as well as to its suppliers, registered levels similar to those observed in September 2022. Finally, on April 4, the Federal Government announced an agreement with Iberdrola to acquire 13 electricity generation plants, which *CFE* will operate.[37]

V.2.3.3. Federal entities

During 2022, most of the financing obtained by subnational governments was long-term. In this regard, as of the first quarter of 2023, long-term credit represented around 96% of total credit to these governments, thus revealing an increasing trend. Likewise, during the first quarter of 2023, there was less dynamism in the contracting of short-term loans compared to the same period of the previous year. As a result, potential debt maturity risks and possible pressures on participatory and unrestricted revenues remain limited. On the other hand, development banks maintained their participation in financing granted to these governments, while commercial banks continue to be their main creditors (Graph 62).

Graph 62
Subnational government financing
Right axis: Billions of pesos
Left axis: Percentage



Data as of first quarter 2023.
Source: SHCP.

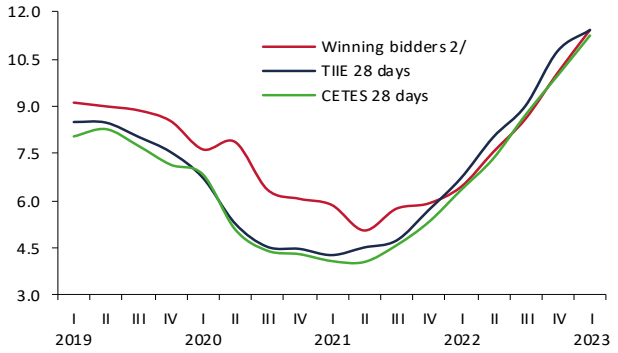
As of the first quarter of 2023, even though the 28-day *TIIE* rate has increased its level, bank financing conditions for state governments were favored by the competitive scheme for obtaining resources.[38] This has been reflected, in some cases, in comparatively lower financing costs, thus diminishing possible pressures on the cost of servicing these financings (Graph 63).

[37] See Ministry of Finance (*SHCP*) press release number 21 and number 23 of 2023. The transaction is for an amount of US$5.943 billion. The acquisition is planned to be carried out through the *Fondo Nacional de Infraestructura* (Fonadin), managed by *Mexico Infrastructure Partners*, and bank financing. The *SHCP* will make a capital contribution to Fonadin of 45 billion pesos to provide 51% of the value of venture capital. In addition, there will be 66.5 billion pesos in financing from development banks (Banobras, Nacional Financiera, and Bancomext) and some of Mexico's commercial banks.

[38] Mexico's Financial Discipline Law of the Federal Entities and Municipalities establishes that, to manage public finances sustainably, the federal entities must carry out competitive processes for the bidding of public debt and once the related legal instruments have been executed, the public entity must publish the results of such instruments on its official website.

Graph 63
Weighted average interest rate on offers of bank loan to state governments [1/]

Percentage



Data as of first quarter 2023.
Source: Prepared from state government released information.
1/ The Federal Entities and Municipalities Financial Discipline Law establishes that, for the sustainable management of public finances, federal entities must conduct competitive processes for public debt bidding and, once the related legal instruments have been executed, the public entity must post the results of such instruments on its official website.
2/ Posted information as of may 31th 2023 by state governments.

Since September 2022, the rating agencies maintained, in most of their reviews, an improved perception of the credit risk of subnational governments. In fact, during the aforementioned period, three state governments upgraded their ratings while the rest remained unchanged. On the other hand, as a result of recurrent defaults on its short-term debt, the government of one federal entity continues having the lowest credit ratings and a high probability of default.

The municipal governments rated by these agencies show, in some cases, conditions that have favored their improvement in credit risk perception. Thus, during the aforementioned period, fifteen entities registered changes in their ratings, eleven upgrades and four downgrades. In particular, one municipal government showed a marginal improvement in its high credit risk rating and another one showed a deterioration by registering the lowest rating.

As for the *SHCP*'s debt alert system, as of March 2023, twenty-nine state governments registered sustainable levels of indebtedness, four more entities than in the first quarter of 2022; additionally, two entities are under observation and no state government registered a high level of indebtedness (Figure 1a). As of December 2022, around two thirds of municipal governments with information available on their indebtedness showed sustainable debt levels, while two municipalities in the state of Durango and one municipality in the state of Sonora registered high debt levels (Figure 1b).

Figure 1
Subnational government debt sustainability

a) State governments, quarterly information

	2022-1	2023-1
SUSTAINABLE DEBT	25 entities [1/]	29 entities [1/]
OBSERVATION DEBT	Chihuahua, Coahuila, Colima, Nuevo León, Quintana Roo	Chihuahua, Coahuila
HIGH DEBT	Durango	No entity

b) Municipal governments, half-yearly information

	2021-2	2022-2
SUSTAINABLE DEBT	515 municipalities [2/]	579 municipalities [2/]
OBSERVATION DEBT	52 municipalities	32 municipalities
	Baja California Sur (2), Coahuila (4), Durango (6), Guerrero, Jalisco (4), México (3), Michoacán (3), Morelos (7), Nayarit (2), Nuevo León, Puebla, Quintana Roo (3), San Luis Potosí, Sonora (5), Tlaxcala, Veracruz (7), Zacatecas	Chihuahua (3), Cohauila (3), Durango (6), Jalisco (2), México (4) Morelos (3), Nayarit, Puebla, Quintana Roo, San Luis Potosí, Sonora (2) Tlaxcala, Veracruz (4)
HIGH DEBT	No municipality	3 municipalities
	--	Mapimí, Tlahualilo (Durango), Puerto Peñasco (Sonora)

Figures as of first quarter 2023 for state governments and as of second half-yearly 2022 for municipal governments.
Source: Prepared from SHCP information.
1/ The State of Tlaxcala has no loans and obligations for 2022 and 2023.
2/ As of second half-yearly 2021, 205 municipalities had failed to provide information and 16 entitites had not been rated, while as of second half-yearly 2022, 126 municipalities had failed to provide information and 48 entities had not been rated.

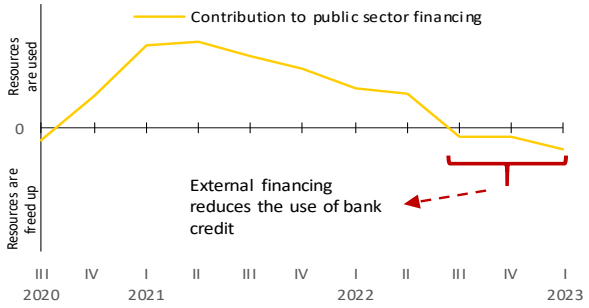
Thus, according to these indicators, the debt levels of state and municipal governments remain in sustainable conditions.

V.2.4. External sector and capital flows

Capital inflows can allow sectors with access to external financing, such as the public sector, to reduce their use of domestic bank credit. As a result, resources are freed

up for use in other sectors of the economy (see Box 3: *Range of the natural value of portfolio flows*). In the fourth quarter of 2022 there were capital outflows that were more than offset by capital inflows during the first quarter of this year. The public sector thus continued substituting domestic bank credit and freeing resources for other sectors (Graph 64). The magnitude of such substitution remained moderate, but increased in the first quarter of 2023.

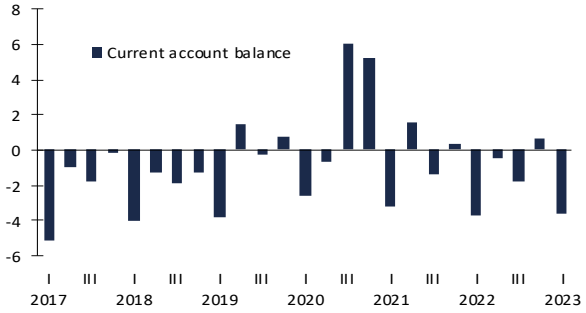
Graph 64
Contribution of net capital flows to real domestic financing growth of the Public Sector [1/]
Percentage points



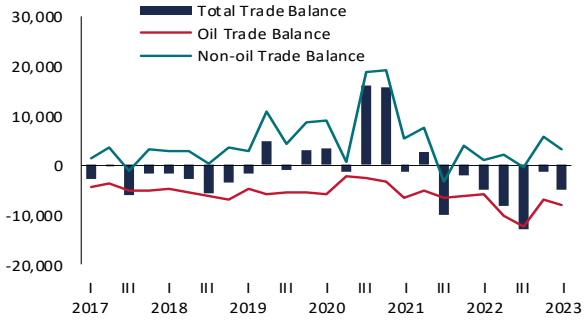
Data as of first quarter 2023.
Source: Banco de México and CNBV.
1/ The contribution of capital flows to financing is obtained as the difference between the annual growth rate of real financing and the rate that would have been observed in the absence of these flows. The latter rate is obtained by assuming, in a vector autoregressive (VAR) model, that the coefficients associated with capital flows and the shocks to them are equal to zero. The model uses data from Q12010 to Q12022 and a moving window of 31 quarters. Capital flows are defined as the sum of net direct, portfolio and other investment flows.

The current account recorded a surplus of 0.7% of GDP in the last quarter of 2022 and a deficit of 3.6% of GDP in the first quarter of 2023 (Graph 65a). Regarding its components, the non-oil trade balance registered a surplus in the fourth quarter of 2022 and in the first quarter of 2023, although of a smaller magnitude in the latter case. As for the oil trade balance, it was in deficit in both quarters, with a more negative balance in the first quarter of 2023 (Graph 65b). The financial account recorded a net borrowing abroad in the fourth quarter of 2022, largely due to the outflow of resources under the heading of other investment. In the first quarter of 2023 there was a net borrowing with a high level of capital inflows, mainly registered in the direct investment item.

Graph 65
Current account and trade balance:
a) Current Account
Percent of GDP



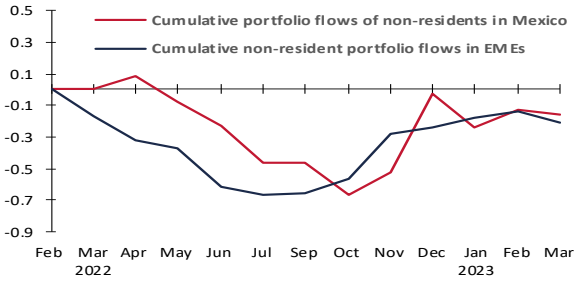
b) Trade balance
Millions of dollars



Data as of first quarter 2023.
Source: Banco de Mexico and INEGI.

Based on timely information from the Institute of International Finance (IIF), portfolio flows of non-resident investors in emerging economies continued exhibiting capital inflows in the last quarter of 2022 and the first quarter of 2023. Thus, this solidifies the recovery trend that portfolio flows have been showing since October 2022, following the decline they experienced at the beginning of the conflict between Russia and Ukraine. For Mexico, the recovery of portfolio flows also consolidated, with December 2022 standing out for its good performance. In March 2023, flows showed reduced momentum, reflecting the events in the banking sector of U.S. and Europe (Graph 66).

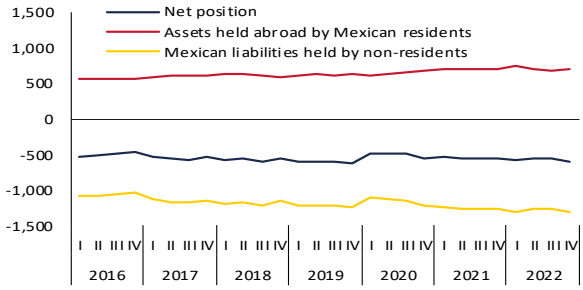
Graph 66
Cumulative non-resident Portfolio Flows to Mexico and EMEs[1/]
Percentage of 2020 GDP



Data as of March 2023.
Source: Institute of International Finance (IIF).
1/ The measure of portfolio flows from emerging economies included those countries considered in the monetary policy and international financial markets sections of the Quarterly Report January-March 2021 for which information was available in the IIF. This measure was obtained by adding the flows of all these economies and dividing the total by the sum of their GDP in 2020. The flows were accumulated since March 2022. The latest information for the rest of the EMEs is from February 2023 since it is the information most up-to-date available that allows obtaining a sufficiently large number of these countries.

The debit (net) international investment position of Mexico increased in the fourth quarter of 2022 compared to the same quarter of the previous year. Regarding assets abroad, investments by Mexican residents decreased by 2.2% and, on the liabilities side, investments from foreign sources decreased by 0.8% (Graph 67).

Graph 67
International investment position[1/]
Billions of dollars



Data as of Q4 2022.
Source: Banco de Mexico.
1/ It refers to the international investment position at the end of the period. The net international position is estimated by substracting liabilities from asssets and then adding the international derivative position. Mexican liabilities in the hands of non-residents have the sign changed with respect to how they are mesured in the international investment position statistics of the balance of payments to obtain the calculation of the country's net creditor position.

The international context continues posing risks ahead, including uncertainty in interest rates in the main advanced economies and a slowdown in the global economy. Therefore, Mexico must continue to maintain the soundness of its macro-financial fundamentals in order to preserve investor confidence and minimize the effects of a possible decrease in the supply of external financing.

Box 3: Range of Natural Value of Portfolio Flows

I. Introduction

Capital flows are essential for economic growth in emerging market economies (EMEs). These economies have lower savings rates and therefore use more external resources to finance investment, which can favor productivity and capital accumulation.[1] In addition, capital flows channel the savings of foreign investors. These investors have more diversified portfolios, which allows them to finance riskier and higher productivity projects.[2] Thus, capital flows can be beneficial in the long term, as they can boost an economy's potential output.

However, capital flows, and in particular portfolio flows, can fluctuate considerably over shorter horizons because they depend on factors that vary not only in the long term (structural factors), but also on factors that change over short periods (conjunctural factors) and factors that, while not being structural, have a more lasting effect (persistent factors). For instance, a brief phase of economic activity surpassing expectations and a structural reform that enhances potential output can both draw capital flows to an Emerging Market Economy (EME). Nevertheless, of these two events, the latter is expected to have more permanent effects.

Thus, it is important to consider the concept of the natural value of portfolio flows. This value measures the part of the flows that does not depend on cyclical factors and, therefore, is influenced only by persistent and structural factors. Thus, any difference between observed flows and the natural value makes it possible to identify upward or downward corrections in portfolio flows going in the future. These corrections can be important, as they can in turn generate adjustments (upward or downward) in other variables, such as the price of financial assets or the exchange rate.

The estimation of the natural value is complex because: i) this value is not directly observable, so it must be inferred using quantitative methods subject to statistical uncertainty, and ii) it is not constant, since the economic fundamentals and the macro-financial environment that determine them evolve over time.

This Box calculates a natural value of portfolio flows for the medium term and another for the long term in Mexico. Given the uncertainty inherent in measuring these values, various statistical methods are employed. By using the point estimates from each method, a range for the natural value is established, acknowledging the uncertainty associated with the estimate.

II. Conjunctural, Persistent and Structural Factors Affecting the Natural Level of Portfolio Flows

Various factors influence portfolio flows:

I. Conjunctural Factors. Conjunctural factors affecting portfolio flows can be understood as temporary shocks to the economy that alter the allocation of global investors' savings among different economies and a country's demand for funds in the short term. Two types of conjunctural factors can be identified according to the duration of their effects: a) those that have effects in the very short term and b) those that have effects of a duration similar to that of the business cycle and, therefore, take a little longer to dissipate.

In the very short term, publication of unexpected higher inflation data in advanced economies can trigger fluctuations in an EME's capital flows. However, if subsequent news contradicts and fails to confirm the upward trend in price growth, the impact will fade quickly. Similarly short-term, but over a duration resembling the business cycle, a surge in consumer confidence might temporarily bolster consumer spending, aggregate demand, and economic activity during the upswing of the cycle. Consequently, this could heighten imports and the nation's need for funds, prompting temporary capital inflows.

II. Persistent Factors. Persistent factors affecting portfolio flows can be understood as prolonged changes in the demand for certain assets, due to changes in the restrictions faced by the authorities and investors in assessing the risk of these assets, and in the restrictions faced by investors in the allocation of their portfolio. These factors, linked to the presence of imperfections or frictions in financial markets—such as global liquidity or regulatory changes—tend to manifest over the medium term. Even though they might not be permanent, they can significantly modify the distribution of global savings among countries over an extended period, surpassing the bounds of a typical business cycle.[3]

The inclusion of an EME's bonds in a global fixed income index, for example, can relax the constraints investors face in assessing the risk of these assets. When there is insufficient information to make this assessment, inclusion in a fixed-income index can be interpreted as a good signal, relax the constraints faced by investors by giving them more information about the risk of the assets and attract capital flows to an EME.[4] In addition, a policy of quantitative easing in an advanced economy can increase global liquidity, increase demand for certain assets and encourage risk-taking. These policies can reduce long-term rates on safer assets and tighten the constraints investors face in their portfolio allocation. Thus, lower rates may force investors with more constraints, such as fixed return targets, to demand riskier, higher-yielding assets, such as EME bonds, in order to meet them.[5]

III. Structural Factors. Structural factors refer to changes in economic fundamentals that affect the savings generated in the

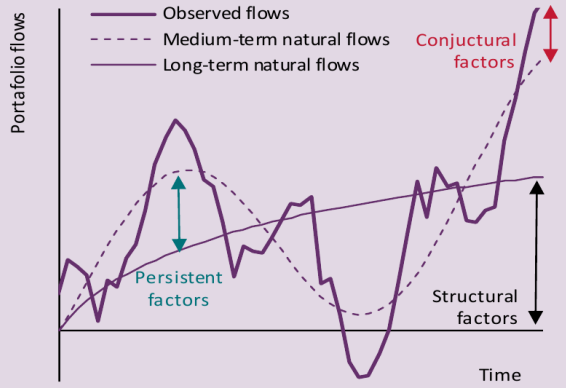
[1] Blanchard and Fischer (1989) and Obstfeld and Rogoff (1994) mention channels through which capital flows increase productivity and capital accumulation.
[2] Obstfeld (1994) argues that financing by more diversified investors allows sectors and firms with high productivity but low equity capital to access credit and reach a larger productive scale.
[3] Borio and Lowe (2002) show that different macrofinancial variables such as credit and financial asset prices exhibit highly persistent cyclical movements that typically have a duration longer than that of the business cycle. In this context, the concept of financial cycle is introduced.
[4] Denis, McConnell, Ovtchinnikov and Yu (2003); and Platikanova (2008) state that the inclusion of indexes reduces information asymmetry between investors and the bond issuer.
[5] In general, policies that increase liquidity and reduce long-term rates encourage greater risk-taking by investors (BIS, 2004; Rajan, 2005).

global economy or a nation's ability to access these savings. These factors, linked, for instance, to technological advancements, demographics, and a country's institutional framework, evolve at a slow pace over time and typically endure for significantly longer periods. As a result, their influence on portfolio flows tends to be more long-term in nature.

A decrease in the propensity to save, triggered for example by a worldwide demographic recomposition, reduces global savings and capital flows to EMEs in the long run. Institutional reforms, such as establishing an independent central bank, can enhance investor confidence in a country, leading to an increased share of this country in global investors' portfolios.

Figure 1

Medium and long term natural flows



Source: Banco de Mexico

III. Estimations of the Natural Value of the Portfolio Flows.

Statistical methods relying on historical flow data and economic models to estimate the natural value of medium and long-term portfolio flows. Employing point estimates from each method, we create a range for the natural value. Results are then interpreted by comparing this range with observed flows (smoothed using a one-year lagged moving average).

The Natural Value of Flows in the Medium Term

Average Flows Over a Business Cycle. A simple indicator of the medium-term natural value is the average of portfolio flows over the business cycle.[6] By calculating the average across the entire cycle, short-term and very short-term cyclical influences are removed. Consequently, deviations of flows from the natural medium-term value are solely contingent on conjunctural factors. These factors, like the aforementioned shifts in aggregate demand, only exert effects within the business cycle until prices of goods and services readjust. Conversely, alterations in the medium-term natural value are contingent solely upon persistent and structural factors.

Medium-term Component of Portfolio Flows. Through a Hodrick-Prescott filter, portfolio flows are decomposed into two elements: one reflecting fluctuations linked to the business cycle and another reflecting longer-term fluctuations. This second element can be interpreted as an approximate measure of the natural value of flows in the medium term.[7]

Fratzscher (2012) Model for the Medium Term. The Fratzscher model (2012) is utilized, wherein portfolio flows are contingent upon *pull factors* associated with the idiosyncratic characteristics of an economy, and *push factors* linked to the attributes of the global environment.[8]

The natural value of flows in the long term

Average Flows over Three Business Cycles. The average of portfolio flows across three economic cycles is calculated. By averaging across three cycles, both cyclical and persistent factors are accounted for. Consequently, deviations of flows from their long-term natural value are also influenced by persistent factors. For instance, global liquidity, as previously mentioned, only impacts within the financial cycle until the market frictions or imperfections affecting the constraints faced by authorities and investors diminish in influence. Conversely, the long-term natural value of flows is solely driven by changes in structural factors.[9]

Long-term Component of Portfolio Flows. The Hodrick-Prescott filter is employed to isolate the long-term component of the flows, effectively removing business cycle and medium-term fluctuations. [10]

Natural Flows Levels from Burger et al. (2022). A measure from Burger et al. (2022), built upon the economic model proposed by Tille and van Wincoop (2010). In this model, the natural level of long-term flows is contingent upon the

[6] To determine the business cycles, the GDP gap with respect to its trend, which is estimated with a Hodrick-Prescott filter. The average is calculated as a moving average. The window in which this average is calculated ends in the reference quarter, while the start of the window is chosen so that its size corresponds to the length of the cycle prior to that of the reference quarter. In addition, an additional exercise was performed to validate these results. In this additional exercise, the official business cycle dating issued by the Mexican Economic Cycle Dating Committee was used to determine the business cycles. It was found that the results were very similar when using this methodology.

[7] A smoothing value of λ = 1,600 is used, since the data are quarterly. In addition, the tail correction method of St-Amant and van Norden (1997) is applied.

[8] *Push* and *pull* factors include the equilibrium interbank interest rate (TIIE), the effective Federal Funds rate, the Ted spread (calculated as the difference between the US Treasury bond rate and the three-month LIBOR rate), the VIX index, Mexican and US stock market returns, and the standardized Mexican and US macroeconomic surprise indexes. The predicted value of the regression model estimated in eight-year moving windows, consistent with the typical maximum length of a business cycle, is reported as natural flow. To exclude the effect of conjunctural factors, the predicted value is calculated with an average of the independent variables in the rolling window, with the exception of interest rates. These latter enter with the observed value because, according to the significance measure proposed by Drehmann *et al.* (2012), a larger part of their movement is driven by persistent factors.

[9] To determine the length of each economic cycle, the GDP gap with respect to its trend is used, which was estimated using a Hodrick-Prescott filter.

[10] A Hodrick-Prescott filter is used. The data are extended to the corresponding period keeping the onset fixed. A smoothing parameter of λ = 400,000 is used, recommended by Drehmann and Yetman (2018) for phenomena lasting more than one business cycle, such as the credit gap. In addition, the tail correction method proposed by St-Amant and van Norden (1997) is applied.

Information that has been published by Banco de México.

accessibility of global savings and the weight of each economy within the portfolio of global investors.[11]

IV. Results

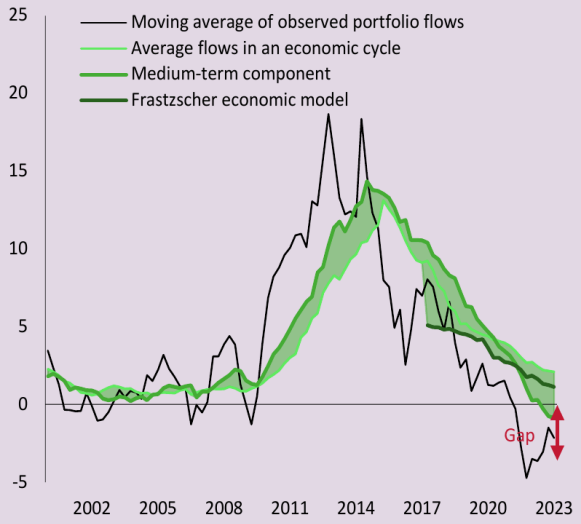
Graph 1 illustrates the observed flows (smoothed using a one-year lagged moving average), the medium-term natural value estimate derived from each of the three methodologies, and the range calculated from these three estimates. Between 2000 and the onset of the 2007 Global Financial Crisis, the range of the natural value exhibited minimal change. However, starting in 2009, this range saw an increase, reflecting the upward influence of persistent factors. These included the pursuit of higher yields by global investors in a context of heightened global liquidity due to the quantitative easing policies enacted by advanced economies' central banks. Moreover, Mexico's incorporation into the WGBI (World Government Bond Index), a global fixed income index, might have also contributed to this increase in the range.[12] Subsequently, from late 2014, the range of the medium-term natural value began to decrease notably, primarily attributed to the gradual scaling back of liquidity measures.[13] Following this, China's integration into global financial markets, notably evidenced by its inclusion in global fixed income indices like the WGBI, might have offered investors additional insights and enhanced perceptions regarding the risk and quality of Chinese bonds.[14] Consequently, this might have prompted a shift away from bonds issued by economies such as Mexico, exerting further pressure on the range.

Fluctuations of flows from their medium-term natural value (gap) are attributed to conjunctural factors. Thus, the gap gets rectified upon the disappearance of these factors, i.e., when prices of goods and services fully adjust, and a business cycle concludes. For instance, in late 2000 and early 2002, flows fell below the range of their medium-term natural value, reflecting the downturn in the United States' business cycle due to the downward revision of earnings expectations tied to technology companies and their adverse impact on economic activity in Mexico. However, this gap persisted only for one business cycle, as it was rectified in the subsequent period with a reversal in the opposite direction.

Graph 1

Range of medium-term natural flows [1/ 2/ 3/]

Billion dollars



Data as of first quarter of 2023

Source: Banco de Mexico, IMF, Bloomberg, CreditSuisse and IIF

1/ The portfolio flows to Mexico for 2023 Q1 were imputed with information from the IIF.

2/ One year moving average.

3/ The measurement of the Fratzscher (2012) model begins in 2017 with the start of the IIF data (2009) and the sample required to estimate the first rolling window of eight years.

Conversely, the range of long-term natural flows has steadily and gradually expanded in tandem with global economic growth, as the latter contributed to increased savings availability (Graph 2). Furthermore, institutional enhancements within the country, such as the establishment of an independent central bank with explicit inflation targets and a sound fiscal framework, have instilled confidence, enhancing the ability of the country to access these savings. Consequently, this has exerted additional upward pressure on the long-term natural range of portfolio flows.

In this case, the gap is due to conjunctural and persistent factors and also anticipates future corrections in the opposite direction, albeit over longer periods. For example, the fact that flows were above the range in the mid-2010s is consistent with the downward correction in later years. Recently, the gap between observed flows and long-term equilibrium values has become significant, indicating a possible upward correction in the future.

[11] Burger, *et al.* (2022) measure global (private) saving as the cross-country sum of the IMF *national saving* variable, minus the net government borrowing. To measure a country's asset share within the global portfolio, the authors take the ratio of its international investment position over the sum of the wealth of the world's other countries. Source: Banco de México, IMF *WEO*, Credit Suisse.

[12] Mexico joined the WGBI in 2010.

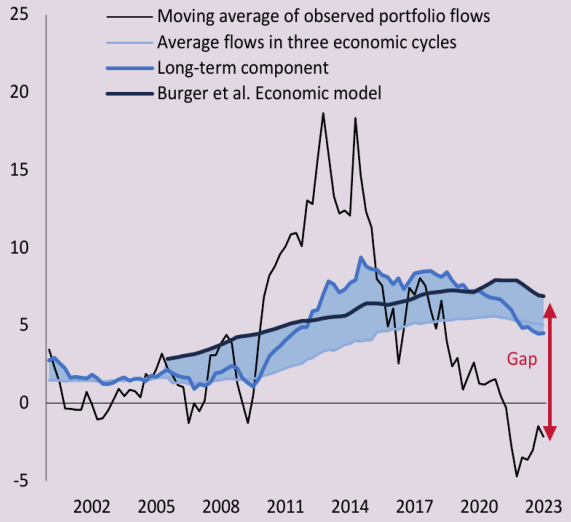
[13] The inclusion of an economy in fixed income indexes, such as the WGBI, or changes in portfolio strategy related to a country's sovereign bonds, such as Norway's, are reflected in the natural value to the extent that they have an impact on Mexico's portfolio flows. Thus, for example, it is observed that both the entry of China and the change in the strategy of the Norwegian Sovereign Fund affected the natural values in Mexico, more pronounced for the medium-term natural value and for the events related to the entry of China than for the change in the strategy of the Norwegian Sovereign Fund.

[14] China joined the WGBI in 2021.

Graph 2

Range of long-term natural flows [1/ 2/]

Billion dollars



Data as of first quarter of 2023

Source: Banco de México, IMF, Bloomberg, CreditSuisse and IIF

1/ The portfolio flows to Mexico for 2023 Q1 were imputed with information from the IIF.

2/ One year moving average.

V. Conclusion

Similar to other unobservable trends in the equilibrium level of economic indicators—such as nominal and real neutral interest rates, the natural rate of unemployment, and potential output—the natural value of capital flows serves as valuable information for policymakers. It enables them to differentiate between conjunctural or short-term fluctuations and those that could have prolonged impacts (Burger et al. (2022)). Estimating the natural values of portfolio flows for the medium and long term in Mexico indicates potential for growth in portfolio flows moving ahead. Future studies could delve into examining the variables influencing gap during different periods. Additionally, as more information becomes available, research could explore how recent phenomena, such as the pandemic or nearshoring, might influence the long-term natural value of flows.

In this context, it is crucial for the country to persist on the path of institutional reinforcement and the implementation of public policies that have facilitated the increase in the natural long-term value of portfolio flows. Attracting external resources remains pivotal for fostering productivity growth and capital accumulation in an emerging economy.

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V.3. Institutions

Banks remain the most important financial intermediaries, followed by siefores (Table 3). In addition, the financial system's assets grew slightly. While assets of commercial banks and most other non-bank financial intermediaries (NBFIS) increased, those of institutional investors (mutual funds, siefores and insurance companies) and brokerage firms decreased. Meanwhile, the concentration of the five largest institutions by sector decreased in the case of commercial banks; however, it increased slightly in most other financial institutions, a situation that contrasts with that observed in the previous *Report.*

Table 3

Mexican Financial System Structure

	Number of entities[2/]	Share of total assets		Real annual growth rate of assets	Share of Top 5 largest entities[3/]
		in the Fin. Syst.	in GDP		
	No units	Per cent	Per cent	Per cent	Per cent
Commercial banks[4/]	50	45.3	44.1	2.1	66.5
Siefores (afores)[5/ 6/]	118 (10)	19.1	18.6	-1.7	75.9
Investment Funds (Managers)[7/]	626 (30)	10.5	10.2	-0.1	67.5
Development Institutions[8/]	10	9.8	9.5	1.9	88.4
Insurance Companies	113	7.7	7.5	-0.5	43.1
Broker dealers	36	3.5	3.4	-2.3	60.1
Non-regulated sofomes[9/]	1,341	1.9	1.8	-2.0	12.7
Regulated sofomes[10/]	25	1.0	1.0	5.6	73.3
Savings and Loan Cooperatives (socaps)	154	0.8	0.8	2.9	54.6
Popular Finance Corporations (sofipos)[11/]	37	0.2	0.2	75.6	79.7
Credit Unions	72	0.2	0.2	-1.5	49.1
Bond warehouses	15	0.1	0.1	5.1	92.8
Total System	**n.a.**	**100.0**	**97.5**	**0.8**	**n.a.**
Memo: Infonavit, Fovissste and Infonacot	*3*	*8.5*	*8.3*	*1.7*	*n.a.*

Figures at March 2023.

Source: BMV, CNBV, CNSF, Consar y Condusef.

1/ This table includes the direct financing granted by the financial institutions mentioned here and may not match the direct and induced financing reported in the Development Banking section.

2/ Refers to the number of entities that report positive assets and may differ from the number of entities authorized to operate.

3/ The five largest entities by assets within each sector are:

Commercial Banks: BBVA, Santander, Banorte, Citibanamex y HSBC.

Siefores: XXI Banorte, Profuturo, Citibanamex, SURA y Coppel.

Investment Funds (Managers): BBVA Bancomer Gestión, Impulsora de Fondos Banamex, Sam Asset Management, Operadora de Fondos Banorte y Operadora Actinver.

Development Institution: Banobras, Nafin, Bancomext, Banjército y FIRA.

Insurance Companies: Pensiones Banorte, Grupo Nacional Provincial, Seguros BBVA, Pensiones BBVA y Metlife México.

Broker dealers: Banorte-Ixe, Finamex, Goldman Sachs, Actinver e Invex.

Regulated sofomes: GM Financial, Cetelem, Arrendadora y Factor Banorte, Ford Credit y Operadora de Servicios Mega.

Non- regulated sofomes: Crédito Real, Marverde Infraestructura, BMW Financial Services México, Caterpillar Crédito y Préstamos Felices en 15 Minutos.

Socaps: Caja Popular Mexicana, Caja de Ahorro de los Telefonistas, Caja Morelia Valladolid, Coopdesarrollo y Acrimex.

Sofipos: Nu México Financiera, Libertad Servicios Financieros, Consejo de Asistencia al Microemprendedor (CAME), Financiera Sustentable y Crediclub.

Credit Unions: Ficien, Unión de Crédito Agricultores de Cuauhtémoc, Unión de Crédito para la Contaduría Pública, Unión Crédito Alpura y Agropecuario de la Laguna.

Bond warehouses: Afirme, Mercader, Sur, Banorte y Accel.

4/ The total assets of the commercial bank include regulated sofomes that are subsidiaries of the respective bank.

5/ The set of pension funds managers (afores) are 10 and they manage 118 Siefores.

6/ An increase in the number of siefores has been observed since January 2020 due to the Siefores' new Investment Regime based on Generational Funds, in accordance with the modifications to the rules issued by the Consar on December 16th, 2019. Available here: https://www.gob.mx/cms/uploads/attachment/file/517105/BP-32-2019_TDF_transicio_n_VF_2_.pdf

7/ The set of Investment Fund Managers (30) manage 626 Investment Funds.

8/ Includes Development banks (6), FND and development public trusts (FIRA, FOVI and FIFOMI).

9/ The figures referring to the number of unregulated sofomes come from the Registry of Commissions - RECO (Condusef). For purposes of number, those sofomes that present a positive portfolio are considered. The asset figures refer to the total credit portfolio granted by these entities reported to Condusef. The credit portfolios of those unregulated sofomes that grant credit only to related entities or subsidiaries are not taken into account, since they are not credit intermediaries in the strict sense.

10/ Sofomes regulated for having equity links with a bank, but are not subsidiaries of said bank and therefore do not consolidate their assets, are considered. Some belong to a financial group. Other sofomes are regulated because they issue debt securities and also are included here.

11/ In December 2022, Nu México, a Fintech entity specialized in credit cards, merged its business with a sofipo that no longer operated, and which it acquired in December 2021. As of December 2022, its assets accounted for in the sofipos sector and becomes the largest entity with a market share of 40%, increasing the concentration of the five largest entities in the sector to 80% from the 66% reported in the last REF. Before this migration, there is no information on this entity as its status is that of a non-public financial company and therefore it was not included in any statistics of this or previous editions of the Report.

V.3.1. Commercial banks

In the last quarter of 2022 and the first quarter of 2023, commercial bank assets continued recovering, mainly as a result of the expansion of the loan portfolio and securities operations.

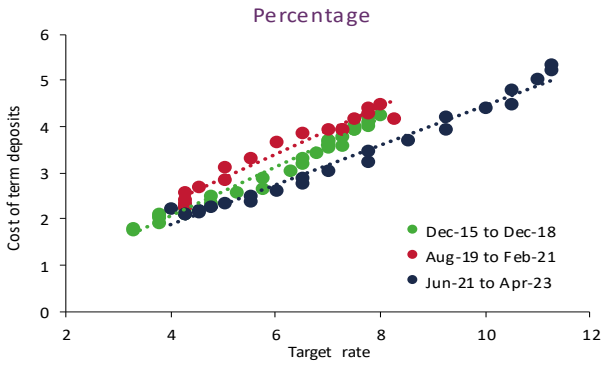
Liabilities also increased, mainly reflecting higher levels of funding. In this context, the cost that banks pay for their deposits has not fully reflected the current tightening cycle. In fact, despite an increase in funding costs (Graph 68a), the structural change observed during 2020 in total deposits in commercial banks, towards a higher level of demand deposits,[39] may have led to a smaller increase than implied by the trajectory of the target rate. In particular, given that demand, deposit accounts tend to pay a much lower rate than longer-term deposit accounts, the higher share of demand deposits observed in the upward cycle that began in June 2021 leads to a lower response of the weighted rate of the total deposit cost than in previous cycles, in which the share of demand deposits was lower. On the other hand, the lending rate applicable to the total loan portfolio of commercial banks has shown a greater response than in the previous upward cycle, but clearly lower than that of the 2019 to 2021 cycle (Graph 68b).

In this context, sensitivity of commercial banks' balance sheet to interest rate variations shows balanced positions between assets and liabilities, such that the effect of adjustments in interest rate levels is, in general, limited.

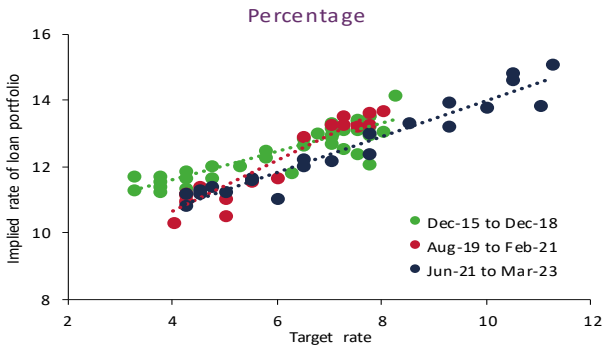
Graph 68

Evolution of the target rate and financial intermediation[1/]

a) Cost of term deposits[2/]



b) Implied rate of loan portfolio[2/3/]



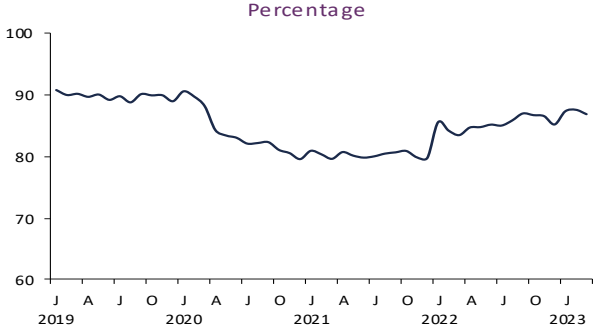
Data for cost of term deposits as of April 2023, for implied rate of loan portfolio as of March 2023.
Source: CNBV and Banco de México.

1/ The financial intermediation defined as deposit taking and local currency loan portfolio and foreign currency loan portfolio.
2/ Three cyclces are considerated for target rate review, first one restrictive as of December 17, 2015 to December 20, 2018 (525 basis points), secondly expansionary as of August 15, 2019 to February 12, 2021 (-425 basis points), and thirdly restrictictive as of June 25, 2021 to end April 2023 (725 basis points). The monthly average cost of term deposits in domestic currency includes demand deposits, time deposits and interbank deposits.
3/ Implied rate annualized-month = (Interest income / Outstanding loan portafolio stage 1 current an end balances) x 12.

It is worth mentioning that, despite an increase in loan portfolio, itis far from being greater than the funds raised by commercial banks (Graph 69).

Graph 69

Loan portfolio to deposit taking ratio [1/]



Data as of March 2023.
Source: CNBV.
1/ Includes loans from banks and from sofomes regulated for having equity links with a bank. Includes domestic and foreign currency.

Solvency

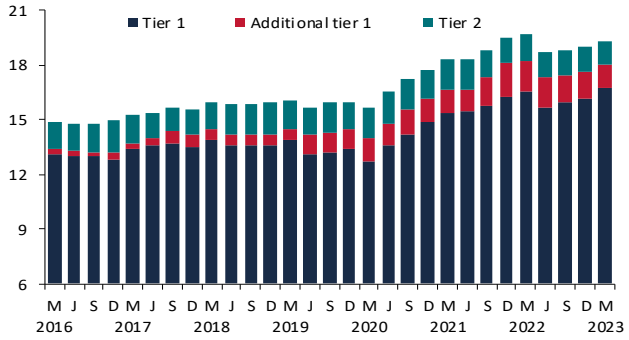
Commercial banks continue being the most important institutions in terms of total assets in the financial system and their share of total assets has increased, in contrast to the lower share of other financial

[39] See Box 5 of the Financial Stability Report December 2022.

institutions. In general, commercial banks maintain high levels of capital and liquidity.

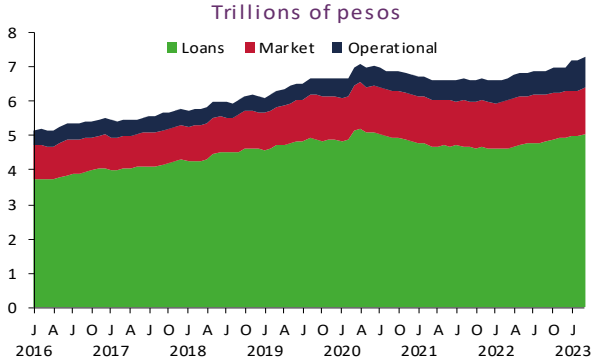
In particular, the Capital Adequacy Ratio (CAR) increased by 55 bps between September 2022 and March 2023, registering a level of 19.30% (Graph 70). This behavior reflected an expansion in regulatory capital, derived from an increase in fundamental capital, which more than offset a higher level of assets subject to risk, as a result of an expansion of assets subject to credit risk and operational risk (Graph 71). In particular, the growth in core capital reflected both an increase in earned capital and a reduction in equity investments in some banks' financial subsidiaries. On the other hand, the increase in assets subject to operational risk originated, in part, from the entry into force of the requirement under the business indicator methodology as of January 2023. As a result, commercial banks exhibited high levels of capitalization, which would have allowed them to face possible risks derived from the economic situation.

Graph 70
Structure of banks' Capital Adequacy Ratio (CAR)[1/]
Percentage



Data as of March 2023.
Source: Banco de México.
1/ Capital Adequacy Ratio is calculated by dividing net capital by risk-weighted assets. Net capital includes Tier 1, Additional tier 1 and Tier 2. Tier 1 includes earned capital and shareholder contributions, it has the major ability to absorb potential losses. Additional tier 1 includes perpetual subordinated bonds and surplus reserves, and therefore it has a lower ability to absorb potential losses, while Tier 2 includes specif term subordinated bonds, and therefore it has a lowest ability to absorb possible losses.

Graph 71
Risk weighted assets[1/]
Trillions of pesos



Data as of March 2023.
Source: Banco de México.
1/ Risk weighted assets reflect the associated risk of loan portfolio. Market risk weighted assets are a risk measure that a banking institution holds due to market factors to which their assets are exposed; while weighted operational risk is a risk measure for possible losses due to inadequacies or failures in internal processes, personal and internal systems or due to external facts.

In connection with the sale of Citibanamex's consumer and retail banking segment announced in 2022, Citibanamex continued evaluating possible sale options and in May 2023 Citigroup announced that, after careful analysis, the sale process will be through an initial public offering (IPO) on a stock exchange. The separation of the businesses to be sold is expected to be completed during the second half of 2024, and the IPO is expected to occur during 2025.[40] Notably, the IPO was one of the alternatives for the sale since the beginning of the process. In this context, through this mechanism, the sale process must comply at all times with the conditions established in the Mexican regulatory framework.

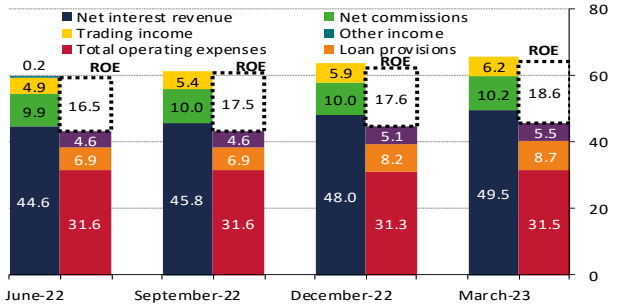
Profitability

The profitability of commercial banks, measured as the ratio of twelve-month net income to average stockholders' equity for the period (ROE), continues growing. In particular, at the end of March 2023, this variable increased with respect to the last *Report*. The level of profitability of the banking sector as a whole is due to higher revenues from net interest income and trading income, in relation to the levels of loan-loss provisions and administrative expenses (Graph 72). However, there is heterogeneity among banks in the system due to differences in business models. Usually, those with a higher level of profitability and capital are

[40] See Citigroup press release.

better able to withstand shocks and have greater flexibility to originate loan portfolios under adverse conditions.

Graph 72
Commercial banks profitability components (12-month flow)
Percent of 12-month average capital



Data as of March 2023.
Source: CNBV.

Financial indicators at risk

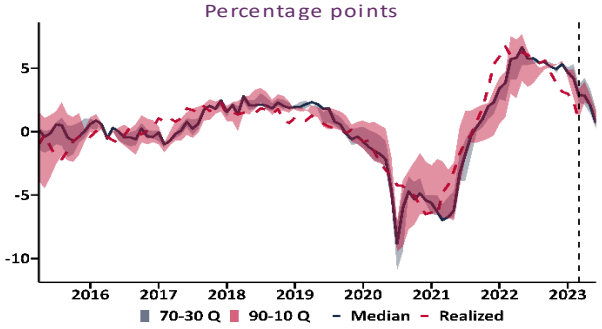
Forecasts of some banking financial indicators are useful tools to identify trends and allow early identification of potential risk accumulation or materialization situations. However, point forecasts provide limited information on these indicators. Using the methodology described in Box 6 of the June 2022 Financial Stability Report, it is possible to make projections of some relevant indicators, so that not only a point forecast, but also, through different estimates of quantiles, a distribution is available, which allows identifying which indicators have a higher level of uncertainty in the estimate, which is usually reflected in higher levels of risk.

Indicators shown reflect the annual change in profitability, net interest margin and ROE; indicators for credit growth; and, finally, an indicator of the change in risk of the credit portfolio, estimated by the change in the non-performing loan rate of such portfolio.[41]

Indicators on profitability measures show that, after registering declines during the pandemic, both ROE and net interest margin (Graph 73 and Graph 74) recovered their growth rates, but with a tendency to return to pre-pandemic growth rates.

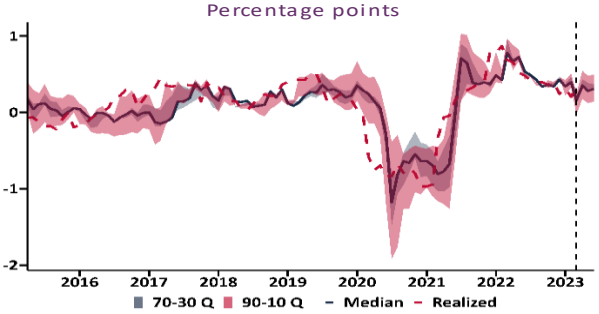
The projection of credit growth also shows a slight slowdown and considerable uncertainty in the greater dispersion of estimates (Graph 75). As with the profitability indicators, a return to pre-pandemic levels is observed.

Graph 73
Out of sample predictions with a horizon of 3 months: ROE
Percentage points



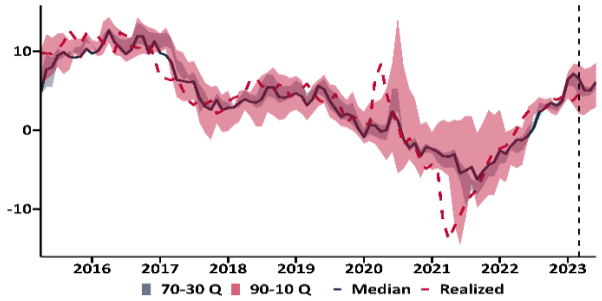
Data as of March 2023, and forecast up to June 2023.
Source: Banco de México.

Graph 74
Out of sample predictions with a horizon of 3 months: Financial margin
Percentage points



Data as of March 2023, and forecast up to June 2023.
Source: Banco de México.

Graph 75
Out of sample predictions with a horizon of 3 months: Real credit growth
Percentage points

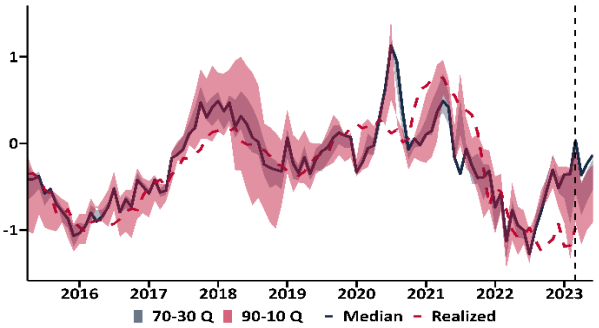


Data as of March 2023, and forecast up to June 2023.
Source: Banco de México.

Finally, the growth rate indicators of adjusted non-performing loans rate (*Imora*, for its acronym in Spanish) are shown. This indicator also reflects a high degree of uncertainty, and although it is still at low levels and, indeed, negative, the growth rate distribution shows high levels of uncertainty regarding this indicator (Graph 76).

[41] In all cases, out-of-sample forecasts are presented for a three-month horizon obtained using quantile regressions of these indicators.

Graph 76
Out of sample predictions with a horizon of 3 months: Ajusted non-performing ratio
Percentage points

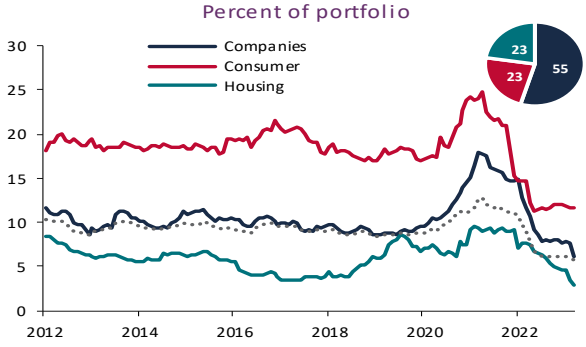


Data as of March 2023, and forecast up to June 2023.
Source: Banco de México.

Credit risk

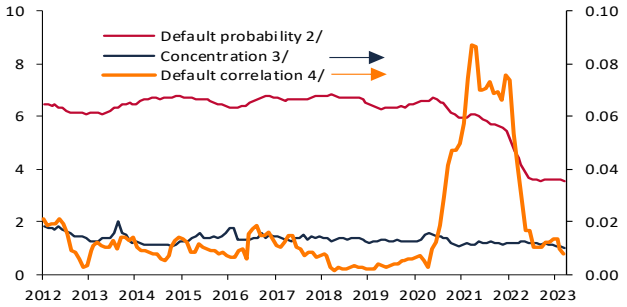
After having remained at stable levels during the fourth quarter of 2022, banks' credit risk, measured by the conditional value at risk (CVaR) at a 99.9% confidence level as a proportion of the loan portfolio, decreased during the first quarter of 2023, from 6.0% in September 2022 to 5.7% in March 2023 (Graph 77a).[42,43] This behavior is mainly explained by decreases in the default correlations of the corporate, housing and consumer loan portfolios over the last few months (Graph 77b).[44]

Graph 77
a) Conditional Value at Risk (CVaR) by type of portfolio[1/]
Percent of portfolio



Data as of March 2023.
Source: Banco de México, CNBV and Credit Bureau.
1/ Using a time period of one year and a confidence level of 99.9%. The pie chart shows the total percentage of the current balance for each portfolio segment.

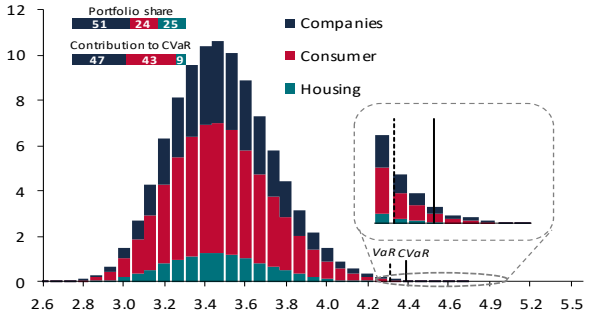
b) Portfolio concentration, probabilities and default correlation[1/]
Percent



Data as of March 2023.
Source: Banco de México, CNBV and Credit Bureau.
1/ Components used as inputs to compute the CVaR of the portfolio.
2/ Average default probability of the portfolio on annual horizon.
3/ Portfolio concentration measured using the Herfindahl-Hirschman Index.
4/ Average default correlation of the portfolio on annual horizon.

Considering all commercial banks' loan portfolio exposures, a distribution of potential credit losses is generated in order to estimate different credit risk metrics (Graph 78). It should be noted that, although consumer portfolio is more fragmented, it has a relatively high probability of default, which makes its contribution to CVaR considerably higher than its share of the total portfolio balance (43% vs. 24%).

Graph 78
Simulated credit loss distribution of the system
Horizontal axis: Percent of portfolio[/]
Vertical axis: Percent



Data as of March 2023.
Source: Banco de Mexico, CNBV, and Credit Bureau.
1/ The percentage of loss for each portfolio is relative to the total loss, within eac interval. The VaR and CVaR levels are 99.9%.

[42] The conditional value at risk (CVAR) allows to assess the losses in the tail of the distribution, given that it represents the expected loss value when greater than the VAR, which, in turn, represents the percentile that corresponds to a given confidence level in a loss probability distribution of a portfolio of credit risk assets.

[43] Credit *VaR* is calculated using the "Capitalization and Credit Risk" (CYRCE) model. The main elements of this model are the probability of default for each loan, the potential default variance and covariance structure, and the portfolio's structure and concentration level. An explanation of the model can be found in Banco de México, *Financial System Report* 2006 (May 2007), 64-67 and in Javier Márquez Diez-Canedo, A New Vision of Credit Risk, Limusa (2006).

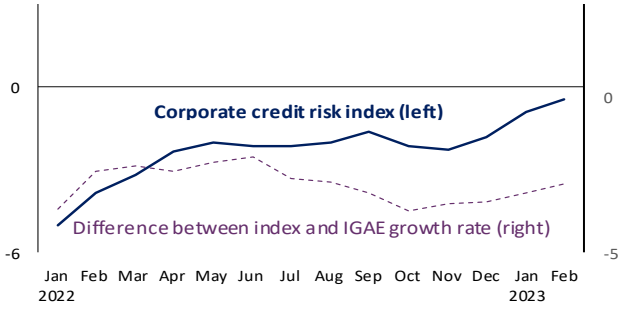
[44] The default probabilities and correlations used in the model are estimated through the observed historical default rates of loans, whose reference can be found in Banco de México, *Financial System Report* 2006 (May 2007), Box 10.

Banks' exposure to changes in inflation, economic activity and formal employment

Indicators are created to evaluate how inflation, formal employment and economic growth (measured through the Global Indicator of Economic Activity, IGAE, for its acronym in Spanish) affect credit risk in the corporate, payroll, mortgage, automotive, personal and ABCD portfolios.

For the corporate portfolio, the indicator signals risk when the IGAE falls in the aggregate and/or when economic activity falls in the sectors with the largest share of credit.[45] The indicator improved with respect to the data from the previous *Report*, reflecting lower credit risk (Graph 79). The improvement was greater than that of the IGAE, due to the good performance of sectors with higher weight in credit than in production, such as construction.

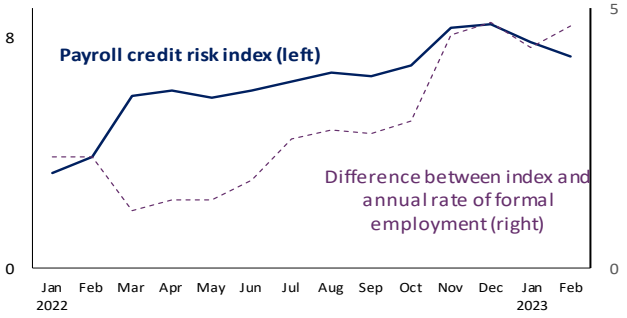
Graph 79
Corporate portfolio credit risk due to changes in economic activity
Variation in percent (rate without base effect)



Data as of February 2023.
Source: Own elaboration with information from Banco de México and INEGI.
For the index, 0 corresponds to the risk associated with the IGAE of February 2020 (base period).

For the payroll, mortgage and automotive portfolios, the indicators signal risk when formal employment falls in the aggregate and/or when it falls in labor markets with more credit participation.[46] The payroll indicator improved since the previous *Report.* This occurred despite the slowdown in formal employment, due to the good performance of labor markets with high credit participation, such as the higher-wage labor market in the State of Mexico (Graph 80). For the mortgage and automotive portfolios, the indicator also improved, with a significant improvement in mortgages due to the good performance of employment in entities with more housing construction, such as Mexico City.

Graph 80
Payroll portfolio credit risk due to changes in formal employment
Annual variation in percent



Data as of February 2023.
Source: Own elaboration with information from Banco de México, INEGI and IMSS.

For the ABCD and personal portfolios, the indicators measure risk due to inflation, as borrowers in these portfolios have less purchasing power and are more affected by price increases.[47] The indicators signal risk when headline inflation increases and/or when inflation increases in expense components consumed more by borrowers with more participation in a loan portfolio.[48] Since the last *Report*, the risk in ABCD decreased. This decrease was greater than that of headline inflation because: (i) borrowers[49] with more ABCD participation spend proportionally more on food; (ii) food inflation dropped more in annual terms than headline inflation. Personal credit risk also decreased, but less than in ABCD because: (i) its borrowers spend more on housing and education; (ii) part of the decrease in housing inflation was offset by higher inflation in education (Graph 81).[50]

[45] The indicator is built as the sum of economic growth in the different sectors. The weight given to the growth of each sector is equal to its share in the corporate loan portfolio. Both aggregate and sectoral changes in economic growth are registered.

[46] The threshold for high-wage formal employment is defined as the median of the historical wage distribution of borrowers.

[47] See Box 1: Inflation and delinquency in non-revolving consumer credit in the December 2022 Financial Stability Report.

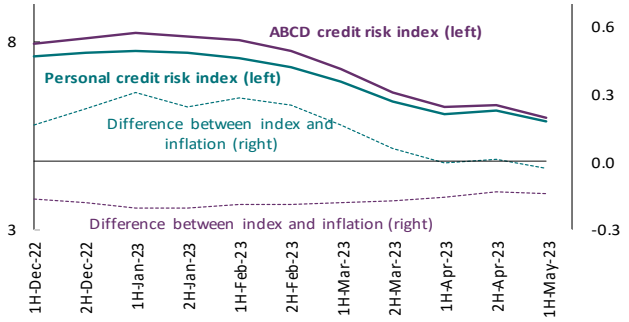
[48] To construct the indicators, first, the inflation to which each municipality is exposed is estimated, then a national average is calculated by weighing each municipality by its share of personal credit and ABCD.

[49] The borrowers are identified through spending patterns considering the socio-demographic strata of each region of the country.

[50] This exercise uses data from the consumer price index based on the information structure by object of expenditure and economic activity by state, which presents disaggregated information on expenditure items such as food, education, leisure and housing, among others. This

Information that has been published by Banco de México.

Graph 81
Credit risk in personal and ABCD portfolios due to changes in inflation
Annual variation in percent

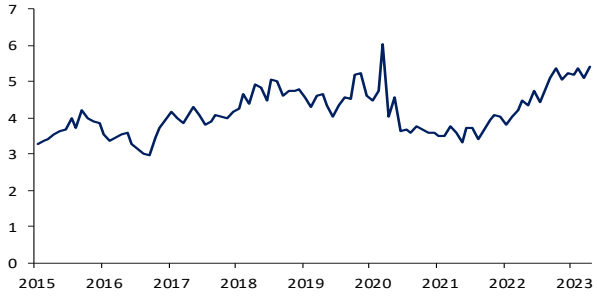


Data as of the first half of May 2023.
Source: Own elaboration with information from Banco de Mexico and INEGI.

Market risk

Banks' market risk, as measured by market CVaR as a share of net capital, increased slightly between September 2022 and April 2023, from 5.11% to 5.41%, respectively; with a minimum value of 5.03%, reached in November 2022. The change is mainly due to adjustments in banking institutions' positions in instruments that are exposed to FX risk, as well as in debt instruments, which are sensitive to increases in interest rates, as well as the risk of variable income instruments. This increase was offset by the rise in net capital during the same period (Graph 82).

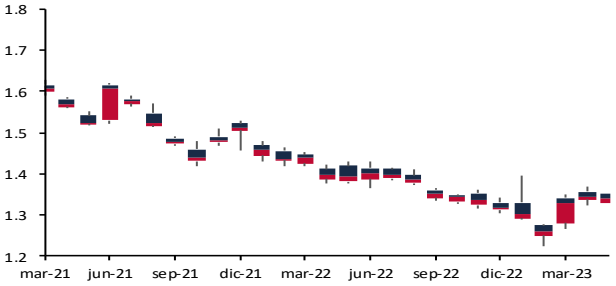
Graph 82
99.9% CVaR for commercial bank's market risk
Net capital percent



Data as of April 2023.
Source: Banco de Mexico, CNBV, BMV, Bloomberg and Valmer.

The sensitivity of the debt securities portfolio to changes in interest rates, measured through duration, based on market information, has shown an increasing pattern as of March 2023, changing the previously observed decreasing trend. This change is mainly due to the recomposition of the institutions' portfolios to instruments with remaining terms longer than one year. As of May, duration stood at an average level of 1.35 years, showing a marginal increase with respect to the value registered in December 2022 of 1.31 years (Graph 83).

Graph 83
Average monthly duration of commercial bank's position
Years

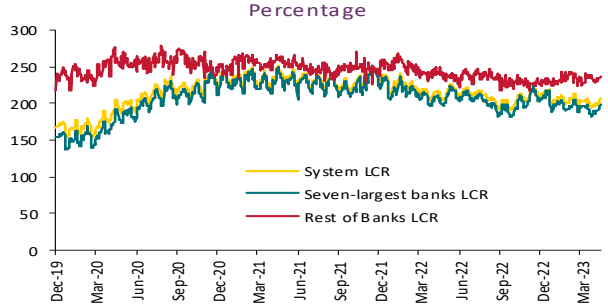


Data as of May 2023.
Source: Banco de México and Valmer.

Liquidity risk

During the first half of 2023, the liquidity of the banking system remained ample, as measured by short-term liquidity indicators, both in domestic and foreign currency (Liquidity Coverage Ratio and Foreign Currency Investment Regime, among others), which remain above regulatory thresholds and pre-pandemic levels (Graph 85). At the individual level, all commercial banks maintained an average Liquidity Coverage Ratio (LCR) higher than 100% during the first quarter of 2023 (Graph 86).

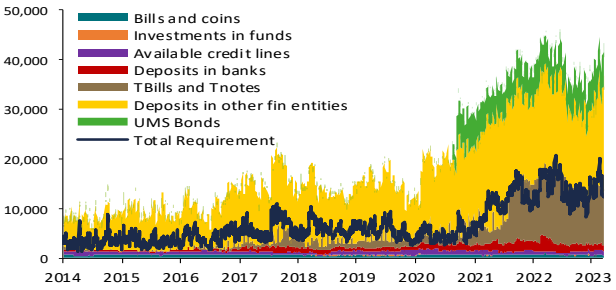
Graph 84
Daily LCR of the banking system and group of banks
Percentage



Data as of May 15, 2023.
Source: Banco de México.

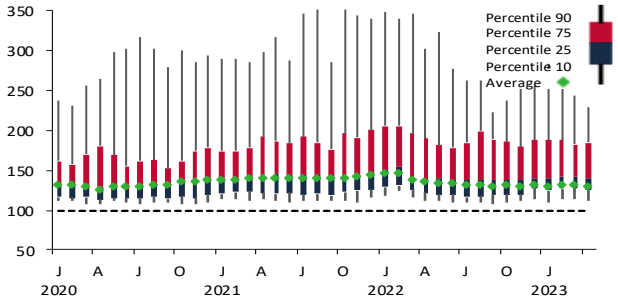
classification allows for a detailed analysis at the state level and by type of expenditure component. This information differs from the one provided by the National Consumer Price Index (*INPC*, for its acronym in Spanish) and its subindex, such as core and non-core, and their respective disaggregates. An illustrative example is the housing item: in the classification by object of expenditure, this item includes concepts such as electricity and fuels. However, in the INPC subindex classification, the housing item, which is in the core subindex, excludes these items, since they are recorded in the non-core subindex.

Graph 85
Liquidity requirement in foreign currency and liquid assets
Millions of USD



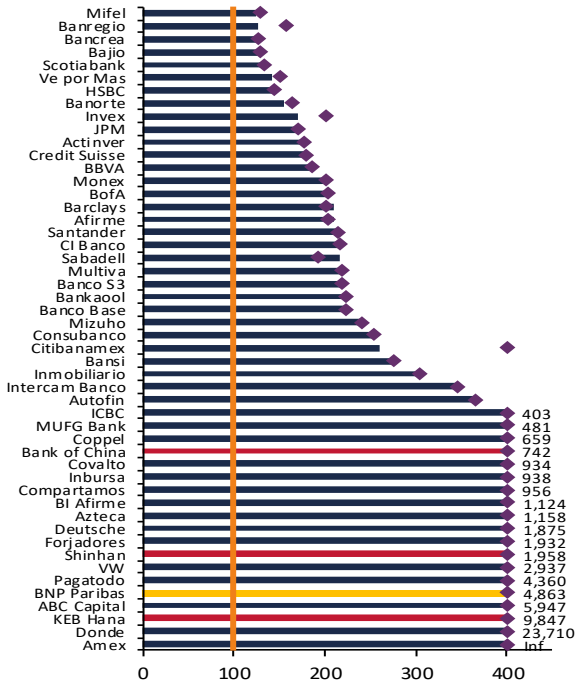
Data as of May 15, 2023.
Source: Banco de México.

Graph 87
NSFR Distribution
Percentage



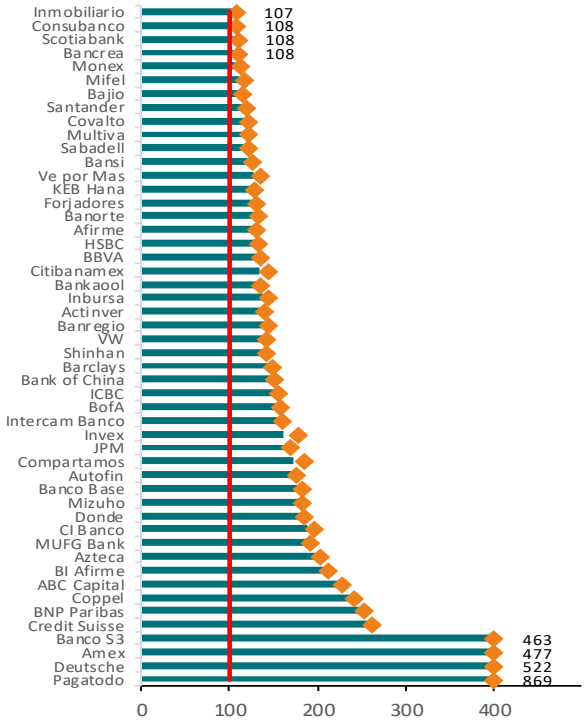
Data as of April 2023.
Source: Banco de México.

Graph 86
LCR of commercial banking institutions [1/]
Percentage



Data from January to March 2023.
Source: Banco de México y CNBV.
1/ The graph shows the quarterly average of the LCR for each bank from January to March 2023. The bar shows the consolidated LCR and the rhombus the individual LCR. In accordance with the regulation, banks marked in dark blue must meet a minimum LCR of 100%, banks marked in red a minimum of 90% and banks marked in yellow a minimum of 60%.

Graph 88
NSFR of commercial banking institutions [1/]
Percentage

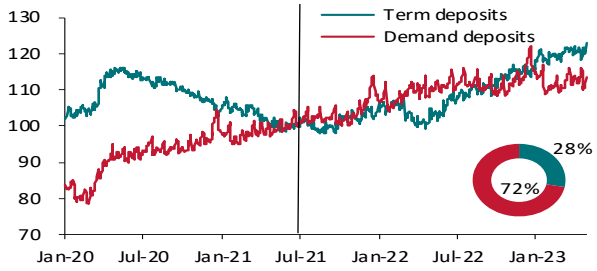


Data from January to March 2023.
Source: Banco de México y CNBV.
1/ The graph shows the quarterly average of the NSFR for each bank from January to March 2023. The bar shows the consolidated NSFR and the rhombus the individual NSFR.

The structural liquidity position, measured by the Net Stable Funding Ratio (NSFR), has remained steady, with marginal changes relative to its pre-pandemic levels (Graph 87). All commercial banks maintained an average NSFR above 100% during the first quarter of 2023 (Graph 88).

Deposit funding at the banking system level remains above pre-pandemic levels and without relevant changes in its composition. Traditional funding (demand and term) continues to represent about 70% of banks' funding, and has continued to grow during the upward cycle of reference rates. In an environment of rising interest rates, deposits, mainly term deposits, are expected to remain strong (Graph 89).

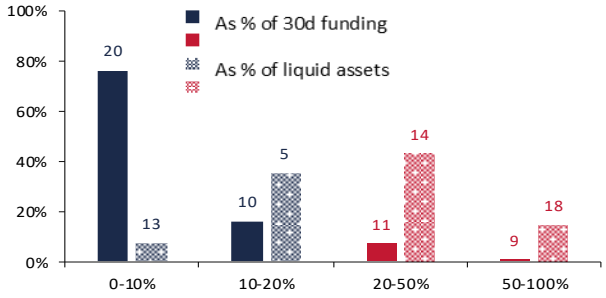
Graph 89
Evolution of traditional funding (demand and term deposits) of commercial banks [1/]
Index, June 25 2021 = 100



Data as of May 2023.
Source: Banco de México.
1/ The graph takes as point of reference the values of June 25, 2021, date in which the increases of the monetary policy rate began.

Despite the abundant liquidity in the banking system, some medium and small banks maintain a high concentration of their funding sources with a few wholesale creditors (Graph 90). These institutions face a higher liquidity risk than their more diversified peers in the event of the sudden exit of some relevant counterparties or in case they are prevented from obtaining new financing due to changes in the renewal patterns of these counterparties.

Graph 90
Funding concentration of the 10 largest counterparts that fall due within 30 days [1/, 2/]
Vertical axis: proportion of total assets of the system
Horizontal axis: percentage of funding of the 10 largest counterparties as proportion of total liquid assets and total funding with a maturity less or equal than 30 days.
Label: Number of banks



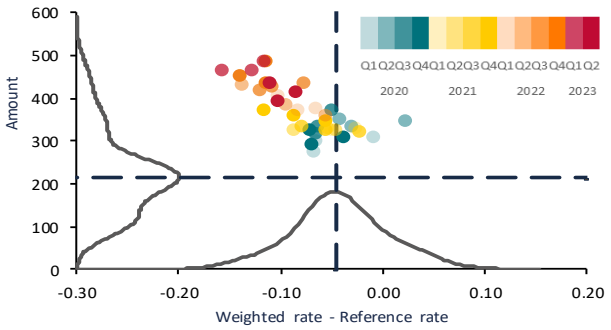
Data as of May 2023.
Source: Banco de México.
1/ Concentrated counterparts consider only those funding counterparts whose total funding at the end of the month is at least 200 million pesos or amounts 0.5% of the bank's total liabilities.
2/ Observations in which the 10 largest counterparts represent more than 20% of the liquid assets or of 30 days funding are identified in red. The label refers to the number of banks in each category.

Interbank loans

The average daily amount of financing in the interbank market during 2023 represents 13% of total financing in the commercial banking system. Within this market, repurchase financing continues to be high compared to its historical median as of January 2008, and with relatively low interest rates compared to the reference rate. On the other hand, unsecured loans are below their historical median and with interest rates close to the reference rate.

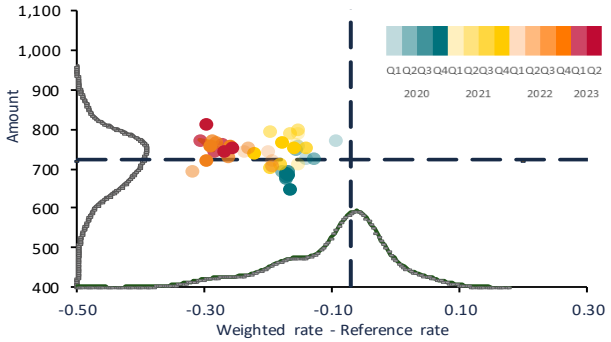
As of the end of the first half of 2022, the daily repurchase financing of non-domestic systemically important banks is above 400 billion pesos (Graph 91). While domestic systemically important banks (D-SIBS) have remained close to their historical median calculated since January 2008 (722 billion pesos). On the other hand, the difference between the reference rate and the banks' funding rates has progressively increased (Graph 91 and Graph 92).

Graph 91
Repo market[1/]
Banks that are not DSIBs[2/]
X axis: Basis points
Y axis: Billions of pesos



Data as of June 2, 2023.
Source: Banco de México.
1/ Data includes all authorized counterparties and all types of collaterlas.
2/ Dotted lines correspond to medians calculated since 2008.

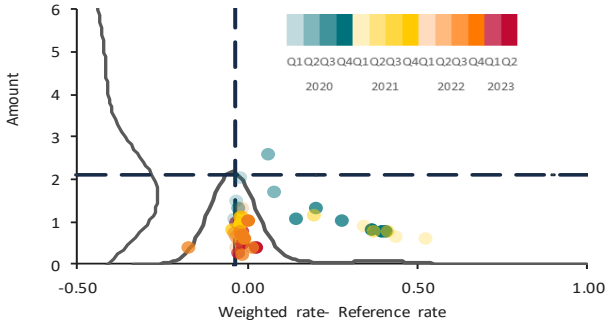
Graph 92
Repo market[1/]
DSIBs[2/]
x axis: Basis Points
y axis: Billions of pesos



Data as of June 2, 2023.
Source: Banco de México.
1/ Data includes all authorized counterparties and all types of collaterlas.
2/ Dotted lines correspond to medians calculated since 2008.

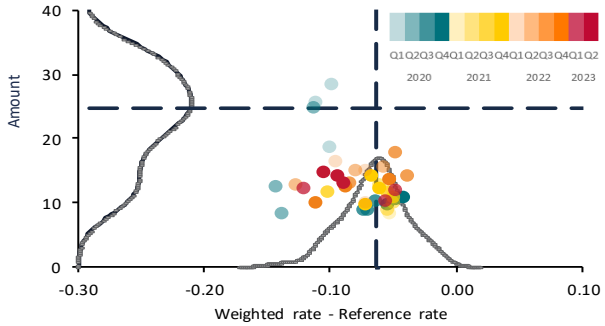
In contrast, in 2023 an average daily funding amount of 12.91 billion pesos for D-SIBS and 0.60 billion pesos for the rest of banks is observed in the unsecured market, amounts that contrast with their historical median as measured since 2008 (23.45 billion pesos and 2.03 billion pesos) (Graph 93 and Graph 94).

Graph 93
Unsecured market
Banks that are not DSIBs[1/]
X axis: Basis points
Y axis: Billions of pesos



Data as of June 2, 2023.
Source: Banco de México.
1/ Dotted lines correspond to medians calculated since 2008.

Graph 94
Unsecured market
DSIBs[1/]
X axis: Basis points
Y axis: Billions of pesos



Data as of June 2, 2023.
Source: Banco de México.
1/ Dotted lines correspond to medians calculated since 2008.

CAR and liquidity risk

A joint assessment of commercial banks´ net-risk Capital Adequacy Ratio (CAR) and the Liquidity Coverage Ratio (LCR) at risk shows that, at the end of March, most banks have sufficient levels of capital and liquidity to withstand periods of stress.

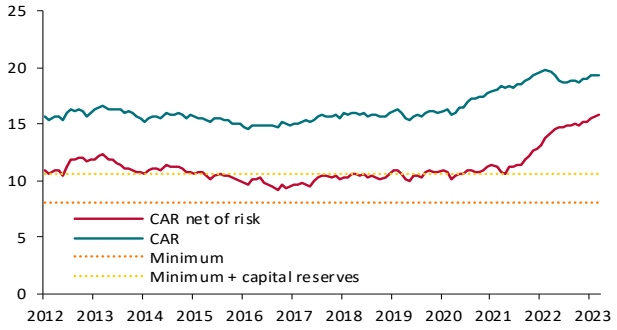
The net risk capitalization ratio (CAR net of risk), estimated as the resulting capitalization ratio against portfolio losses equal to the 99.9% conditional value at risk,[51,52] increased during the last quarter of 2022 and the first quarter of 2023, from 14.94% in September 2022 to 15.81% in March 2023 (Graph 95). This is the result of the decrease in the CVaR of the loan portfolio and the increase in the system's CAR for the period. The banking system ratio levels remain well above the regulatory threshold, thus highlighting the banks' ability to mitigate unexpected losses arising from past-due loans in their portfolios.[53]

[51] Assuming that such losses are directly covered by the banks' capital without affecting their reserves and that such portfolio has a 100% weighting to determine its capital requirement.
[52] This indicator can be used to assess whether a bank's capitalization levels are adequate to cover unanticipated loan portfolio losses.
[53] As these estimates are based on historical conditions to date, this indicator is a benchmark rather than a forecast of the potential losses that could be observed in the current situation.

Graph 95

CAR net of risk [1/]

Percent



Data as of March 2023.

Source: Banco de México, CNBV and Credit Bureu.

1/ Estimated as the capitalization ratio that results from reducing the CVaR at a 99.9% confidence level, both from the net capital and risk weighted assets. This indicator assumes that the credit portfolio incurs losses in an amount equivalent to a CVaR of 99.9% and such losses are absorbed by the banks and then reflected in their capital levels without affecting reserves, and that this portfolio is weighted at 100% to determine their capital requirements.

Based on the liquidity-at-risk results,[54] the banking system has a sound liquidity position at the end of March. Even under extreme deposit outflow scenarios, most banks maintain an LCR above the regulatory minima level of 100%. These institutions account for about 94% of the system's total assets (Table 4).

Table 4

Bank groups by liquidity at risk [1/]

Group	Criteria	Group bank assets as a share of total commercial banking assets
1	LCR ≤ 65	2.3%
2	65 < LCR ≤ 100	3.5%
3	LCR > 100	94.2%

Data as of March 2023.

Source: Banco de México.

1/ Total assets data for commercial banks refer to those published by the CNBV at the end of March 2023.

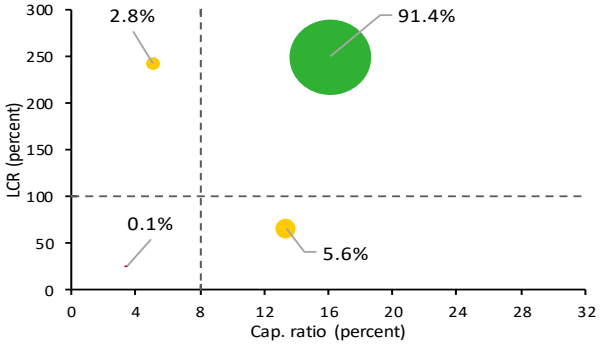
The same liquidity exercise performed at the system level, suggests that in the aggregate, the Mexican banking system would have sufficient liquid resources to face periods of stress associated with extreme outflows in the system's deposits. It is worth noting that, despite the stress episodes observed in some US regional banks, the average retail deposit outflows observed in the Mexican banking system during March were well below the 95% average CVaR for all Mexican banks.

The joint evaluation of the results of the liquidity-at-risk and net risk capitalization ratio exercises suggests that most banks comply with both requirements and have sufficient liquid resources and capital to face periods of stress. At the end of March, the institutions below the regulatory minimum of both requirements, under the stress scenarios, represent about 0.1% of the system's assets (Graph 96).

Graph 96

Liquidity and solvency at risk of commercial banks [1/]

Weighted average, March 2023



Figures as of March 2023.

Source: Banco de México.

1/ The lines show the regulatory thresholds for the liquidity requirement (CCL = 100%) and the minimum capitalization requirement (ICAP = 8%). The bubbles depict the total assets for the group of institutions within each quadrant, and the percentage is its proportion with respect to the commercial banks' total assets, where the centroid is the asset-weighted average. The red, yellow and green colors denote those institutions that fail to comply both requirements; fail to comply with one of the two requirements; and comply with both requirements.

Contagion risk

This section describes the results of the contagion risk assessment[55] using the exposures network between financial institutions in the interbank market. This approach allows to analyze, using the Mexican financial system's network grid, the mechanisms through which

[54] The purpose of the liquidity-at-risk exercise is to evaluate whether commercial banks have sufficient liquid assets (cash and high-quality debt securities) to meet their net outflows of inflows in a 30-day stress period. For this purpose, outflow factors are estimated based on historical information on each bank's deposits (CVaR at 95%). The potential impact on the value of liquid assets is also considered under four historical scenarios, four macroeconomic scenarios (section VI.1), and two scenarios associated with climate change (section VI.3).

[55] Interbank contagion risk refers to the potential for problems faced by one bank in meeting its financial commitments to be directly or indirectly transmitted to other banks.

certain risks and vulnerabilities can be spread to the financial system as a whole. To achieve this, information on all exposures observed daily within the national financial system, as well as among foreign financial institutions, is used.[56]

The pandemic caused some changes in the structure of the network and some risk measures to undergo important changes. In particular, in some periods, the risk of contagion, measured by losses in the worst chains of contagion, was reduced. Three years later, some indicators returned to their pre-pandemic levels.

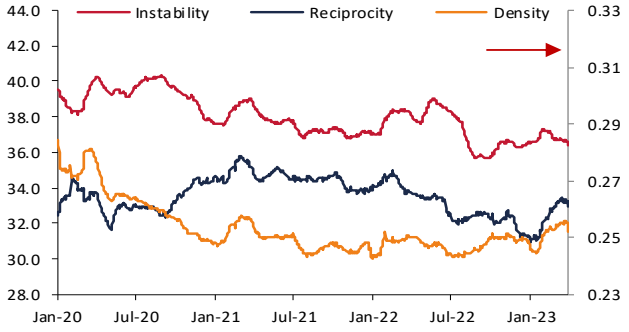
Likewise, although some banks, mainly in the United States, had financial problems, and even went bankrupt, the fact that banks in the system did not have direct exposures to these banks limited the impact, which reflected in both network and systemic risk measures.

The most persistent change in the network structure is that it has not returned to pre-pandemic levels of interconnection. Network density has stabilized at a lower level (Graph 97). In this same graph, it can be seen that the indicators of reciprocity and disassortativity[57] have maintained, in general terms, the same trend they had prior to the pandemic, but they are useful to identify some short-term movements. For example, it was observed that, during March, the disassortativity indicator had a slight fall, possibly related to the problems of some US banks, although it did not have a considerable impact.

Graph 97

Measures of the interfinancial exposure network 1/

Percentage



Data as of March 31, 2023.
Source: Banco de México.
1/ The graphed series relates to the simple 21-days moving average of the original series.

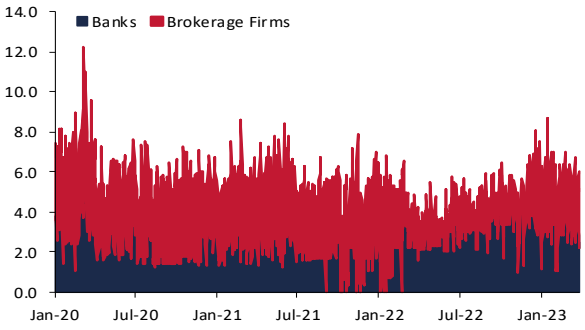
In the case of losses in the worst contagion chains, the levels are still lower than those observed at the beginning of the pandemic, although in the last six months of the year they have risen on some days (Graph 98). The severity of losses suffered by the affected intermediaries has also increased in recent months (Graph 99).

Losses in the worst contagion chains, measured through the percentage of assets of the intermediaries involved, increased with respect to the levels of the previous *Report.* However, it should be noted that, despite the uncertain conditions in March, no increases were observed in this indicator (Graph 98). Likewise, the number of banks ending the year at low levels of capitalization has remained stable and no changes were observed in March (Graph 99).

Graph 98

Percentage of banks and brokerage firms' assets involved in the worst contagion chains by type of intermediary

Percentage

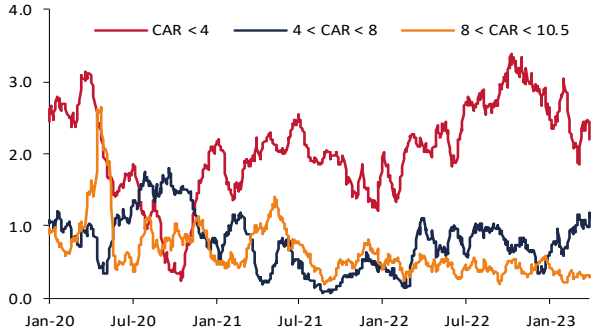


Data as of March 31, 2023.
Source: Banco de México.

Graph 99

Average of the banks' assets lost in the worst contagion chains by final CAR Levels 1/

Percentage



Data as of March 31, 2023.
Source: Banco de México.
1/ The graphed series relates to the simple 21-days moving average of the original series.

[56] It is considered information of exposures in the interbank network, originated by: (i) the purchase and sale of securities; (ii) deposits and loans; (iii) market operations, such as derivatives and repurchase agreements; and (iv) foreign currency purchase and sale transactions.

[57] Disassortativity is defined as a greater propensity for intermediaries, generally not very interconnected, to seek greater relationships with highly interconnected intermediaries, thus discontinuing interrelationships with others, which are not very interconnected.

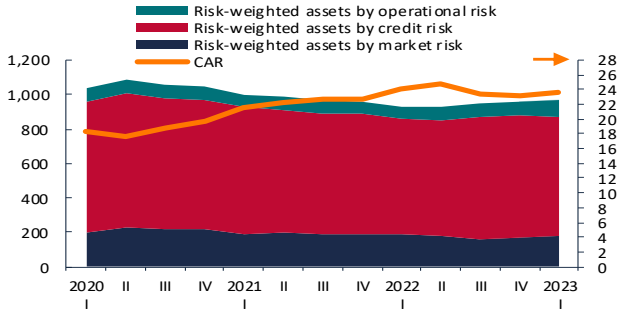
Finally, the severity of the losses sustained by the affected intermediaries has increased slightly in recent months (Graph 98), with this group of intermediaries reporting higher losses as a proportion of assets (Graph 99).

V.3.2. Development banks and other development financial institutions

As of March 2023, development banks and other public development institutions (development banking system)[58] continue showing financial soundness. The system reflects a favorable evolution in the main items of the financial statements, in which a positive net income and a growing capitalization index stand out, despite the decrease in the financing balance and a greater constitution of preventive reserves. It should be noted that the *FND* stopped granting loans as of December 2022 and presented a generalized deterioration of its financial indicators.[59]

Development banking institutions are adequately capitalized; as of March 2023, they recorded a CAR of 23.7%, 46 bps lower than that of March 2022. This is explained by a 3.7% increase in total risk assets, partially offset by a 1.8% increase in net capital. As of the third quarter of 2022, credit risk assets increased due to a rebound in placements in some institutions (Graph 100).

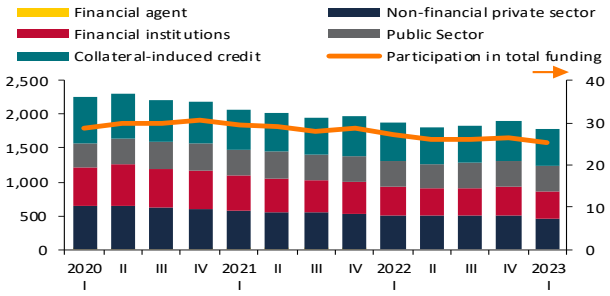
Graph 100
Development banks Capital Adequacy Rate
Left axis: billions of pesos
Right axis: percentage



Data as of March 2023.
Source: CNBV.

As of March 2023, the development banking system registered a balance of direct and induced financing[60] of 1,794 billion pesos; the year-on-year contraction was 3.9% in real terms. This balance is equivalent to 25.2% of the banking sector's total financing and 6.0% of GDP (Graph 101). As of the same date, total financing granted by development banks and other development institutions was made up of 69% direct credit and 31% net induced credit (Figure 2).

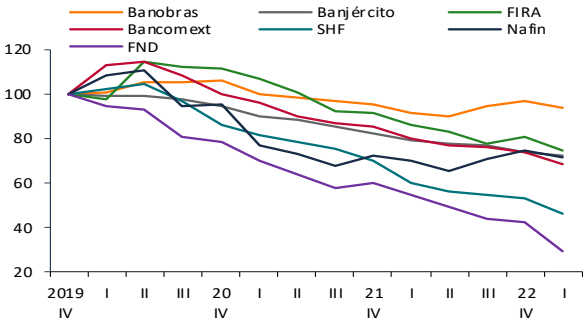
Graph 101
Evolution of loan balances and induced credit balances from development banking system
Left axis: billions of pesos
Right axis: percentage



Data as of March 2023.
Source: CNBV.

Second-tier credit contracted 8.3% in real terms during last year, while first-tier credit decreased 4.9% in real terms. The total balance of credit showed a mixed performance among institutions (Graph 102). The increase in *Nafin* and *Banobras* was mainly due to loans related to state-owned companies.

Graph 102
Growth in loan portfolio by institution
Index (December 2019 = 100)



Data as of March 2023.
Source: CNBV y Banco de México.

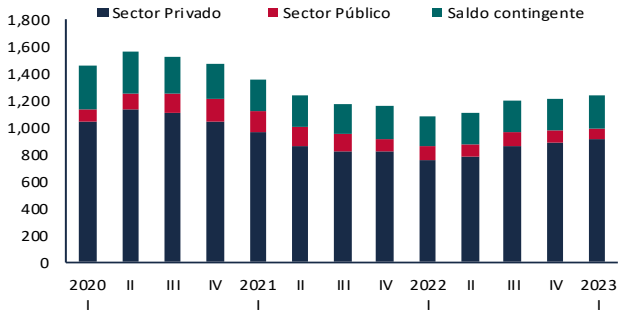
[58] Refers to the 6 development banks (Bancomext, Banco del Bienestar, Banjercito, Banobras, Nafin and SHF), FIRA and FND.

[59] On April 25, 2023, the Chamber of Deputies approved the Bill for the extinction of the FND, which abrogates the Organic Law of the institution. The Senate's approval was on April 28, 2023. The decree was published in the Official Gazette of the Federation on May 29, 2023. The decree states that the *SHCP* will have a term of 180 calendar days to publish the liquidation bases, and that the sole liquidator will be the *Instituto para Devolver al Pueblo lo Robado* and the labor rights of the workers will be fully respected.

[60] Development banks and other development institutions fulfill their mission by: a) granting financing through first and second tier credits, "direct lending", and the providing collateral, "induced lending", which means the final loan amount with a percentage of collateral coverage; b) the operation of special development programs; c) technical assistance; and d) operations as a financial agent.

The placement of credit and guarantees as of March 2023, defined as the amount disbursed in the last 12 months, grew at a real annual rate of 14%, registering a change in trend compared to the fall observed as of the third quarter of 2020 (Graph 103). All institutions had increases in credit placement in the last 12 months, except Agricultural Trusts (*FIRA,* its acronym in Spanish*)* and *FND*.

Graph 103
Loan and guarantee placement flows from development banking system (12M)
Billions of pesos



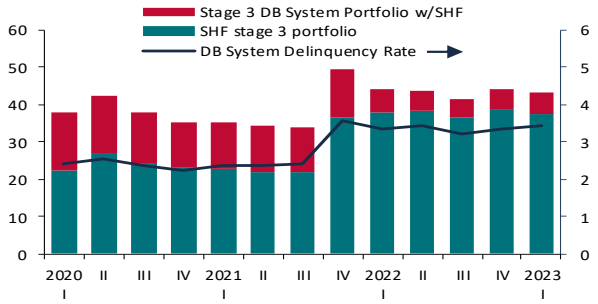
Data as of March 2023.
Source: CNBV y Banco de México.

The concentration of the loan portfolio of development banks and other development institutions in borrowers is low (Herfindahl-Hirschman Index <110 in the aggregate).[61] *SHF* and Banobras have the highest Herfindahl-Hirschman indexes in borrowers (428 and 321, respectively), however, these indicators are considered low. Additionally, 70% of the portfolio is concentrated in the highest regulatory credit ratings (A1/A2 CNBV scale).

As of March 2023, the stage 3 portfolio[62] stood at 43.11 billion pesos, an increase of 4.3% over the same month of the previous year. It should be noted that 74% of this portfolio is concentrated in 9 counterparties, including a telecommunications project financed by several development banks.[63] Preventive reserves exhibited a real annual increase of 0.3%, mainly explained by the higher loan placements in the period.

In March 2023, the non-performing loan rate (IMOR, for its acronym in Spanish) of the development banking system was 3.45%, 9 bps higher than that of March 2022 (Graph 104). As a reference, the IMOR of the commercial portfolio of commercial banks reached 1.66%.[64] The increase in the IMOR is explained by the 1.6% annual increase in the total portfolio, as well as by the 4.3% increase in the stage 3 portfolio.

Graph 104
Evolution of "Stage 3" portfolio from development banking system
Left axis: billions of pesos
Right axis: percentage



Data as of March 2023.
Source: CNBV and Banco de México.

As of March 2023, credit induced by collateral accounts represents 2.68 times the contingent balance, that is, the coverage is 37.2% on average; induced credit registered an increase of 1.0% in real terms last year. This is mainly due to the increase in *SHF* mortgage insurance division and *FIRA*. The rest of the institutions registered negative real growth in the induced balance.

The main sources of funding for the sector are promissory note with interest payable at maturity (*PRLV*, for its acronym in Spanish) and securities issued, which as of March 2023 have a 65% and 27% share, respectively, of the total. At the end of March 2023, the cost of funding was below the 28-day *TIIE* (Graph 105).

In terms of market risk, three institutions account for 84% of total development banking securities holdings (Nafin 31%, Banjercito 28% and Banobras 25%). Seventy nine percent of the securities have a term to maturity of less than 3 years and, in terms of own holdings, the majority are in government instruments.

[61] Some development institutions, according to their mandate, serve specific economic sectors; therefore, a sector concentration indicator is not applicable.

[62] With the entry into force of IFRS9 by 2022, the loan portfolio is now classified in 3 stages, according to the level of risk and impairment: in general terms, stage 1 incorporates those loans less than 30 days past due, stage 2 those between 30 and 89 days past due and stage 3 those 90 days or more past due.

[63] In October 2022, the transaction was restructured. The creditors subscribed the bankruptcy agreement proposed by the borrower. This contemplates a payment scheme that allows the recovery of the principal and the borrower's operational continuity.

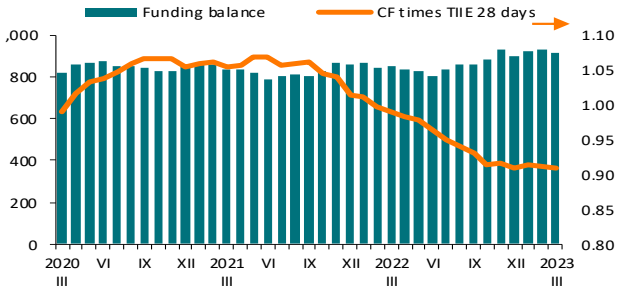
[64] The figure for commercial banks also includes the loan portfolio of sofomes regulated as having an equity link with a bank, whether they are subsidiaries of the latter or not.

Graph 105

Development banks funding evolution

Left axis: billions of pesos

Right axis: times



Figures in current prices.
Source: Banco de México.
CF: Cost of funding in times TIIE 28 days times (weighted average).

As of March 2023, liquidity conditions in development banks and other development institutions have remained stable.

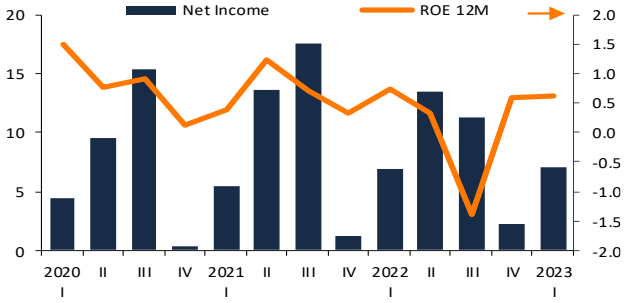
As of the same date, the development institutions as a whole reported a net income of 7.02 billion pesos, 8% higher year-on-year.[65] This was mainly due to the increase in the financial margin, explained by higher interest income from securities and repurchase agreements, as well as higher income from the loan portfolio. The *FND* is the only institution that presented a negative net result directly derived from its operations. The annualized ROE indicator stood at 0.6% (Graph 106).

Graph 106

Net income and ROE (12M) from development banking system

Left axis: billions of pesos

Right axis: percentage



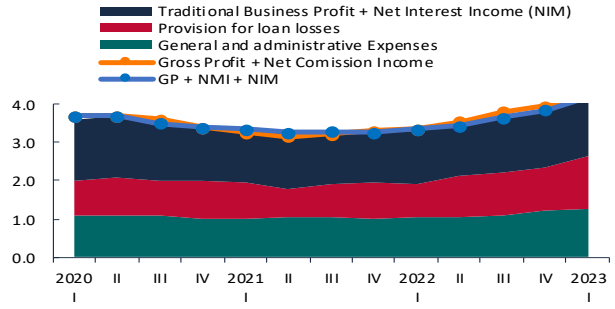
Data as of March 2023.
Source: CNBV y Banco de México.

The financial margin as of March 2023 was 39% higher year-on-year; this is mainly explained by the increase in reference rates. Interest income increased 76% and interest expense increased 91%; nevertheless, the increase in interest income was sufficient to offset the increase in expenses and the creation of allowances for loan losses (Graph 107).

Graph 107

Performance indicators (proportional to Net Productive Assets)

Percentage



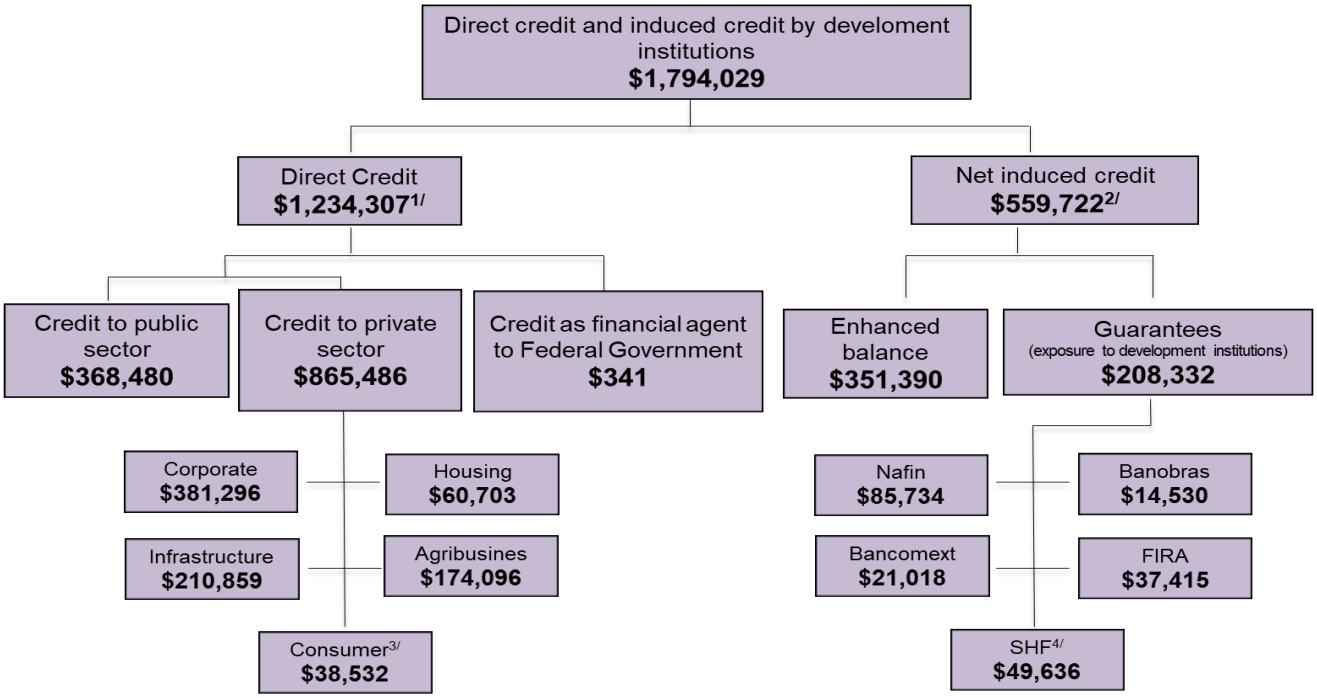
Data as of March 2023.
Source: CNBV y Banco de México.
Cumulative figures from the last 12 months.

[65] As of March 2023, the amount of resources tapped from development banking institutions was 2,100 MDP.

Figure 2

Direct Credit and induced credit by development banking system

Millions of pesos



Data as of March 2023.

Source: Banco de México.

1/ Credit balance portfolio on development institutions' balance sheet.

2/ Net induced credit means aggregate credit balance granted by private financial intermediaries, partially collateralized by development institutions.

3/ Consumer credit portfolio includes credit granted to the Mexican military through Banjercito and development bank loans to employees related to labor benefits.

4/ Includes insurance guarantees from the *SHF*'s Mortgage Credit Insurance (SCV, for its acronym in Spanish).

V.3.2.1. Infonavit and Fovissste

Infonavit

The National Fund for Worker's Housing (*Infonavit,* for its acronym in Spanish) is the main provider of mortgage loans in Mexico. The amount of mortgage loans originated by Infonavit showed slight annual growth in real terms at the end of March 2023. Despite this recovery in lending, the balance of Infonavit's outstanding mortgage loan portfolio showed an annual contraction in real terms as of March; while the balance of the past-due portfolio grew due to the transfer of the portfolio from extended to past-due status as a result of the failure to regularize payments at the end of the extension period.

At the end of March, the mortgage portfolio non-performing loan rate stood at 18.6%, an increase of 0.6 percentage points since the last report (data as of September 2022) and after reaching its highest level in February (18.9%). The high levels of non-performing loans in Infonavit's portfolio are also explained by the deterioration of the portfolio originated in minimum wage multiples (*VSM*, for its acronym in Spanish) (Graph 108).[66,67] Although Infonavit continues with the program to convert its portfolio from *VSM* to pesos, the

[66] It is also worth recalling the portfolio reclassification it performed at the end of 2019 after finding credit classification errors at the juncture of the implementation of the new accounting standards (IFRS) and which implied an increase in the level on a permanent basis.

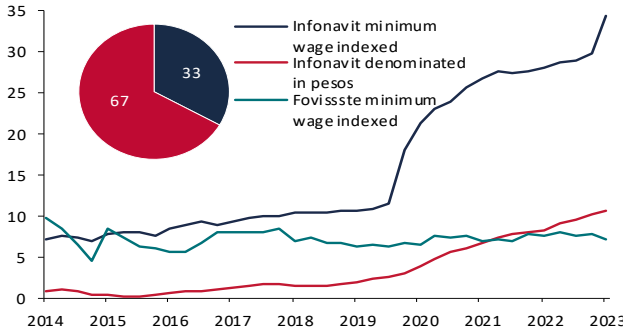
[67] In the case of these loans in VSM, which originated between 1997 and 2016, the outstanding balance of borrowers is denominated in UMAs (*Unidad de Medida y Actualización*). This outstanding balance is updated annually based on increases in the minimum wage and the consequent updated value of the UMA.

portfolio originated in *VSM* is still significant and its share will continue to decrease over time.[68, 69] As of March 2023, 67% of the portfolio was already peso-denominated, 13 percentage points higher than in March 2022. In addition, the aforementioned conversion program from *VSM* to pesos includes benefits in some cases, such as balance forgiveness.

Graph 108

Infonavit[1/] and Fovissste's [2/] NPL Mortgage Ratio

Percentage



Data as of March 2023.
Source: Infonavit and Fovissste.
1/ The Non-performing loan (NPL) ratio is defined as the ratio of non performing loans and the total portfolio.
2/ Fovissste's total portolio is minimun wage indexed.

At the end of March, the balance of loan-loss provisions registered an annual decrease (-5.8%), which contrasted with the increase in the total past-due portfolio (2.6%). Thus, the reserve coverage ratio fell to 78.6%, the lowest level since it was recorded. Nevertheless, Infonavit has sufficient reserves and equity to face losses from non-performing loans. In this regard, the capitalization ratio reported by the Institute as of March 2023 is 11.67%.

Regarding Infonavit's profitability, at the end of March there was an improvement in its net interest income, which boosted the ROE indicator; however, it is still at negative levels. The improvement in the financial margin is mainly due to a decrease in financial expenses. This expense had risen due to the high nominal yield paid to the housing sub-account in relation to Infonavit's investment portfolio income, which decreased.

With respect to destination of credit, credit granted for the acquisition of new and existing housing has shown greater dynamism in terms of amount since the last *Report.* In addition, credit for the acquisition of land for housing use increased significantly, although it has a very small share of the total, as it is a recently created product.[70] The recovery in the number of loans for the repair, expansion or improvement of housing, which in the last six months already reached a share of 20% of the total granted, after having decreased in 2021 is noteworthy. The above suggests that the rightful owners are opting for self-production and remodeling, which coincides with a lower supply and the increase in housing prices.[71,72]

At the end of March 2023, the balance of Infonavit's housing sub-account rebounded significantly, registering a real annual growth of 7.4%.[73] In addition, the number of labor relations has increased since the last *Report* for all income levels. By type of employer registration, large employers registered a higher growth rate in the number of employment relationships in recent months, suggesting an improvement in the labor market for this segment. Although the number of labor relations of large companies and SME increased last year, in both types of companies there has been a deceleration in their growth rate in recent months (bimonthly data as of December 2022). This is relevant because Infonavit's borrowers are vulnerable to employment shocks, as most of them belong to low-

[68] The Board of Directors of Infonavit determined that the adjustment to loans denominated in times the minimum wage (VSM) would be only 5.2% by 2023, which corresponds to the average of the annual increases in inflation over the last five years. The increase in the minimum wage was 20% and the increase in the Unit of Measurement and Updating (UMA) was 7.82%. See Infonavit Press Release #003.

[69] With respect to this portfolio in VSM, between 2019 and 2022, 966.3 thousand beneficiaries with a total balance equivalent to more than 74.9 billion pesos had their loans converted, so that at the beginning of February 2023 there were 2.4 million people who still had loans in VSM. In addition to the currency conversion of loan balances, there is the possibility of accessing other benefits (for example, write-offs of part of the balance) that could also be affecting the portfolio growth rate. See Infonavit press release #011.

[70] The 2021 amendment to the Infonavit Law opened the possibility for beneficiaries to use their credit for the purchase of land. See Official Gazette of the Federation.

[71] By type of housing purchased with Infonavit credit according to price classification, traditional and popular housing stands out in number of loans granted with a share of one third and almost one quarter of the total placed, respectively; however, since the last report, the number of loans granted for popular housing has fallen (-11.1% in the last 6 months and -26.1% year-over-year). Although in the same period the number of loans for traditional housing has increased (7.8% in the last 6 months, -9.9% y/y), the growth in the amount granted at constant prices has been lower (5.8% in the last 6 months, 2.2% real y/y).

[72] The supply of new housing is declining for almost all types of housing according to their price classification based on data from the *Registro Único de Vivienda* (RUV), with the exception of the residential plus segment.

[73] The housing sub-account records are grouped according to the employment status of the beneficiary (active or inactive).

income deciles and half of them have an employment relationship with an SME, which in turn are vulnerable to macroeconomic shocks. In recent months, there has been a recovery in the number of loans, for almost all income levels of borrowers.[74]

In summary, the main risk faced by Infonavit is the unemployment of its borrowers.[75] In this regard, the power to supervise companies in order for them to withhold the collection of loan repayments via payroll is a factor that mitigates the credit risk to which Infonavit is exposed. Other risks faced by Infonavit are an increase in non-performing loan ratio, an increase in inflation and a decrease in the yield of its asset portfolio, since Infonavit grants high nominal rates of return to the housing sub-account.

Fovissste

Fovissste is the third largest mortgage provider in the country. At the end of March 2023, its total portfolio consisted of 605,084 loans, and only 6.5% of loans were past due. After stagnating at the beginning of 2022, in the last half of the year, its mortgage portfolio origination shows a recovery; however, its past-due portfolio has also increased. The portfolio in extended status, although corresponding to a small portion of the performing portfolio, also increased slightly. As of March 2023, the non-performing loan rate of Fovissste's portfolio decreased with respect to the level observed in the last *Report* (Graph 108).[76] In addition, the loan-loss reserve coverage ratio is at high levels.

Fovissste is working on new credit products and on a pilot credit scheme denominated in pesos to mitigate the credit risk to which it is exposed by having a portfolio denominated in *VSM* like Infonavit. Fovissste also faces the challenge of converting this portfolio to pesos. At the end of March 2023, its financial statements do not yet show a peso-denominated portfolio.[77]

The labor stability of Fovissste's beneficiaries has been, over time, an element of strength for its financial situation. Around 88% of the portfolio on its balance sheet is under the ordinary regime, which means that it is collected via payroll deduction. On the other hand, workers' contributions to the fund have grown by 2.1% as of March 2023, the highest annual rate registered since March 2022.[78] In addition, Fovissste maintains an Equity Strength Index (IFP, for its acronym in Spanish) or capitalization level of 16.4%, above the regulatory minimum.

V.3.3. Siefores and mutual funds

V.3.3.1. Siefores

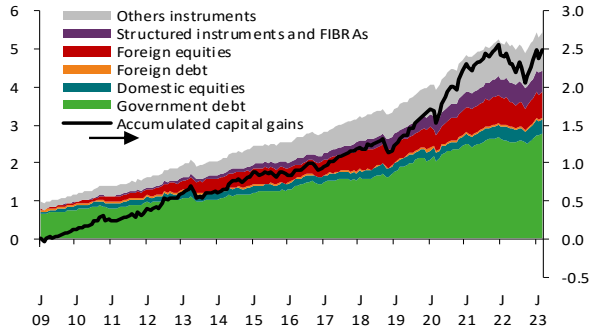
During the period covered by this *Report* the Siefores registered an increase in their assets under management, and thus continue to be the main institutional investors in the country, with government securities and foreign securities being the investments with the highest share in the composition of their portfolio (Graph 109).

Graph 109

Siefores' portfolio and accumulated capital gains

Right axis: Accumulated flows in trillions of pesos

Left axis: Balances in trillions of pesos



Data as of March 2023.

Source: Consar.

Between September 2022 and March 2023, the Siefores had capital gains in their investment portfolios. These capital gains are mainly due to the increase in the market value of government securities and domestic and foreign equity instruments. However, these capital gains still do not offset the losses observed during most of 2022. It should be noted that this type of fund has a long-term investment horizon so short-term reductions in asset prices tend to disappear over time as market shocks dissipate and asset prices recover. Although in relative terms, as a proportion of assets under management, these write-downs have been of similar magnitude to those registered in other episodes, the

[74] In the period since the last report, 65% of the loans placed were granted to beneficiaries with incomes below 6 UMAs, while these loans accounted for almost half of the total amount transferred.

[75] A shock to employment that implies the termination of an active employment relationship with Infonavit increases the credit risk of Infonavit's portfolio, since the monthly payments of the loans granted to the beneficiaries are made through payroll deduction.

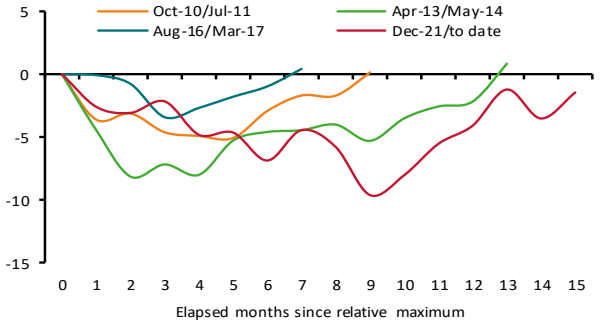
[76] It is worth mentioning that the last time Fovissste carried out a portfolio segregation or removal was in September 2022, for approximately 3,212 million pesos, a situation that was already reflected in its non-performing loan rate reported in the last *Report* (figures as of September 2022).

[77] They only record portfolios denominated in times general minimum wage (VSMG) and in times *Unidad de Medida de Actualización* (VUMA), as well as a small amount in times basic minimum wage (VSMB).

[78] The figures used do not consider interest income from the Fund's operating surplus.

current episode has had a longer duration than the episodes observed in 2010, 2013 and 2016 (Graph 110).

Graph 110
Accumulated capital gains: Selected periods 1/
Assets percentage



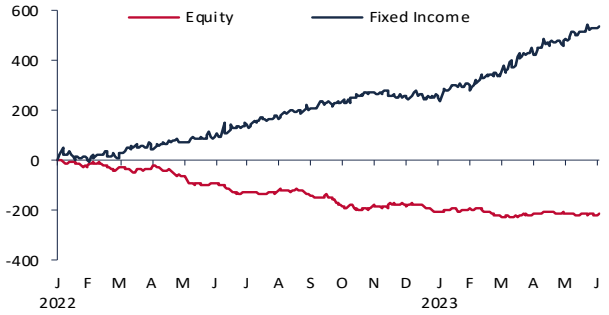
Data as of March 2023.
Source: Consar.
1/ Capital gains calculated as a share of net assets of onset accrual period.

With data as of the first quarter of 2023, unemployment withdrawals remained high, although at a lower average level than in the last two quarters of 2022. In this regard, such withdrawals continue to represent a limited risk. In fact, the accumulated flow of unemployment withdrawals between September 2022 and March 2023 represents 0.22% of the Siefores' total net assets as of the third month of this year, a figure that compares with the percentage of accumulated flows of unemployment withdrawals between March and September 2022 of 0.24% with respect to net assets as of September 2022. Likewise, unemployment withdrawals represent 4% of the contributions received by the Afores as of the first two months of 2023. Thus, the possible impact of the level of unemployment withdrawals on the assets managed by these financial intermediaries is limited, as are the potential risks derived from it.

V.3.3.2. Investment funds

Fixed income investment funds continue growing their assets under management as a result of valuation gains and inflows. On the other hand, equity investment funds continued decreasing their assets due to outflows that continued to be observed, almost constantly, since the beginning of 2022. However, there are no liquidity constraints in the sector (Graph 111).

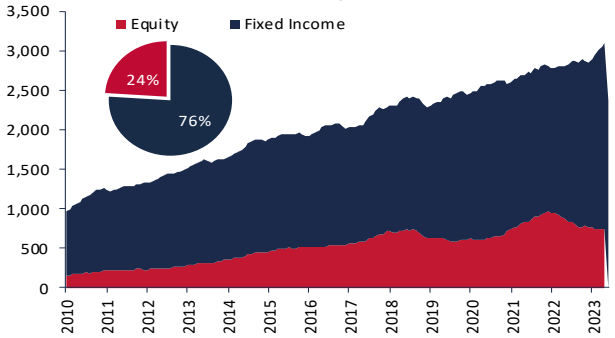
Graph 111
Cumulative change in investment flows assets
Billions of pesos



Data as of June 2, 2023.
Source: Banco de México using CNBV data.

The investment funds sector is comprised of 248 fixed-income funds and 378 equity funds. The amount of total assets managed by mutual funds amounted to 3,119 billion pesos, representing an increase of 9.5% in nominal terms with respect to the end of 2022 (Graph 112). The behavior of the investment fund sector has been heterogeneous. So far in 2023, fixed income funds had a nominal increase of 13.3% in assets compared to December 2022, while variable income funds had a decrease of 0.9% for the same period.

Graph 112
Total net assets of investment funds
Billions of pesos

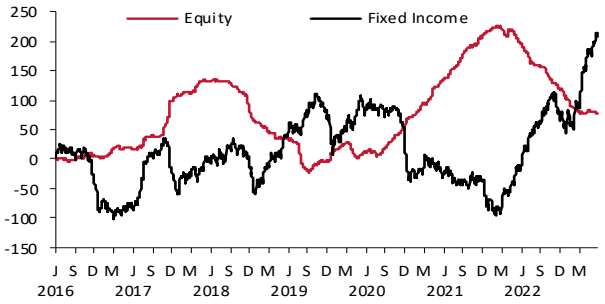


Data as of June 2, 2023.
Source: Banco de México using data from CNBV.

In 2023, fixed income funds have received cumulative flows of 164 billion pesos, continuing the trend that has been observed since the beginning of 2022 (Graph 113). Additionally, since mid-2022 these funds have shown returns above the historical average[79] in most of the periods (Graph 114).

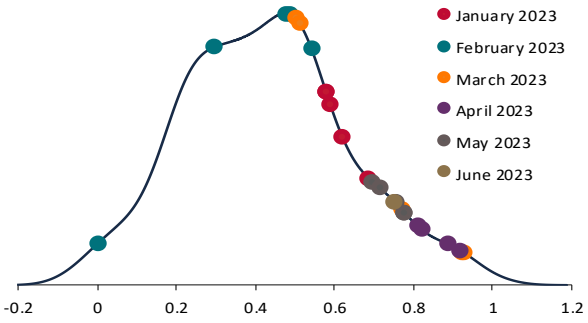
[79] Calculated since January 2016 as the weekly average of monthly returns.

Graph 113
Cumulative flows of investment funds
Billions of pesos



Data as of May 2023.
Source: Banco de México using CNBV data.

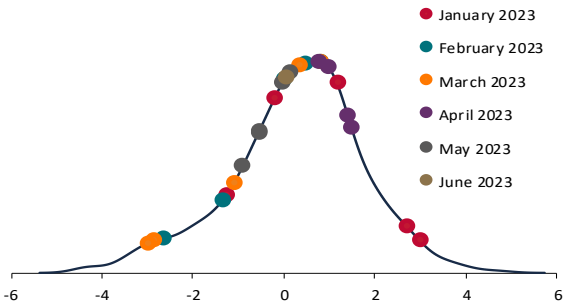
Graph 114
Monthly returns of fixed income funds[1/]
Percentage



Data as of June 5, 2023.
Source: Banco de México using data from CNBV and Morningstar Direct.
1/ Each point represents the average of the daily observations of the monthly returns for each week of the month.

Equity funds have shown cumulative redemptions of 25 billion pesos in 2023. However, yields have been volatile, with some periods being negative and others positive (Graph 115). As a result, assets have only fallen by 7 billion pesos this year and the total assets managed by equity funds are 747 billion pesos.

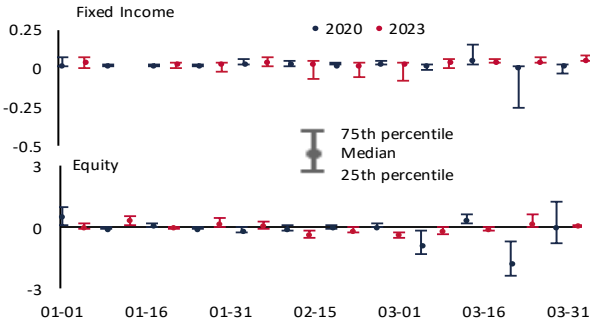
Graph 115
Monthly returns of equity funds[1/]
Percentage



Data as of June 5, 2023.
Source: Banco de México using data from CNBV and Morningstar Direct.
1/ Each point represents the average of the daily observations of the monthly returns for each week of the month.

Despite events such as regional bank failures in the United States, which generated volatility in the financial markets during the first quarter of 2023, fixed income and equity funds did not show atypical returns compared to what was observed in early 2020 with the onset of the pandemic (Graph 116).

Graph 116
Monthly returns on the first quarter of 2020 and 2023 [1/]
Percentage



Data as of March 2023.
Source: Banco de México using data from CNBV and Morningstar Direct.
1/ Daily observations of weekly averaged monthly returns.

Regarding fund's liquidity, for fixed income investment funds, the proportion of liquid assets[80] with respect to their total portfolios has increased by 0.47% since the close of 2022, while for variable income investment funds it remained constant for the same period. The difference between the percentage of repurchase or liquidity at risk and the percentage of liquid assets for

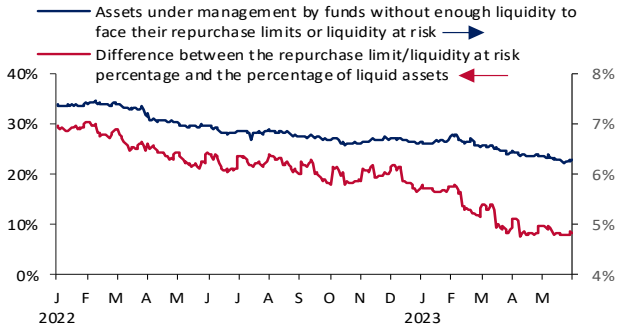
[80] Calculated as liquid assets over total assets. The following are considered liquid assets: bank deposits, CETES, BONDES, bonds, udibonos and BPAs in direct and repurchase agreements.

the total fund system[81], has progressively decreased and at the end of May 2023 is equivalent to 4.8% of the sector's assets. Likewise, the assets managed by the funds without sufficient liquidity to meet their repurchase limits or liquidity at risk have also decreased by the same date, standing at 22% of the sector's total assets (Graph 117).

Graph 117

Assets of investment funds with liquidity shortfall

Percent of total net assets



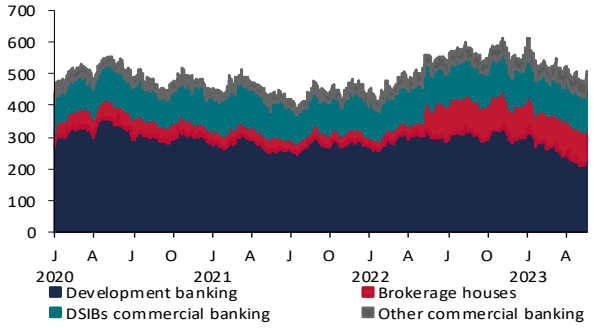
Data as of June 2, 2023.
Source: Banco de México using data from CNBV.

On the other hand, investment funds are liquidity providers in the repo market. In 2023, funds represent 19.8% of the financing granted in this market, although they have decreased financing by 8% with respect to the end of 2022. In this regard, there was a 21% fall in financing for development banks. Nonetheless, institutions in this sector remain the main counterpart of financing granted by funds, followed by brokerage firms (Graph 118). In terms of their debtor position, the funds have not financed themselves in this market, even though they were authorized to do so as of June 2020.

Graph 118

Amount financed by investment funds in the repo market

Billions of pesos



Data as of June 2, 2023.
Source: Banco de México.

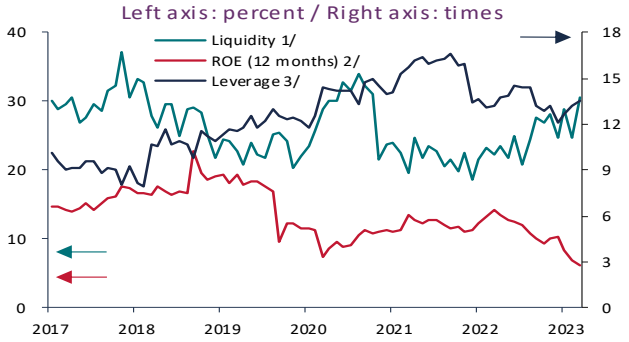
V.3.4. Broker-dealers

The brokerage sector is comprised of 36 institutions. The sector's assets totaled one trillion pesos, decreasing 2.3% in real annual terms. Assets represented 3.5% of the total assets of the financial system at the end of March 2023. The main risks of this sector are leverage through repurchase agreements and the market risk of its investment portfolio.

Since the last *Report*, broker-dealers' leverage increased slightly, a situation that is explained by higher passive positions with repos, as well as a slight increase in the balance of loans received. The passive repo transactions are mainly with counterparties within the mutual fund sector, as well as with individuals. Most of the passive repo position is collateralized by government securities, which means that the credit risk to which broker-dealers are exposed is limited. The liquidity indicator, defined as the ratio of current assets to current liabilities, improved slightly and brokerage firms' profitability continued its downward trend (Graph 119).

[81] Measured as the difference between the percentage of repurchase/liquidity at risk and the percentage of liquid assets, with respect to total assets.

Graph 119
Leverage, liquidity and ROE
Left axis: percent / Right axis: times



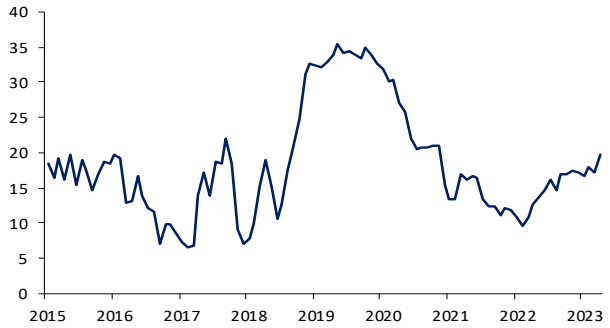
Data as of March 2023.
Source: Banco de México and CNBV.
1/ Liquidity = Current assets / Current liabilities. Where:
Current Assets = Cash and Equivalents (Cash + Banks + Other cash and cash equivalents + Currencies receivable) + Unrestricted Tradeable Instruments + Unrestricted Readily Marketable Instruments + Repo Receivables + Accounts Receivable.
Current Liabilities = Short-term bank loans and from other bodies + Repo liabilities + Other Accounts Payable.
2/ ROE = Net Income 12-month flow / Total Equity 12-month
3/ Leverage = (Total liabilities - Settlement Receivables) / Total Equity.

Regarding the sector's solvency, the CAR at the end of March 2023 increased and remains at high levels for both the system and most of the individual entities. The increase in the system's CAR is explained by an increase in net capital, while there was a decrease in risk weighted assets. This variation in risk assets is due to decreases in both the credit and market risk components.

The sector's profitability, measured in terms of the twelve-month net income to stockholders' equity ratio (*ROE*), continues the downward trend that began in the second quarter of 2022, and in March 2023 stood at 6.2%, down from 6.9% reported in the last *Report*. This is mainly due to lower income from services, which is the main source of income for the sector. In particular, commission expenses and fees paid increased in March 2023. In addition, brokerage firms registered higher administration expenses.

The market risk to which broker-dealers are exposed, measured by market CVaR as a proportion of net capital, recently increased from 16.8% in September 2022 to 19.7% in April 2023. The variation is mainly due to changes in the institutions' portfolio positions, increasing exposures in debt instruments, instruments exposed to FX risk, and equity instruments (Graph 120).

Graph 120
99.9% CVaR for brokerage firm's market risk
Net capital percent



Data as of April 2023.
Source: Banco de México, CNBV, BMV, Bloomberg and Valmer.

Interest rate sensitivity of the broker-dealer debt securities portfolio, as measured by market-based duration, has shown a slightly increasing trend so far in 2023, from 0.78 years in December 2022 to 0.80 in May 2023. Although financial conditions have remained tight during the period, the relatively low duration of their portfolios suggests that the impact of interest rate hikes would be limited.

V.3.5. Insurance companies and bonding institutions

The insurance and bonding sector reported an increased in real terms in written premiums. However, the sector's average cost of claims increased in the first quarter of 2023. Coverage indicators continued at levels above the regulatory minimums in the same period.

The insurance and bonding institutions sector is comprised of 113 institutions, with 103 insurance and 10 bonding companies. The sector's assets totaled 2.19 trillion pesos, decreasing -0.5% in real annual terms. The sector's assets represented 7.7% of the financial system's total assets as of the first quarter of 2023.

During the first quarter of 2023, the sector presented an increase in premium issuance of 5.4%[82] (Graph 121). This growth is mainly explained by the transfer of the cost of claims to the premium price due to the increase in hospital and auto repairs costs. The 15.4%

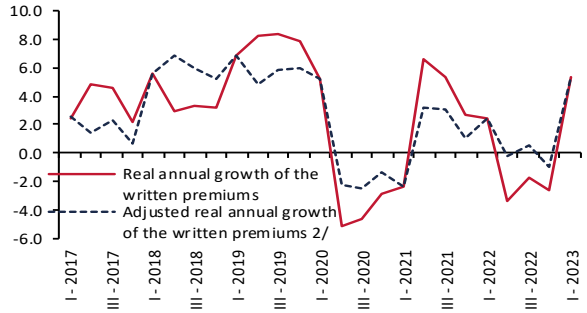
[82] The growth figures in this section are expressed as cumulative real growth compared to the same quarter of the previous year.

increase in automobile premia, associated with the annual growth in the sale of new automobiles, is noteworthy. In addition, the Non-Auto Damages operation grew by 11.7% due to the renewals of the *SHCP* and SEP biennial policies. The Accident and Health insurance operation also contributed to the growth in premium issuance due to increases in the Medical Expenses and Health lines.

The loss ratio increased to 77.6%[83]; however, it remains below the levels observed in 2021. Worthy of note was the decrease in Life claims of -15.4% due to the reduction in mortality, which was offset by an increase in claims in Non-Auto Property & Casualty (24.8%), Auto (21.4%), and Accident & Health (12.3%).

Earnings for the sector as a whole increased 9.3% compared to the first quarter of 2022. The increase in income is mainly explained by income from financial products, which grew 62%. In turn, the improvement in income from financial products is due to higher interest income from fixed-income investments and an increase in dividends from equity investments. Although the sector's income is below the levels observed before the pandemic, it has shown a recovery since 2021.

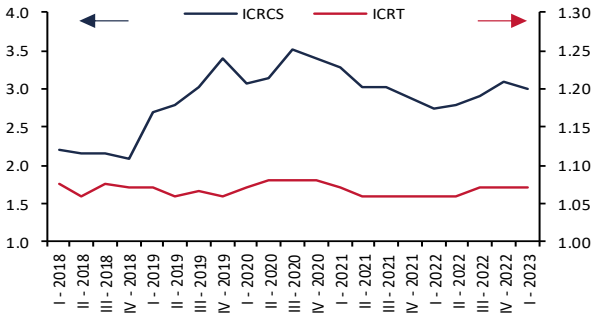
Graph 121
Real annual growth of the written premiums of the insurance and bonding sector [1/]
Percentage



Data as of March 2023.
Source: CNSF.
1/ Cumulative growth compared to the same quarter of the previous year.
2/ The Pemex comprehensive policy has a biennial term. In order to understand the growth trends of the sector, the premium is evenly spread over each year.

Finally, the sector continues showing high solvency ratios. Both the Technical Reserves Coverage Index[84] (*ICRT*, for its acronym in Spanish) and the Capital Solvency Requirement Coverage Index[85] (*ICRCS*, for its acronym in Spanish) suggest that investments are sufficient to cover obligations to policyholders (Graph 122). The Mexican insurance sector maintains sufficient and liquid reserves to face risks without jeopardizing the stability and solvency of the sector.

Graph 122
Coverage ratios of the insurance sector
Number of times



Data as of March 2023.
Source: CNSF.

V.3.6. Other non-bank financial intermediaries (*OIFNB*, for its acronym in Spanish)

Regulated and unregulated financial institutions that are part of the financial system, as well as companies that, among other activities, carry out credit intermediation or credit operations on a regular and professional basis in the country (collectively referred to as other-non-bank financial brokers, *OIFNB*, for its acronym in Spanish), continue to face challenges,

[83] The loss ratio is defined as the net cost of claims over the written premia earned in the period using year-to-date data.

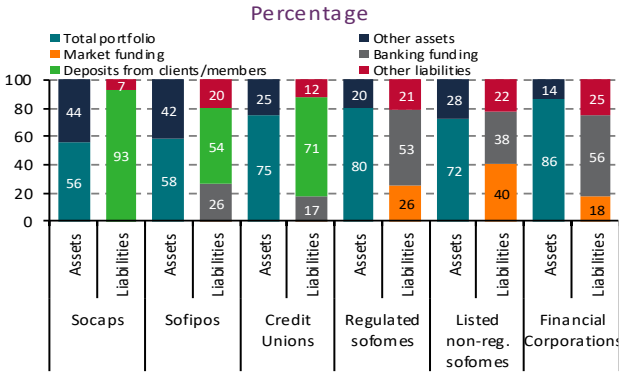
[84] The technical reserves coverage index is calculated by dividing the investments backing the technical reserves by the amount of such reserves. When this ratio is greater than or equal to one, it means that the institution maintains sufficient resources to back its obligations.

[85] The Capital Solvency Requirement (*RCS*) coverage index is calculated by dividing the sum of eligible own funds backing the *RCS* by the amount of the solvency capital requirement. If the ratio is greater than one, it means that the institution maintains sufficient resources to cover unexpected losses.

particularly related to tighter financial conditions.[86] This tightening has had an impact on both the cost of and access to new financing for these institutions.

The non-regulated segment (financial companies and non-regulated sofomes),[87] whose funding depends mainly on bank sources or the debt market (Graph 123), has faced significant challenges to refinance its debt in a context of increased risk aversion among investors due to the default in payment of some entities in the sector with international bond liabilities in recent years. While some entities have entered into bankruptcy or liquidation process, in some cases, they have reached agreements with creditors for the payment of liabilities. Some have carried out complex restructuring and divestment plans to obtain liquidity. Although the observed cases of default do not constitute systemic risk events, and some creditors within the Mexican financial system that had exposure to these companies have managed to recover part of their investments, dependence on market funding or on a reduced number of sources makes it difficult to replace this type of funding in the face of shocks, even the exogenous ones. Hence, this dependence is presented as a vulnerability of the business model of these financial institutions without a stable source of funding. Therefore, going forward, additional effects on *OIFNB* that depend on market funding, both domestic and external, and that have a high concentration in their institutional funding sources, cannot be ruled out.

Graph 123
Assets and Liabilities of Other Non-Bank Financial Intermediaries (OIFNB)



Data as of March 2023.
Source: Banco de México, BMV, CNBV and Condusef.
By March 2023, there are 72 credit unions (63.5 billion pesos in total assets), 37 sofipos (71.2 billion pesos in total assets), 154 socaps (246.9 billion pesos in total assets), 10 finance corporations (351 billion pesos in total assets), 1 listed non-regulated sofom (11 billion pesos in total assets) y 25 regulated sofomes ER (242.4 billion pesos in total assets).

Although the assets of the *OIFNB* sector represent a relatively low fraction of the assets of the Mexican financial system, for some segments of the non-financial private sector, *OIFNB* represent an important percentage of their sources of financing, particularly the consumer and business financing segments, as well as for the unbanked SMEs (Table 5). In this regard, as of March 2023, a recovery in credit portfolio origination by *OIFNB* was observed, but with a greater magnitude in the case of regulated lenders.

[86] The entities comprising the OIFNB sector include entities that are part of the financial system, some of which are regulated (socaps, sofipos, regulated sofomes that are not subsidiaries of credit institutions and those that issue debt in the local market, as well as credit unions and bonded warehouses), while others are non-regulated (non-regulated sofomes). It also includes financing granted by financial companies that perform credit intermediation on a regular basis by granting credit (leasing companies or financial arms of automobile companies), as well as that granted directly by department stores listed on the stock exchange to their customers through credit cards. Although the entities mentioned here represent a small percentage of financing to the non-financial private sector, and due to their low interconnection with the country's banks they are not systemic, they do play an important role of inclusion in the financial system since they serve savers and borrowers who are not served by the banks.

[87] They do not have prudential supervision and regulation by any financial authority, except for money laundering and terrorist financing issues.

Table 5

Regulation and Risks Related to Other Non-Banking Financial Intermediaries[1/]												
Entity / Instruments / Activity		Risk of:			Those that participate in credit intermediation other than banking	Total assets			Regulation by:			Supervisor / Regulator
		Maturity Trans-formation	Leverage	Runs		Thousands of million Mexican Pesos	% of GDP	Real annual change in per cent	Capitalization	Liquidity	Leverage	
Socaps (levels 1 to 4)		✓	✓		✓	240	0.8	-0.3	✓	✓		CNBV
Sofipos (levels 1 to 4)		✓	✓	✓	✓	67	0.2	90.2	✓	✓		CNBV
Credit unions (levels 1 to 3)		✓	✓		✓	63	0.2	-3.7	✓	✓		CNBV
Regulated Sofomes	With links with a bank and consolidated with said bank	✓	✓			280	1.0	-24.0	✓	✓		CNBV
	With links with a bank but not consolidated	✓	✓			60	0.2	-18.9	✓	✓		CNBV
	No links with a bank and issues debt[2/]	✓	✓	✓	✓	229	0.8	13.6				CNBV
Non-regulated Sofomes[3/]		✓	✓		✓	541	1.8	-1.9				
Financial corporations[4/]		✓	✓		✓	351	1.2	-2.7				
Non Bank credit card issuers[5/]		✓	✓		✓	74	0.3	10.1				
Securitizations of financial entities[6/ 7/]		✓	✓		✓	474	1.6	-7.8				CNBV
Securitizations of non-financial entities[6/ 8/]		✓	✓			297	1.0	-0.6				CNBV
Total non-banking financial intermediaries						**2,396**	**8.2**	**-0.6**				
Real Estate Investment Trust (fibras)[6/]			✓			501	1.7	4.5			✓	CNBV
Mortgage trusts (no fibras)[6/]		✓	✓		✓	6	0.02	-19.7			✓	CNBV
Development Capital Certificates (CCD)[6/]			✓			390	1.3	-7.7			✓	CNBV
Energy and infrastructure trusts (fibra E)[6/]			✓			136	0.5	0.9			✓	CNBV
Investment projects trusts (CERPIS)[6/]			✓			55	0.2	-16.0			✓	CNBV
Total infrastructure financing vehicles						**1,088**	**3.7**	**-2.0**				
Total of financial intermediaries, infrastructure financing vehicles and activities						**3,485**	**11.9**	**-1.0**				
Other financial intermediaries or activities[9/]					✓	1,044	3.6	-84.2				CNBV/CNSF
Capital investment funds [10/]						0	0.0	n.a.				
Pensions funds [11/]						6,064	20.7	-2.2				Consar
Commercial banks		✓	✓	✓		12,942	44.1	2.1	✓	✓	✓	CNBV/Banxico

Preliminary figures at March 2023

Source: Banco de México, CNBV, CNSF, Condusef, Indeval and BMV

1/ The red marks indicate cases in which the risk described may materialize or does materialize currently in some of the entities within the specific sector in Mexico. The risks in the columns are defined as: (i) maturity transformation risk: the risk from obtaining short-term funding to invest in long-term assets; and (ii) the leverage risk: the risk coming from borrowing funds to buy assets to increase potential investment profits (losses).

2/ In 2014 several legal provisions were reformed to include sofomes that issue debt within the regulatory framework. From 2015, 18 non-regulated companies changed their purpose to regulated on being issuers of debt and gradually began to report to the CNBV.

3/ The figures referring to the number of non-regulated sofomes is taken from the Commission's Registry - RECO (Condusef). The figures on assets are not available, so we use instead the size of the total credit portfolio granted by the entities and reported to the Condusef. The credit portfolios of non-regulated sofomes that only grant credit to related or affiliated entities are not considered. The figures of non-regulated Sofomes collected by the Condusef are subject to changes.

4/ These are companies that take on indebtedness but are no financial entities under Mexican law. For example, the financial arms of auto manufacturers and commercial credit or leasing companies. The figures shown here only include those that issue debt in the financial markets.

5/ This only includes the balance of the credit granted directly by department stores to their customers without the intervention of any financial broker.

6/ Relates to the outstanding value a market prices.

7/ Includes securitizations of banks, sofomes, the Infonavit and the Fovissste.

8/ Includes securitizations of both the private and public sectors, such as of the states and non-financial companies.

9/ Includes fixed income investments funds, locally exchange traded funds (ETFs) bond warehouses, brokerage firms and credit insurers.

10/ Includes investment funds in capital instruments and local ETFs linked to equity indexes.

11/ Includes Siefores.

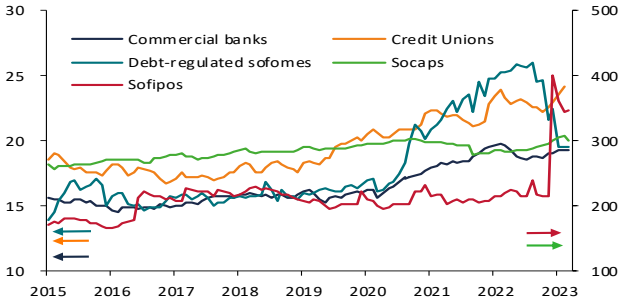
Thus, in the described environment, at the end of March 2023, commercial financing granted by the entities of the *OIFNB* sector registered an increase, mainly in that granted by regulated entities. In the consumer segment, there was an increase in financing granted by the *OIFNB* for both regulated and non-regulated lenders. New competitors have emerged, particularly in the sector of popular savings and credit institutions, and with this, a significant increase in the share of credit granted by regulated *OIFNB*.[88] In the case of credit unions, the financing they grant continues decreasing.

For some institutions, particularly non-regulated ones, delinquencies remain at historically high levels. In contrast, the delinquencies of regulated institutions (sofipos, socaps, credit unions, regulated sofomes) have, in some cases, decreased. Regarding the regulatory capitalization indicators of regulated institutions, all are at adequate levels and, except for regulated sofomes, higher than those of the previous *Report* (Graph 124). In the case of sofipos, the start of operations of a new institution raised their capitalization level by more than 60%.

Graph 124

Capitalization Level of Regulated NBFIs [1/, 2/]

Percentage



Data as of March 2023, except credit unions with data as of February.

Source: CNBV.

1/ Right axis: Capitalization Level = Net capital / Total capital requirement for risks. Socaps and Sofipos must maintain a net capital equal to or greater than the total regulatory capital requirement for risks; i.e., equal to or greater than 100%.

2/ Left axis: Capitalization Index = Net capital / Risk-weighted assets. Commercial Banks, regulated Sofomes equity-linked to Commercial banking institutions or financial groups and and Credit Unions must maintain a minimum ICAP of above 8%.

Although the profitability of most entities has increased, the socaps sector stands out, maintaining higher profitability levels than the banking sector. The profitability of credit unions has deteriorated since the last *Report*. The sofipos' sector shows negative profitability; however, there is heterogeneity among institutions as it is a sector that has high levels of administrative expenses, as well as credit provisions.

In general, *OIFNB* are vulnerable to downturns in economic activity. Although these institutions do not represent a risk to financial stability, since they are small and have little interconnection with the country's banks and other financial intermediaries (Table 6), the size of their interconnection with the banking system increased slightly with respect to the previous *Report*, and the number of members or depositors they serve can be significant.[89]

[88] In December 2022, NU Mexico, a Fintech entity specializing in credit through a digital card, merged its business with a sofipo it no longer operated, which it acquired in December 2021. As of December 2022, its assets will be included in the sofipos sector, part of the popular savings and credit institutions, and it will become the largest entity with an asset share of 40% of the total. This situation allows it to raise funds from the public. Prior to this migration, there was no information on this entity because its status was that of a non-public financial company and therefore it was not included in any statistics in this or previous editions of the *Report*. However, in November 2022 the company reported serving 3.2 million customers with its digital credit card product, while in March 2023 that figure reached 3.5 million customers.

[89] Sofipos rely heavily on traditional fundraising to fund their lending activity. In order to guarantee its deposits, a sofipo must be associated with the Protection Fund, which is a trust set up by the Federal Government with the development bank acting as trustee institution, without such trust having the status of a federal public administration entity or a public trust (Articles 98 and 99 of the Law of Savings and Popular Credit (LACP)). Deposit insurance is managed by Prosofipo through the trust and the savings of sofipos' depositors are protected for up to 25 thousand UDIs in the event a sofipo is settled or disappears (Article 105 of the LACP). The assets of the Protection Fund will be

Table 6

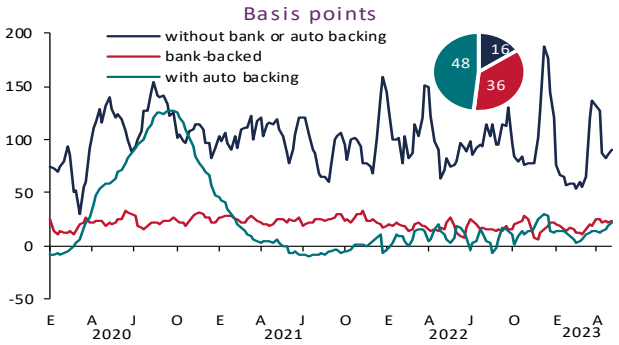
Exposures (assets minus liabilities) of Banks with ONBFIs				
Entity	Commercial Banks' assets with ONBFIs	Commercial Banks' liabilities with ONBFIs	Assets - Liabilities	
	Millions Mexican Pesos	Millions Mexican Pesos	Millions Mexican Pesos	% of banks capital
Savings and Loan	104	58,726	-58,622	-4.16
Popular Finance	11,602	11,860	-258	-0.02
Credit Unions	4,219	6,038	-1,819	-0.129
Regulated Sofomes	81,531	7,212	74,319	5.28
Non-regulated Sofomes	48,045	n.d.	48,045	3.41
Financial Companies	26,164	n.d.	26,164	1.86

Preliminary data as of March 2023.
Source: Banco de México and Indeval.
1/ Banks' assets with ONBFIs include credits and investments in securities, whereas its liabilities with ONBFIs include deposits in banks, investments in banking securities and repo payables to ONBFIs.
2/ The net capital of the banks is as of August 2022, the latest date available.

Although in the aggregate the financing obtained through debt issues in the local market has recovered in recent months, the amount of short-term debt issued by some independent financial institutions (both regulated and non-regulated) has decreased and its cost remains high (Graph 125).

Graph 125

Yield spread of short-term debt issued by NBFI



Data as of May 26, 2023.
Source: BMV and BIVA.

1/ Non-bank financial institutions, without bank or auto backing: Mercader, Crediclub, Factoring Corporativo, Financiera Bepensa, Ion Financiera, Mercader Financial, Portafolio de negocios, Sofoplus, Cetelem (are sofomes ER), Corporación Actinver and BBVA Leasing (are financial companies).

2/ Non-bank financial institutions, bank-backed: Afirme almacenadora, Afirme arrendadora, Afirme Factoraje, Fundación Dondé and Start Banregio (the first one is an OAC, the rest are sofomes ER).

3/ Non - bank financial institutions , auto backed: GM Financial, Navistar Financial (son sofomes ER), Paccar Financial, Toyota Financial, VW Leasing (are financial companies).

It is worth mentioning that there are new potential participants in the credit market, mainly from the fintech sector and other entities, which currently finance their lending activities through private equity investors or with financing from foreign banks. However, some participants consider the legal form of sofipo to be attractive in order to have access to other sources of funding with greater stability, as it has already been observed.

Other financing vehicles

Real Estate Investment Trusts (*Fibras*, for its acronym in Spanish) specialized in the industrial, office and hotel sectors showed a slight increase in their revenues and occupancy rates, due to the recovery in economic activity, while their levels of indebtedness showed a reduction and have remained at low levels, and their profitability levels are currently above their historical average (Graph 126). The debt service and liquidity coverage indicator of the Fibras deteriorated slightly since the last *Report*. However, during 2023 some Fibras have refinanced their debt through bank credit lines and local debt. Regarding the level of investment spending, at the end of March there was a significant increase from a historically low level, as some Fibras focused on industrial properties have invested in new properties during 2023.

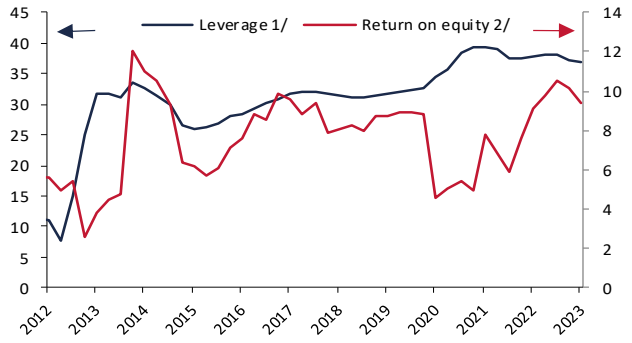
made up of the following resources: the contributions made by the Federal Government; the ordinary monthly fees payable by the sofipos; the extraordinary fees payable by the sofipos; and other assets, rights and obligations acquired by the Fund (Article 101 of the LACP).

Socaps are cooperatives in which a group of individuals form a society to pool their own resources and lend them to each other, generating a profit on the savings. They are also known as savings banks and are not-for-profit companies. Like sofipos, socaps have a Savings Protection Fund that covers up to 25 thousand UDIs per saver, which is administered by the Cooperative Protection Fund Trust (FOCOOP).

Graph 126

Leverage and return on equity of Mexican REITs

Percentage



Data as of March 2023.
Source: BMV and BIVA.
1/ Leverage is calculated by dividing debts by assets.
2/ Return on equity (ROE) is calculated by dividing 12-month Net Income by 12 month average Total Equity.

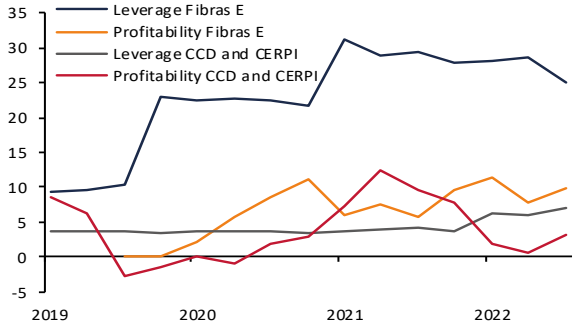
The outstanding balance of Certificates of Capital Developments (CCD) and Senior Trust Bonds for Investment Projects (*Cerpis*, for its acronym in Spanish) has contracted since the last *Report*. In addition, there was a decrease in the proportion of assets dedicated to investment projects with respect to the total, as some vehicles have been divested. In addition, the leverage and liquidity indicators of these vehicles deteriorated slightly and profitability decreased due to the lower use of their assets in productive investments (Graph 127). Regarding *Fibras E*, the balance of their capital issues remained stable, as did their leverage and liquidity risk indicators, while their profitability improved at the margin.

With respect to debt securitization issues of mass or homogeneous loans (e.g., issues made by Infonavit or Fovissste), although their over-collateralization indicator had been on a downward trend since 2020, as of the end of last year it reversed and remained high as of March 2023. The level of delinquency in the vehicle portfolio is high but stable (Graph 128). In the case of non-homogeneous securitization issues (e.g., highway tolls), a high but stable leverage level has been observed, with a deterioration in their liquidity indicator, but achieving a higher profitability of the assets backing the trusts.

Graph 127

Leverage & profitability of Fibras E, CCD and CERPI 1/

Percentage

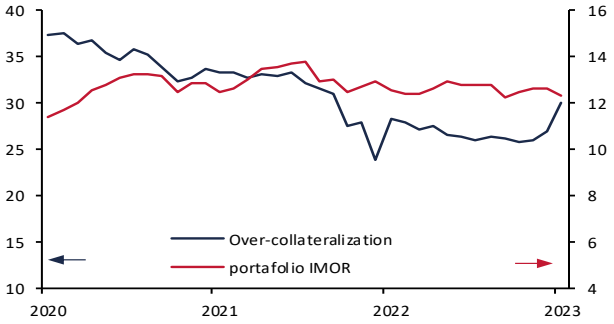


Data as of March 2023.
Source: BMV y BIVA.
1/ Leverage is calculated as total liabilities divided by total assets. Profitability is mesured by ROE, and it is considering the 12-month net income.

Graph 128

Over- collateralization and delinquency levels of homogeneous securitizations 1/

Percentage



Data as of March, 2023.
Source: BMV and BIVA.
1/ Over-collateralization is calculated as one minus the ratio of the outstanding balance of the issuance and the sum of current assets plus cash, times 100.

Institutions using financial technology

Financial Technology Institutions (*ITF*, for its acronym in Spanish) continue their process of institutionalization and formal integration into the financial system, with a steady increase in licenses granted. Growth in the sector represents positive aspects for financial inclusion and financial services competition, although some business models are still being tested.

As of May 2023, 58 authorizations have been published in the Official Gazette of the Federation to operate under the figure of ITF in accordance with the terms of the Financial Technology Institutions Regulation Law (*LRITF*, for its acronym in Spanish). Of these, 22 refer to Crowdfunding Institutions (*IFC*, for its acronym in Spanish) and 36 to Electronic Payment Fund Institutions (*IFPE*, for its acronym in Spanish). During the first half of

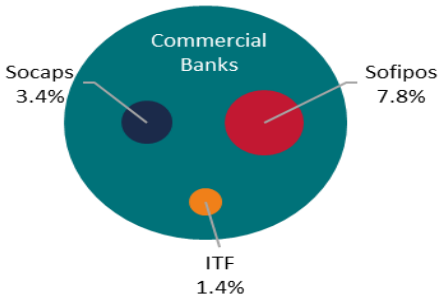
2023, 14 ITF have been authorized, of which 6 are IFC: Monific, Expansive Realty, Capital Funding Lab, Ucombi, Inverteca and Snowball; and the other 8 are IFPE: Mozper, Edenred, Klar Pagos, Sí Vale Fintech, Alto Azareo, Sylon Capital, UBR Pagos México and Neritopay. Some of them were already operating in accordance with transitory Article 8 of the *LRITF*.

Although the ITF sector is growing, it still remains at relatively low levels compared to the banking sector, based on the capital contributed by ITF. However, with respect to other financial intermediaries such as Socaps or Sofipos, the size of ITF capital represents a larger proportion (41.3% and 17.8%) (Graph 129). It is therefore important to continue monitoring this fast-growing sector and identify any vulnerabilities associated with it, since, although it does not represent a source of systemic risk, in an environment of low growth and high inflation, this sector may be threatened not only by the impact on consumer and corporate demand, but also by the tightening of financial conditions.[90]

Graph 129

Relative size of financial intermediaries compared to commercial banks 1/

Percentage in terms of capital stock



Data as of May 2023.
Source: CNBV, Federal Official Gazette, Crunchbase and entities' websites.
1/ For the case of Financial Technology Institutions (ITF), this refers to the contributed capital, which results from the sum of the initial capital stock plus the financing obtained through several investment rounds. The figures related to capital stock of Commercial Banks, Socaps and Sofipos are up to March 2023.

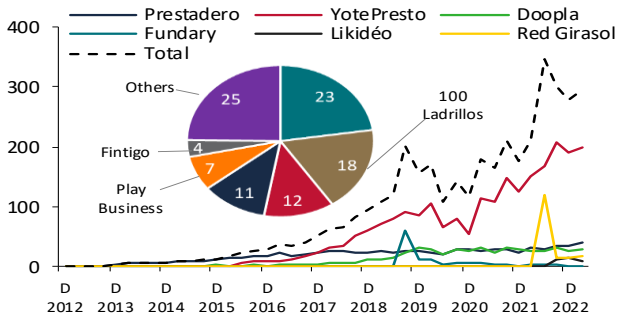
IFC are institutions that connect debtors and investors through their digital platforms. Because they allocate credit based on criteria that analyze various sources of applicant data and use artificial intelligence algorithms, these institutions could boost financial inclusion by improving access to credit for the underserved population. The use of such technologies allows them to identify quality clients that might go unnoticed by other types of institutions, in addition to offering them products tailored to their different risk profiles.

IFC continues showing an upward trend in credit placement among its customers, with a 32% increase over March 2022 and a quarterly growth of 3% in March 2023 (Graph 130). However, some institutions that channel this type of financing continue experiencing problems with their non-performing portfolio, with non-performing loan levels even close to 30%. These institutions' business models and strategies should be monitored when attracting investors, given the challenges they may face in the current environment of high interest rates.

Graph 130

Quarterly credit placement by institution 1/

Millions of pesos



Data as of March 2023.
Source: Institutions' websites.
1/ The pie chart denotes the proportion of capital contributed by the IFC compared to the total. The credit placement series omit certain institutions due to the low frequency of their data.

In general, both ITF and the so-called Fintechs (in the broad sense) contribute to financial inclusion by providing financial services to the part of the population that did not use to have access to them, for example, due to lack of credit history or the cost of financial services. Some Fintechs are offering secured credit cards, through the possibility of depositing an initial amount to obtain the credit line, generally for the same amount. After a certain time, the amount is returned to the customer, who can then apply for a new card. The companies use artificial intelligence for credit approval and the modality allows users to gradually build up their credit history.

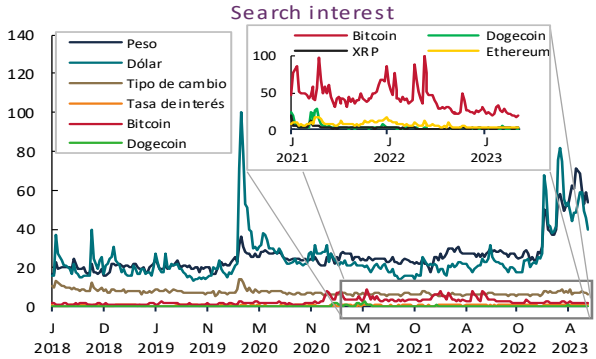
Although the financial system has kept out of the operation and events of the virtual asset (VA) market, the development of said market should be monitored. The operation of VA among individuals is still very low and interest in these assets seems to have decreased

[90] Beau D. (2022): "Between mounting risks and financial innovation - the Fintech ecosystem at crossroads", BIS Central Bank Speech, October 20, 2022.

since the episodes of losses and volatility observed in 2022.[91] Using the number of Google searches as an indicator, there is still no relevant interest from Mexico's population (Graph 131).

Graph 131

Google searches for main virtual assets in Mexico[1/]



Data as of June 4, 2023.

Source: Google Trends.

1/ "Google Trends" normalizes search interest to facilitate comparisons between terms. Search results are normalized relative to the time and region of the query. The graphs show the normalized search interest for the sample of all selected search terms. Some virtual assets were omitted from the graph as their search interest was close to zero (< 6).

However, in global markets, the global use of financial technology has facilitated the adoption of VA. Banco de México will continue promoting a healthy distance between VAs and the traditional financial system, as well as to monitor the evolution of this market, in order to identify in a timely manner, the implications that such evolution could have on financial stability and promote, if necessary, measures to safeguard it.

[91] For a description of the 2022 volatility episodes in the AV markets see Box 7 of the Financial Stability Report December 2022.

Box 4: International Regulatory Proposals in the Virtual Asset Market

I. Introduction

This box discusses some of the regulatory and prudential standards reactions of various institutional bodies and jurisdictions around the world to Virtual Asset (VA) markets, including the so-called stablecoins, recent volatility events in these markets and, in general, those undertaken to address the risks that exist with respect to the interaction of the financial system with these markets.[1]

The operation of VA between individuals is still relatively very low and the interest in these assets seems to have decreased after the failures and volatility that occurred in 2022 in the market for these assets, as well as the bankruptcies of institutions associated with this market.[2] However, even though the VA market is not large enough with respect to the traditional financial system, the digital environment continues to advance rapidly and it is important to monitor its development and avoid the emergence of risks that could impact users and financial stability.

II. Local Regulatory Proposals

The regulatory focus on VAs has increased considerably in recent years and looks set to continue to do so.

A significant number of countries are investigating, defining, consulting and legislating to subject VAs to a regulatory framework. Regulatory projects range from outright prohibition to imposing requirements, limits and various safeguards for consumers and the financial system.

II.1 Regulatory Position in Mexico

In Mexico, as has been stated on several occasions, Banco de México considers it necessary for the financial system and VAs to maintain a healthy distance. Therefore, it has been determined that financial institutions in Mexico do not hold positions in such assets, do not acquire them as collateral and do not finance leveraged positions of their customers in VAs. VAs are regulated in Mexico by the Law to Regulate Financial Technology Institutions (LRITF) and by regulation issued by Banco de México (Circular 4/2019).[3] Recent events have confirmed the risk, both for investors and the financial system, of operating with VAs, reinforcing Banco de México's position.

II.2 Regulatory Positions in Other Jurisdictions

Many other jurisdictions have implemented total or partial bans on VA trading, and have warned investors of the risk of trading in these instruments. Some examples are: Algeria, Bolivia, China, Egypt, Morocco, Nepal, Qatar, Saudi Arabia and Algeria.

For its part, India is evaluating the prohibition of issuing digital currencies other than the one that could eventually be issued by the Reserve Bank of India, and has warned of the risk that investing in VA implies for investors.

South Korea

Virtual Assets are not considered legal tender and platforms for trading them (*exchanges*) are subject to strict regulation. In 2017, the government restricted the use of anonymous individual accounts and prohibited domestic financial institutions from operating Bitcoin futures transactions. To conduct transactions, individuals must open accounts in "real names." In 2020, money laundering and terrorist financing prevention legislation was extended to platforms, requiring them to be licensed by the Financial Services Commission's Financial Intelligence Unit.

United States

Faced with the prudential risks of stablecoins, the U.S. President's Working Group on Financial Markets (PWG) issued, in November 2021, a report[4] urging the U.S. Congress to pass legislation requiring issuers of so-called stablecoins to register as depository institutions, which would impose on them the same regulatory regime as banks, including governance and risk management; capital and liquidity requirements; and resolution plans and recovery requirements.

There are several initiatives in Congress, including the Responsible Financial Innovation Act (RFIA) that would impose 1:1 reserve requirements and transparency requirements. Although the initiative does not require all stablecoins to become depository institutions, it creates a special chapter for these AVs with tailored requirements. Also, on March 8, 2023, it was announced that a new initiative will be introduced, which will address cybersecurity risks and those related to vendors and third parties, as well as provide guidance on which assets should be under the regulation of the Securities Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC).

In February 2023, the Board of Governors of the Federal Reserve System, the Federal Deposit Insurance Corporation (FDIC) and the Office of the Comptroller of the Currency (OCC) issued a joint statement[5] alerting banking institutions to liquidity risks from funding VA-related institutions and practices for managing those risks.

European Union (EU)

In May 2023, the Council of the European Union approved the Markets in Crypto Assets Regulation (MiCA) and the Transfer of

[1] For a definition and description of VAs and the risks they could imply for financial stability, see Box 6 of the Financial Stability Report for the second half of 2021.
[2] For an overview of volatility episodes in the 2022 Virtual Asset markets, see Box 7 of the Financial Stability Report for the second half of 2022.
[3] The LRITF assigns Banco de México the power to authorize, through general provisions, the Financial Technology Institutions (ITF) and Credit Institutions (CI) that may operate with specific AV determined by Banco de México. Consequently, Banco de México issued Circular 4/2019, where it is established that such Institutions may only carry out internal operations with AV with prior authorization from Banco de México. For more information on the regulation of VAs in Mexico and the risks they could imply for financial stability, see Box 6 of the Financial Stability Report for the second half of 2021.
[4] PWG, FDIC and OCC (2022).
[5] Board of Governors of the Federal Reserve System et al (2023).

Funds Regulation (TFR),[6] which are expected to start to be implemented between mid-2024 and early 2025.

MiCA is the world's first cross-jurisdictional regulatory and supervisory framework for VAs. Its purpose is to regulate VAs in the 27 EU member countries to achieve the objectives of ensuring legal certainty for VAs within its scope; supporting innovation and fair competition; protecting consumers, investors and market integrity; and ensuring financial stability by including preventive measures.[7]

MiCA will apply to all market participants that issue VA (issuers) or provide services related to these assets (VA Service Providers; CASPS). [8]

The regulation standardizes rules of conduct and capital requirements for participants and thus creates a regime in the operation, management and organization of issuers and service providers in the field of VA, covering, among other things, licensing, disclosure requirements, prevention of market abuse and environmental sustainability requirements.

United Kingdom

In 2014, the UK tax authority issued guidance on the tax treatment of VAs and in 2017 the Financial Conduct Authority (FCA) issued warnings to consumers about the risks associated with such assets. However, the UK's first coordinated regulatory response came from the creation of the Cryptoassets *Taskforce* in 2018, which brought together the Treasury department, the FCA and the Bank of England, with the aim of establishing a plan to implement regulation and oversee future developments of VAs.[9]

Accordingly, from January 2020, new firms undertaking VA activities in the UK are required to apply for registration with the FCA and ensure compliance with anti-money laundering and counter-terrorist financing regimes. In addition, in 2021, the FCA imposed a permanent ban on complex financial products whose value is related to VAs (derivatives and listed securities) and in January 2022, the intention was announced to incorporate certain VAs into FCA regulation governing the way in which certain financial products and services are marketed and promoted to consumers.

III. Response of Global Supervisory Authorities and Agencies

The events of 2022 caused a generalized loss of confidence in this type of assets, after questioning their security and exposing their deficiencies and lack of intrinsic value. [10] In addition to these events, the collapse of the U.S. regional bank, Silicon Valley Bank (SVB), highlighted the existence of additional risks and transmission channels in relation to the so-called stablecoins.[11] All of the above has attracted the attention of the authorities and the main international bodies issuing regulatory standards, which are working intensively on the development of effective and globally consistent regulation of VAs, as detailed below.

Bank for International Settlements (BIS)

The Basel Committee on Banking Supervision (BCBS) of the BIS published in December 2022 the standard on the minimum prudential treatment of banks' exposures to VA.[12] These standards will be incorporated into the Basel consolidated framework and will become effective as of January 1, 2025, establishing the minimum requirements to which all banking institutions dealing with VA must adhere. It is important to note that jurisdictions may choose to implement stricter requirements or to establish total prohibitions.

The principle governing the standards is that of "same risk, same regulation". In other words, when VAs and their intermediaries perform an economic function equivalent to that performed by instruments and intermediaries in the traditional financial sector, they must be subject to equivalent regulation. One of the main challenges faced by supervisors was to agree on the classification of VAs. To this end, the BCBS established conditions for the classification of VAs and created two groups: Group 1 includes VAs that meet certain stability conditions; Group 2, assets that do not. The first group includes traditional assets that have been digitized or tokenized, as well as VAs that have effective stabilization mechanisms (stablecoins). In addition to traditional assets and stablecoins that fail to meet some conditions, Group 2 includes all VAs that do not have a backing or asset pool, such as Bitcoin or Ethereum.

For Group 1 assets, the BCBS requires that they at least be subject to capital requirements based on risk weights of the underlying exposures under the existing Basel framework. In turn, by failing to meet the classification conditions and representing a higher risk, Group 2 assets should be subject to a more conservative capital treatment.

The BCBS will continue to monitor the development of the VA market and work on completing the minimum standard in this regard. [13]

Financial Stability Board (FSB)

In October 2022, the Financial Stability Board (FSB) published a proposal for a framework for the international regulation of VA activities. [14]

[6] Council of the European Union (2023).
[7] BNP Paribas (2023)
[8] European Union (2023).
[9] House of Commons (2023).
[10] For example, the case of FTX, the second largest AV trading platform in the market, stands out (days before its bankruptcy). Despite having been involved in liquidity provision events for troubled AV institutions and being involved in regulatory discussions with various authorities, the events of 2022 brought to light the various internal governance and risk management problems of the institution.
[11] On March 10, 2023, two of the most important stablecoins in the sector, USDC and DAI, lost their peg to the US dollar as a result of direct or indirect exposures to SVB, although their share price improved following the announcement of the measures taken by the US authorities.
[12] Basel Committee on Banking Supervision (2022).
[13] Some outstanding issues include possible additional requirements on statistical and redemption risk testing of stablecoins; the inclusion of permissionless blockchain assets; assessing whether stablecoins can be used as collateral for capital requirement purposes; criteria and degree of hedge recognition for Group 2 assets; and Group 2 exposure limits.
[14] FSB (2022a)

The central components of this regulatory framework are the recommendations to promote consistency and comprehensiveness of regulatory, supervisory and oversight approaches to VA activities and markets;[15] and the recommendations for the regulation, supervision and oversight of global *stablecoins.*[16] This, with the objective of strengthening international cooperation, coordination and information exchange and addressing potential risks to financial stability.

These recommendations were issued for public consultation and are based on the principle of "same activity, same risk, same regulation", as in the BCBS. In accordance with its work plan, the FSB, in close cooperation with other relevant regulatory bodies, will continue to work on its objectives to: finalize the recommendations by mid-2023; continue to coordinate regulatory approaches and ensure they are consistent; and review the implementation of the recommendations by the end of 2025.

International Monetary Fund (IMF)

The IMF released its position on this asset class and, at the request of member countries, in February 2023 published some guidance on appropriate policy responses in response to VAs. The document "*Elements of Effective Policies for Crypto Assets*" (2023) operationalizes the principles of the 2018 Bali Fintech Agenda of the World Bank and IMF and includes macro-financial considerations, such as implications for monetary and fiscal policies.

The document mentions several measures aligned with Financial Stability Board (FSB) standards. In particular, it recommends safeguarding monetary sovereignty and stability by strengthening monetary policy frameworks and not granting VAs official currency or legal tender status, as well as avoiding excessive volatility of capital flows. Other measures are related to clarity on the legal certainty of VAs and the tax treatment of these assets, as well as the development and application of prudential, conduct and oversight requirements to all VA market participants. It is also recommended to establish a joint monitoring framework through different authorities and strengthen international cooperation to increase supervision and enforcement of VA regulation. Finally, it is suggested that the Financial Stability Board (2022a): "FSB proposes framework for the international regulation of crypto-asset activities", Press release, October 11, 2022.

Financial Stability Board (2022b): "Regulation, Supervision and Oversight of Crypto-Asset Activities and Markets," Consultation Paper, October 11, 2022.

Financial Stability Board (2022c): "Review of the FSB High-level Recommendations of the Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements", Consultation Report, 11 October 2022.Gensler, G. (2022): "Kennedy and crypto. Speech, US Securities and Exchange Commission," September 8, 2022. https://www.sec.gov/news/speech/gensler-sec-speaks-090822.

impact of VAs on the stability of the international monetary system be monitored.

IV. Conclusions

Although VAs do not yet pose an imminent risk to financial stability, their accelerated growth, their growing adoption and interconnection with the traditional financial system, and recent events in these markets, highlight the need to act in a timely manner to avoid risks that could impact investors and the stability of the financial system. For this reason, Banco de México reiterates the importance of maintaining a healthy distance between the financial system and VAs, thus preventing the risks inherent to these assets from contaminating the system's operation.

It is important to continue monitoring the evolution of this market, the international regulatory initiatives in different jurisdictions and the regulatory standards proposed by different international organizations, as well as the interaction, or action-reaction events, between supervisory authorities and participants in the VA markets, since this dynamism can determine the evolution of these markets and the emergence of new risks.

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[15] FSB (2022b)

[16] FSB (2022c)

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V.4. Financial market infrastructures

Securities depository institutions and securities settlement systems

The Securities Deposit, Administration and Settlement System (DALI, for its acronym in Spanish) is the infrastructure of Indeval's infrastructure (Mexico's Central Securities Depository) responsible for offsetting and clearing securities market transactions. Debt securities and shares issued in Mexico are registered and settled in the DALI, as well as live trading, repurchase agreements and securities lending transactions carried out by its depositors in the financial market.

At the end of April 2023, the cumulative availability level of DALI services was 99.94%. For its part, the cumulative availability of peripheral services in the same period was 100%. Such services correspond to:

- Collateral management for repurchase agreement transactions (SAVAR, for its Spanish acronym), a system that administers collateral for repurchase agreements with maturities beyond three days in Mexico;
- Securities lending facility for federal government bonds (*Valpre E*¸ for its acronym in Spanish), a system that manages securities lending in Mexico related to the market makers program of *SHCP*, and;
- Securities Lending facility for DALI participants (*Valpre FV*, for its acronym in Spanish), which allows for loans to be arranged between financial institutions in Mexico.

As of February 2023, the average monthly settlement amount in the DALI was 4.46 trillion pesos. Settlement is mostly composed of government securities, representing 84.24% of the average amount settled, followed by bank securities with 13.56 %, corporate sector securities with 1.50% and capital market securities with 0.70%.

Central counterparties

A central counterparty is a financial market infrastructure which stands between the parties entering into financial transactions, thereby serving as a buyer for each seller, and a seller for each buyer.

Contraparte Central de Valores, S.A. de C.V. (CCV, for its acronym in Spanish) and the Asigna Default and Settlement *(*Asigna) trust are the central counterparties established in Mexico to clear and settle securities and derivatives transactions, respectively. Asigna and CCV have procedures and methodologies in place to secure financial resources to cover credit and liquidity risks exposures arising from their roles as reciprocal debtor and creditor in the financial transactions they offset and settle. These resources include the Contribution Fund and the Default Fund. The Contribution Fund is comprised of collateral provided by the Clearing Members and their clients, who provide collateral to cover market and liquidity risk exposures in the event of default by a Clearing Member. On the other hand, the Default Fund is made up of margins that can be mutualized from the Clearing Members to cover defaults, especially in situations of market stress. Until April 2023, the CCV and Asigna systems had a cumulative availability level of 99.90% and 99.96%, respectively.

During the first half of 2023, Asigna and CCV have covered their risk exposures consistent with the resources required as guarantees for the Contribution Funds and the Compensation Funds. In the case of Asigna, its Safety Net[92] is 31,633 million pesos, which is mainly composed of a Contribution Fund of 27,461 million pesos[93], with 50.30% cash resources, as well as a Compensation Fund of 3,304 million pesos, composed of cash resources.[94]

CCV 's Safety Net is 4,943 million pesos and it is mainly composed of a Contribution Fund of 3,704 million pesos, 93.68 % of which are cash resources, and a

[92] The Safety Net is a set of financial resources that the central counterparties make up, mainly from the requirements they make to their participants, to cover credit and liquidity risk exposures.

[93] This amount corresponds to the required contributions, which may vary from the contributions deposited, since the Clearing Members may decide to deposit more than the required amount.

[94] Figures provided by Asigna as of April 28, 2023.

Compensation Fund of 646 million pesos, composed of cash resources.[95]

V.5. Other risks to the financial system

V.5.1. Business continuity risks

Due to the systemic importance of Financial Market Infrastructures and payment systems, they must provide their services and operate under any type of condition, at any time and from any place. In this sense, Banco de México must maintain a high level of availability of the systems it manages and operates.

At the end of the first quarter of 2023, the average availability rate of the two SPEI instances was 99.9995%, which represents an unavailability of 6 minutes in the aforementioned period due to maintenance time required for the infrastructure supporting system operation.

In addition, during the first quarter of 2023 we continued with the execution of exercises of the operational continuity mechanisms implemented jointly with the participants. The purpose of these exercises is to verify that the necessary elements are in place to deal with any event that could affect the availability of both the central infrastructure and the participants.

It is worth mentioning that during this period, Banco de México has not reported any incidents in the technological infrastructure used to operate the payment systems or in its operating processes. In this sense, the payment systems have not been disrupted as a result of any incidents.

V.5.2. Cybersecurity risks

Cybersecurity risks continue to be one of the most relevant risks for the financial system globally. Thus, financial institutions and authorities have adopted different measures to monitor cybersecurity risks and threats in Mexico and globally. In addition, as a result of the conflict between Russia and Ukraine, special attention has been given to cybersecurity risks to financial systems related to international transfers. Since the global financial sector has not been the main target of cyber-attacks originated by the conflict, and institutions in Mexico report not having detected activities or attacks that could be attributable to the war, Banco de México, together with the financial authorities, decided to lower the alert level from "Orange" to "Yellow".[96] Nevertheless, Banco de México will continue to encourage financial institutions to strengthen their protection and response schemes to these events.

From December 2022 to the date of this *Report*, there were 4 relevant cybersecurity incidents[97] in Mexican financial institutions, which were addressed by the Security Sensitive Incidents Response Group (GRI, FOR its acronym in Spanish) of the financial authorities in accordance with their protocols, with no relevant economic impact reported on customers of the Mexican financial sector.

In order to continue strengthening and maintaining current security levels, as well as to strengthen the exchange of information related to threats, vulnerabilities, incidents and cyber risks, technological tools were enabled that will allow financial authorities to exchange information on attacks and threats in order to promote incident prevention actions among their respective regulated parties, and to better coordinate possible response actions.

So far in the first half of 2023, through the GRI, the financial authorities have issued 15 newsletters with technical data on attacks in the Mexican and international financial sector, enabling institutions to implement preventive measures against incidents detected in other entities.

Likewise, Banco de México continues to monitor cybersecurity risk indexes based on international methodologies. In this regard, the Mexican Cyber-attack Risk Index (Graph 132) presents the number of news items in which a cyber threat was mentioned and a cybersecurity risk was proven for the Mexican financial sector.[98] The index shows that the most recurrent cyber threats in recent years are: card sellers, malware and ransomware.

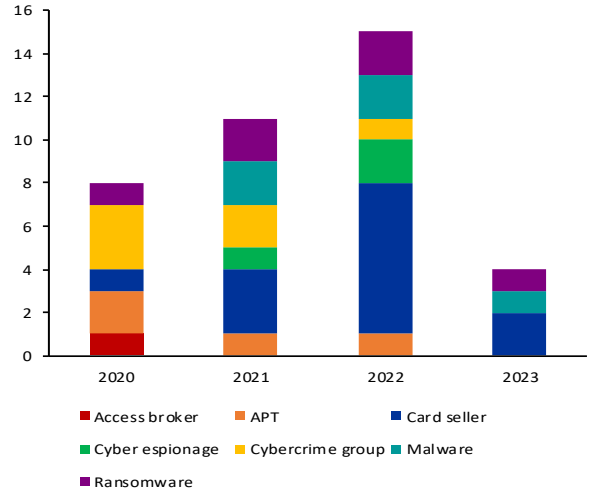
[95] Figures provided by CCV as of April 28, 2023.

[96] At the "Yellow" alert level, digital surveillance is maintained, focused on monitoring cyber threats and relevant events associated with the conflict by actors linked to Russia, Ukraine or their sympathizers; and the implementation of technological and operational actions to monitor the SWIFT system and other platforms used for international transactions is considered.

[97] A summary of the major cyber incidents reported to Banco de México since 2019 within the national financial system is available at this link (in the "Incident response in the financial sector" section).

[98] For more information see Financial Stability Report, December 2022. Box 8: Cybersecurity Assessment of the Mexican Financial System.

Graph 132[99]
Cybersecurity Attack Risk Index in Mexico
News items



Data as of May 2023.
Source: Banco de México.

On the other hand, the Financial Sector Cyber Attack Risk Perception Index,[100] which measures cyber risk in the financial sector for different countries based on news from international coverage sources,[101] indicates that, for the period from January 2021 to May 2023, Mexico ranks 27th out of 105 countries (from lowest to highest risk) with a rating of 1.57%, with the mean of all countries being 4.32% and the median 3.77%. Banco de México will continue to monitor these indicators in order to detect changes in the cyber risk environment for the domestic financial sector in a timely manner and, if necessary, reinforce security measures to mitigate them.

V.5.3. Environmental risks and sustainability of investments

Banco de México has been actively working to support financial system participants in internalizing climate-related risks. This, considering that the economic and financial impacts associated with climate change, as well as the risks associated with the transition to a lower carbon economy, may result in considerable future losses for financial institutions and could represent a risk for the financial system in general. Thus, this section updates the analysis of these risks presented in previous editions of this *Report*.

Public interest indexes related to environmental risks and natural disasters

Two indexes are constructed to capture the interest of Mexican society in environmental issues, particularly those related to (i) extreme hydrometeorological events and natural disasters; and (ii) transition risks. For this purpose, information on searches for terms associated with (i) and (ii) on the web is collected.[102] An increase in indexes reflects greater public awareness, which may derive from positive, negative or neutral environmental events and should not be mechanically associated with greater environmental risks or higher transition costs.

Since the last *Report*, the index of interest in extreme hydrometeorological events and natural disasters was, on average, higher than historical and the previous six months, reflecting an increase in Mexican society's interest in such events. The most searched terms were

[99] ***Access broker:*** Threat actor that illegally accesses organizations' computer networks and resells access through clandestine Internet forums. **APT**: Advanced Persistent Threat, with high levels of expertise in hacking techniques and the resources and time required to use various sophisticated attack vectors to breach target organizations in order to sabotage them or obtain sensitive information or financial gain. ***Card seller***: Threat actors whose main activity consists in stealing information related to bank cards of financial institutions' customers, in order to sell such information in clandestine Internet forums. **Cyber espionage:** Threat whose purpose is to extract sensitive information from government institutions or large corporations. **Cybercriminal group:** Threat dedicated to carrying out criminal activities directed mainly at computer systems, with the aim of obtaining economic resources. This category groups together generalized threats that cannot be associated with any of the other categories. ***Malware:*** Threat designed to compromise the confidentiality, integrity or availability of information on a computer system. ***Ransomware:*** A type of malicious software whose purpose is to hijack sensitive information from a computer system in order to make the victim pay a ransom for it or to prevent its publication on clandestine Internet forums.

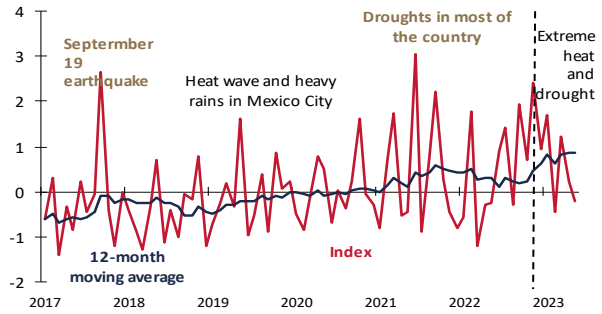
[100] The index by country is calculated as the ratio between the number of news items referring only to cyber risk in the financial sector and the number of news items referring to general risks in this sector (cyber risk, credit risk, reputational risk, environmental risk, among others), so the higher the value, the greater the number of news items on financial cyber-attacks in relation to news items on other risks, for the country evaluated.
In the numerator is the number of news items containing words related to cybersecurity (cyber, cybersecurity), financial sector (bank, market, financial, finance, insurance company, Fintech, credit card) and risk (risk, threat, vulnerability, uncertainty, loss, attack, incident, hack, fraud, data breach, data loss).

[101] Reuters (sections: *technology, Fintech, funds, funds, economy and banks*), and official Twitter accounts of international newspapers: @Breaking views, @business, @markets, @BBCBusiness, @ftfinancenews, @MarketWatch, @BusinessInsider, @BW, @YahooFinance, @economics, @WSJmarkets, @CNBC, @financialpost.

[102] The basis to select the search terms is the work of Zhang, L. (2021), who performs a similar analysis for the case of Hong Kong. Based on this, the relevant terms are selected for the index of environmental risks and natural disasters, and for the index of transition risks. For more information see the June 2022 Financial Stability Report. The information collected is seasonally adjusted, so the index reflects the interest of Mexican society above what would correspond to seasonal factors.

"extreme heat" and "drought", which are related to i) the heatwaves that hit the western, central, and southern areas of the country between January and March and; ii) the droughts that affected the northeastern region of the country, particularly Nuevo Leon and Tamaulipas, between February and March (Graph 133).

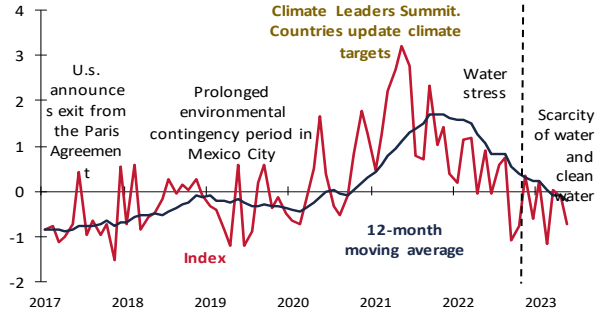
Graph 133
Interest index on isssues related to extreme hydro-meteorological events and natural disasters
Summary



Data as of May 2023.
Source: Banco de Mexico and Google Trends.

Meanwhile, the public interest index for transition risks was below its historical average and that of the previous six months. During this period, the most searched terms were "water scarcity" and "clean water", reflecting that the water used by the population and industries in their productive processes was less available in the center and north of the country from January to March (Graph 134).

Graph 134
Interest index on issues related to transition risks
Summary



Data as of May 2023.
Source: Banco de Mexico and Google Trends.

Transition risks

Climate-related risks for economic and financial systems are relevant and material, and the discussion about the impacts of these risks has been gaining increasing relevance within international organizations and financial markets. There is consensus on the need for structural changes to move towards a lower carbon economy. To achieve this, it is necessary to replace fossil fuel-based energy with renewable options and transform carbon-intensive activities. However, implementing a lower carbon economy may entail significant costs, such as investment in new green technologies, converting polluting industries, and training the workforce for new jobs in clean energy sectors.

A disorderly transition to a cleaner economy can affect the financial system through different channels, such as a possible drop in asset prices, a possible increase in defaults on credit obligations of companies affected by green policies, reputational damage to institutions supporting those polluting industries, legal and regulatory risks, and shifts in market demand. If these transition risks are not considered in the risk management of financial institutions, they can create challenges to the stability of the financial system.

In this section, credit is studied in the sectors most vulnerable to transition risks. Three sector groups are considered[103]: (i) those directly exposed because they generate high emissions in their own production process (Group 1); (ii) those indirectly exposed because they use inputs which generate high emissions (Group 2) and; (iii) sectors indirectly exposed because their demand depends, to a large extent, on polluting industries (Group 3).[104] This classification is complemented with company profiles for each group, to identify vulnerabilities that could interact with transition risks.

In the indirectly exposed sectors (Groups 2 and 3) there is a higher representation of individuals and small and medium-sized enterprises (SME) (Graph 135a and Graph 135 Individuals may be more constrained than corporations in times of financial stress since their resources depend solely on the owner's equity. Small and medium-sized companies tend to have less equity than large companies and a business structure less conducive to risk management. Therefore, these two types of companies, present in the indirectly exposed

[103] This analysis first appeared in the December 2020 Financial Stability Report.

[104] The definition of Group 2 is related to Scopes 2 and 3 of the GHG Protocol, since these scopes consider that companies can generate emissions even when they physically occur in the plant that produces the inputs and not in the company that consumes them. In other words, they can emit indirectly through the use of inputs. The definition of Group 1 is directly related to the definition of Scope 1.

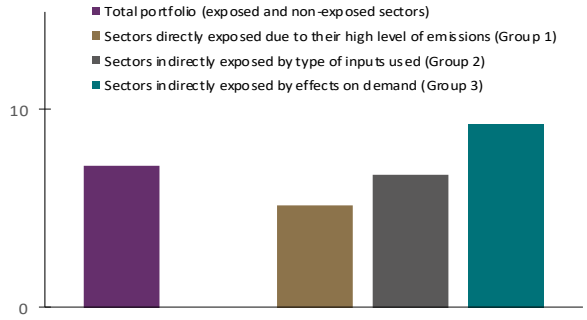
sectors, might require more financing if transition risks materialize, but they might also be perceived as riskier and face more difficulty in obtaining it.

Graph 135

Portfolio in sectors exposed to transition risks, by type of exposure

a) Percentage of the portfolio in companies of natural persons

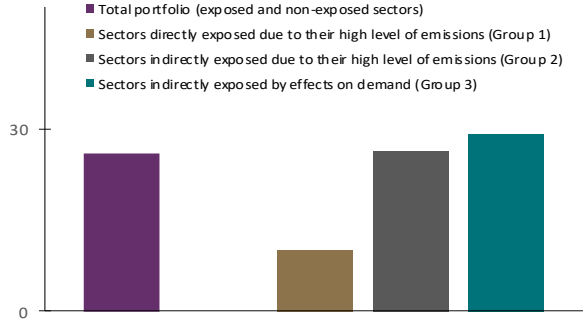
Percentage



Datas as of December 2022.
Source: Banco de México, CNBV and INEGI.

b) Portfolio percentage to SMEs

Percentage



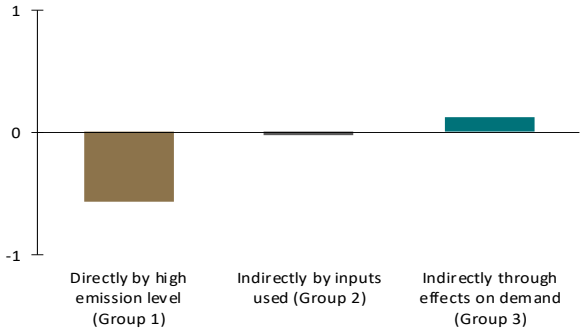
Data as of December 2022.
Source: Banco de Mexico, CNBV and INEGI.

In these indirectly exposed sectors, the behavior was mixed. Exposure increased in sectors vulnerable to demand shocks (Group 3), where credit had grown sharply in the recovery of post-pandemic financing and where there is a higher representation of companies that might be perceived as riskier. In contrast, exposure decreased in sectors vulnerable to the impact on input production (Group 2). In the same sense, during the period covered by this *Report,* the direct exposure of commercial banks to transition risks decreased (Graph 136).

Graph 136

Portfolio balance changes in sectors exposed to transition risks

Percentage

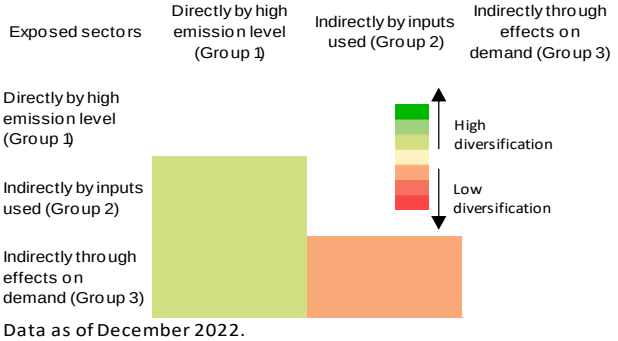


Data as of December 2022.
Source: Banco de México, CNBV and INEGI.

Furthermore, in the indirectly exposed portfolio, banks are poorly diversified in the face of the possible occurrence of events that simultaneously affect both companies' demand and the production of their inputs (Graph 137). Also, banks exposed to demand shocks have lower capitalization and intermediaries exposed to input shocks have higher delinquency rates (Graph 138). This could amplify the negative impact in case transition risks materialize.

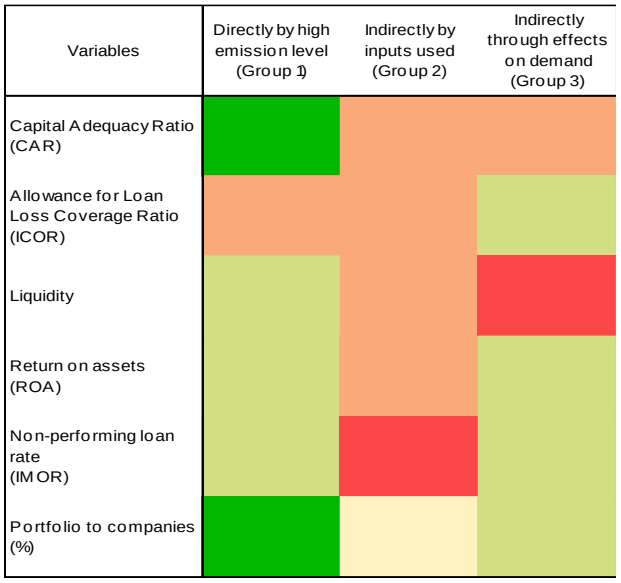
Graph 137

Portfolio diversification among sectors with different transition risk exposure 1/



Data as of December 2022.
Source: Banco de México, CNBV and INEGI.
1/ The colors show how diversified the portfolio is against these risks. The red color means less diversification, while the green color means more diversification. Diversification is based on the correlation coeffcicient between each bank's credit portfolio share in sectors exposed to different transition risks.

Graph 138
Risk amplifiers and mitigants, depending on the bank's exposure to transition risks[1/]



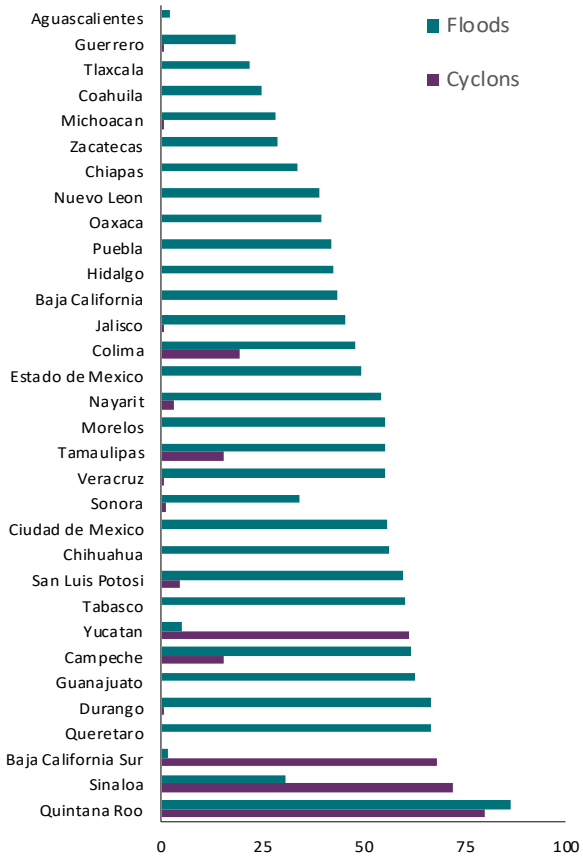
Data as of December 2022.
Source: Banco de Mexico, CNBV and INEGI.
1/ Shades of green show mitigating effects while shades of red show amplifying factors. The color is defined by the correlation coefficient between each factor considered and the credit portfolio shares in each sector subject to transition risks.

Physical Risks: Corporate Loan Portfolio

This section examines the exposure of corporate loan portfolio to physical risks, considering four types of hydrometeorological phenomena: cyclones, droughts, heatwaves and floods.[105] In particular, loans are detected in sectors and regions of the country exposed to each type of phenomenon. To do this, first the bank loans granted to companies located in municipalities exposed to a specific hydrometeorological event are accounted for. Subsequently, for each municipality, only the credit of sectors vulnerable to the same phenomenon is considered. The analysis is made for the different federal entities of Mexico (at state level) and for commercial bank financial intermediaries (at bank level).

Floods remain the most important phenomenon in terms of portfolio exposure. The exposures to floods and droughts continue with their previous trends, downward in floods and markedly upward in the case of droughts (Graph 139 and Graph 140). On the other hand, the trend in exposure to cyclones showed a break, interrupting the previous downward trend. This is due to the fact that some municipalities were considered to be at greater risk to cyclones, rather than a reallocation of the portfolio within municipalities (see Box 4: Increased occurrence of tropical cyclones and credit exposure in Mexico).

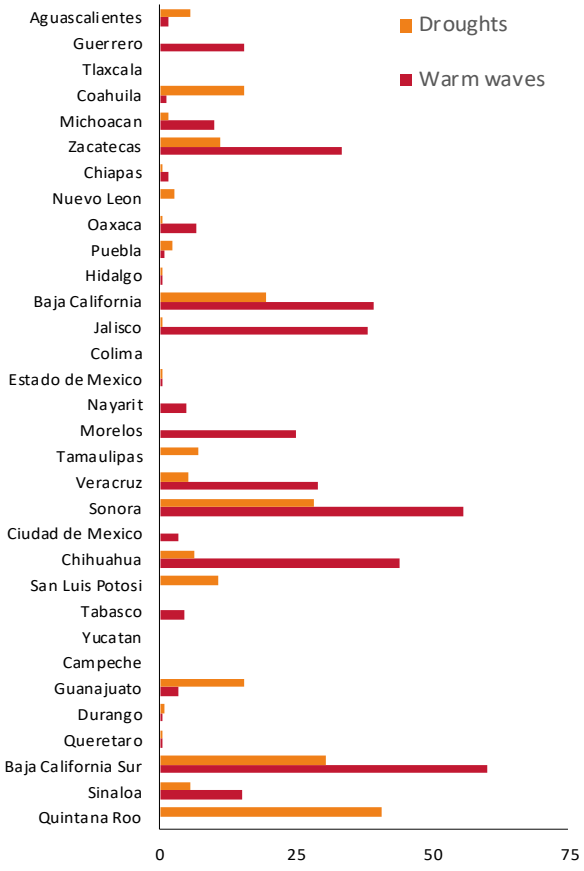
Graph 139
Portfolio in sectors and municipalities vulnerable to cyclons and floods
Percentage



Data as of December 2022.
Source: Banco de Mexico, CENAPRED, CNBV and INEGI.

[105] The Sixth Assessment Report published by the Intergovernmental Panel on Climate Change (IPCC, 2021) confirmed that these are the four extreme weather events that, going forward, are expected to increase in frequency or intensity.

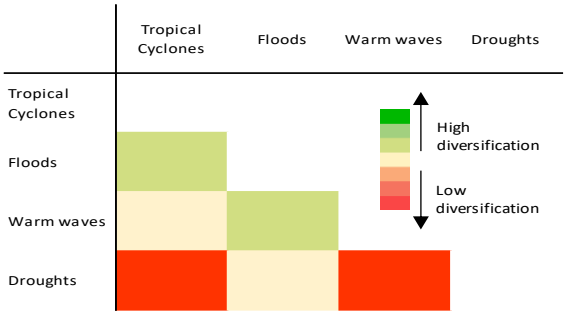
Graph 140
Portfolio in sectors and municipalities vulnerable to heat waves and droughts
Percentage



Data as of December 2022.
Source: Banco de México, CENAPRED, CNBV and INEGI.

Droughts represent an increasing risk due to their rise in exposure, but also because the states with higher portfolio exposure to this phenomenon are those with the most exposed portfolio to the rest of the hydro-meteorological phenomena. Because of this low diversification, the loan portfolio in these states could be more affected if more than one of these events were to occur in a short period (Graph 141). On the other hand, in these states the proportion of workers in the agricultural sector, one of those most affected by droughts, decreased, which means that, if the risks materialized, the effects would be lesser (Graph 142).

Graph 141
Portfolio diversification among sectors and municipalities exposed to different hydro-meterological events (for different states) 1/



Data as of December 2022.
Source: Banco de México, CENAPRED, CNBV and INEGI.
1/ The colors show how diversified the portfolio is against these risks. The red color means less diversification, while the green color means more diversification. Diversification is based on the correlation coeffcicient between each state's share of loan portfolios exposed to different hydro-meteorological events.

Graph 142
Amplifying and mitigating factors of physical risks (for different states)1/

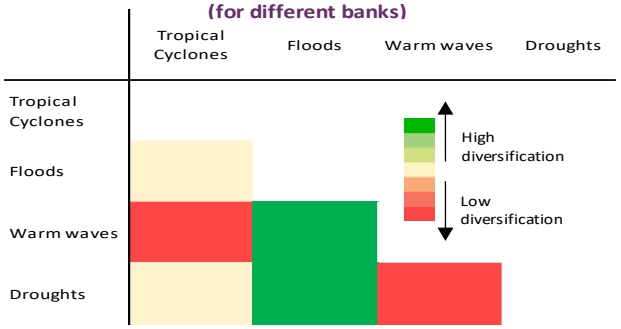


Data as of December 2022.
Source: Banco de Mexico, CENAPRED, CNBV and INEGI.
1/ Shades of green show mitigating effects while shades of red show amplifying factors. The color is determined by the correlation coefficient between each factor and the shares of credit portfolios for each sector and state exposed to the different hydro-meteorological events.

Banks with a higher portfolio exposure to droughts do not tend to have more portfolio exposure to other phenomena. In more general terms, portfolio diversification in the face of the occurrence of multiple

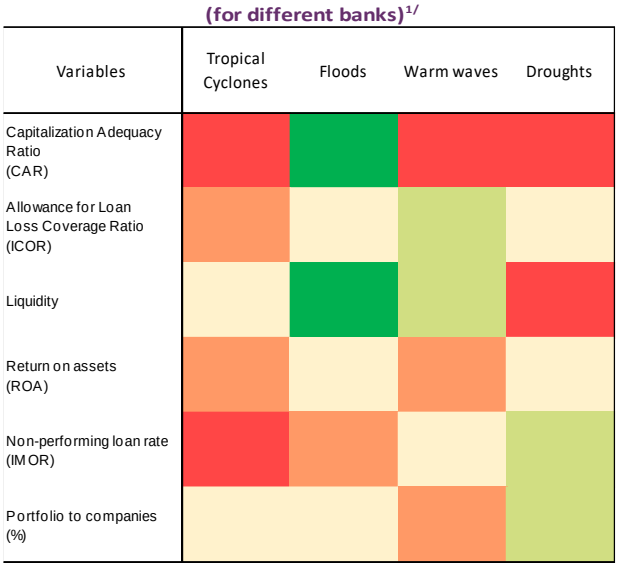
events in a short period does not represent a major risk for these institutions (Graph 143). In reference to the characteristics of the banks that could amplify the impacts, there is an increase in the number of potential amplifiers in the case of tropical cyclones (Graph 144). This is due to the municipalities that are now considered to be at higher risk.

Graph 143
Portfolio diversification among sectors and municipalities exposed to different hydro-meteorological events (for different banks)



Data as of December 2022.
Source: Banco de Mexico, CENAPRED, CNBV and INEGI.
1/ The colors show how diversified the portfolio is against these risks. The red color means less diversification, while the green color means more diversification. Diversification is based on the correlation coefficient between each bank's share of loan portfolios exposed to different hydro-meteorological events.

Graph 144
Factors amplifying and mitigating physical risks (for different banks)[1/]



Data as of December 2022.
Source: Banco de Mexico, CENAPRED, CNBV and INEGI.
1/ Shades of green show mitigating effects while shades of red show amplifying factors. The color is determined by the correlation coefficient between each factor and the shares of credit portfolios for each sector and state exposed to the different hydro-meteorological events.

Box 5: Increasing Occurrence of Tropical Cyclones and Exposed Credit in Mexico

I. Introduction

Tropical cyclones are a destructive hydrometeorological hazard. Therefore, unlike other non-destructive hazards such as heat waves, tropical cyclones can have a significant impact on infrastructure, material goods and human lives, in a large and varied number of sectors of the economy. Thus, Banco de México has been analyzing the exposure of the corporate portfolio to tropical cyclones in its *Financial Stability Report* since the second half of 2020.[1] A greater exposure of this portfolio is associated with a greater corporate credit risk, since the occurrence of tropical cyclones could affect demand, reduce companies' revenues, increase their costs and, thus, reduce their liquidity and repayment capacity. Moreover, cyclones could deteriorate the value of the assets that companies use as collateral.

The analysis of exposure to tropical cyclones becomes more important, since the frequency and intensity with which they affect some areas of Mexico have been increasing. Examples of this increase are large hurricanes such as Willa, which made landfall as a hurricane category 3 in the Pacific Ocean, or Delta, a hurricane category 2, which affected states such as Sinaloa and Nayarit and the Yucatan peninsula in recent years. Moreover, recent information suggests that the number of Mexican municipalities with an underlying tropical cyclone risk has increased. [2]

This Box analyzes the implications of the increase in the number of municipalities exposed to cyclones for the exposure of the credit portfolio at the national level. The analysis shows that the exposure of the credit portfolio increased and that this change could be explained by two effects: (i) a *size effect*, which is comprised by the weight of the credit portfolio of municipalities that increased their underlying cyclones' risk at the national level and; (ii) a *composition effect*, which is composed by the distribution of credit between sectors in the sample municipalities. In addition, this box includes a sensitivity analysis which considers that in the medium term the intensity and frequency of cyclones could increase.

II. Implications on exposure to tropical cyclones

To measure the probability of occurrence of cyclones in a municipality and the damage they can generate, the portfolio analysis traditionally done in this *Report* uses a hazard index at the municipal level. This index is obtained from the National Center for Disaster Prevention (CENAPRED) and is constructed based on historical information on the frequency of cyclones (number of events that have hit a municipality) and their intensity (measured on the Saffir-Simpson scale that considers wind speed). With this information, the hazard index classifies municipalities into five categories: very high, high, medium, low or very low exposure, reflecting the different probability of occurrence and intensity with which cyclones affect a municipality.

In 2022, CENAPRED updated the calculation sample and modified the calculation method of this hazard index. In particular, there were two changes: (i) the sample was expanded with new hurricane information available for the period 2016-2020 and; (ii) a smaller range of affectation was considered based on the hurricane eye trajectory. [3]

These changes modified the number of municipalities included in the high and very high exposure categories, which are those classified in this *Report* as being exposed to cyclones. On the one hand, 3 municipalities in 3 states were removed from the group of exposed municipalities as they decreased their underlying exposure below the high or very high-risk levels (among them, Ensenada in Baja California). On the other hand, 23 municipalities in 9 states were included in the group of exposed municipalities as they increased their underlying exposure to high or very high risk (among them, the most notorious cases are Merida in Yucatan and Acaponeta in Nayarit). These changes significantly increased the exposed portfolio to tropical cyclones in Yucatan, Nayarit, and Sonora, and reduced it in other states such as Baja California.

In addition, the reclassification of municipalities affected the exposure of the portfolio at the national level. In particular, the reclassification affected the exposure of this portfolio through both the *size* and *composition effects*. The *size effect* refers to the increase in national exposure due to the weight of the affected municipalities in the portfolio of the entire country. The *composition effect refers* to the increase or decrease in national exposure due to the sectoral distribution of credit in the municipalities considered.

The results show that the percentage of the corporate portfolio exposed to tropical cyclones increased by 0.9 percentage points due to the reclassification of municipalities, which represents an increase of more than 14% of the initial total exposure (Graph 1).[4]

In this calculation, the *size effect* increased the national exposure by 1 percentage point explained by the addition of 23 newly exposed municipalities. Meanwhile, the removal of the 3 municipalities that decreased their underlying exposure below the high or very high-risk levels reduced it by 0.1 percentage points.

In addition, the *composition effect* was positive, reflecting that the portfolio of the new sample of exposed municipalities is more concentrated on sectors vulnerable to cyclones than the rest of the country. This is largely due to the fact that these municipalities have a higher proportion of their portfolio in the sectors of agriculture, forestry, fishing and hunting; wholesale trade; and accommodation and food services.

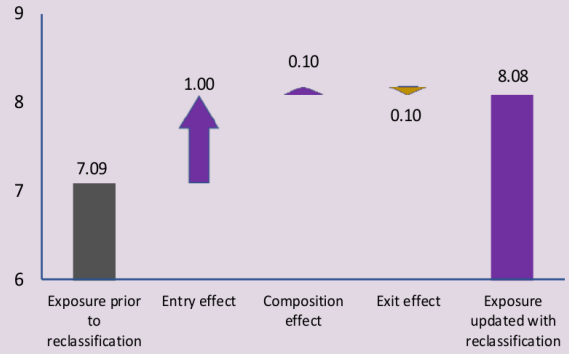
[1] The corporate portfolio represents 47.7% of the total commercial banking portfolio as of December 2022.

[2] Consult the document published in 2022 by CENAPRED (see the references section in this box).

[3] The change in 2022 decline the radius of affectation from 50km to 20km.

[4] These effects could be mitigated by the fact that 28.9% of the portfolio exposed to tropical cyclones is associated with personal guarantees, financial and non-financial collateral, pass-through and measurement coverage schemes, first loss coverage schemes and credit derivatives. In addition, some financial institutions have insurance related to the occurrence of cyclones for the corporate loan portfolio.

Graph 1
Changes in the portfolio exposed to cyclones at the national level due to the reclassification of municipalities [1/]
Percentage



Data as of December 2022

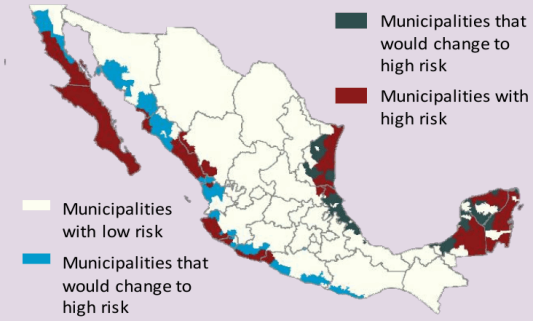
Source: Banco de Mexico, CENAPRED, CNBV and INEGI
1/ The size effect indicates the increase in the proportion of the portfolio exposed to a phenomenon due to the size of the portfolio in municipalities that enter or leave high levels of risk. The composition effect measures the difference in the sectoral distribution of the portfolio of these municipalities and the national one.

III. Sensitivity of increased exposure to tropical cyclones in the medium term

Reports from the Intergovernmental Panel on Climate Change (IPCC, 2023) and the National Oceanic and Atmospheric Administration (NOAA, 2023) suggest that tropical cyclones of greater strength, such as categories 4 and 5, could increase in frequency in the North Pacific and North Atlantic. Therefore, it is likely that, in the medium term, coastal cities or cities near the coasts of the country will increase their risk level.

Therefore, the sensitivity of the exposure of the national portfolio to a new increase in the number of municipalities classified to be at greater risk to tropical cyclones is analyzed. In particular, the sensitivity analysis includes a scenario in which coastal or near-shore municipalities currently classified as medium risk increase their risk to the high or very high levels, due to an increase in the frequency and intensity of tropical cyclones. Figure 1 shows these municipalities in blue and green, for the Pacific and Atlantic oceans, respectively. [5]

Figure 1
Calculation of different scenarios in view of the increase in the frequency and intensity of cyclones in the medium term
Increased risk due to presence in different scenarios



Source: Own elaboration with information from CENAPRED

If the affected municipalities were only coastal or near the Pacific Ocean coast (blue color), such as Hermosillo in Sonora and Puerto Vallarta in Jalisco, the exposure of the national portfolio would increase by 1.45 percentage points. This increase could be broken down in a positive contribution of 0.69 percentage points from the *size effect* and 0.76 percentage points from the *composition effect*. [6]

If, on the other hand, the affected municipalities were only those close to the Gulf of Mexico (green color), such as Tampico in Tamaulipas and the city of Campeche, the national exposure would increase by 0.53 percentage points, with an upward contribution of 0.26 and 0.27 percentage points of the *size* and *composition effects*, respectively. That is, the effect would be larger if the affected municipalities were only those close to the Pacific Ocean than if the affected municipalities were only those close to the Gulf of Mexico.

Furthermore, in a scenario in which municipalities near both coasts were affected, the national exposure would increase by 1.98 percentage points, with an upward contribution of 1.02 percentage points from the *size effect* and 0.97 percentage points from the *composition effect.*

IV. Final considerations

The reclassification of municipalities exposed to tropical cyclones increased the number of exposed municipalities to this hydrometeorological hazard. This change implied a sizable increase in the total exposure of the national portfolio to tropical cyclones, of approximately 14% of the initial exposure. Furthermore, in a sensitivity analysis in which it is considered that the frequency and intensity of cyclones could increase in the medium term, the increase in exposure is almost 2 percentage points.

Thus, the increase in the intensity and frequency of cyclones could increase the exposure of the portfolio even more

[5] In this new scenario, 136 municipalities were added that would change to high hazard, 65 on the Pacific coast and 71 on the Gulf of Mexico coast.
[6] These effects could be lessened because 37.3% of the portfolio exposed to tropical cyclones located near the Pacific coast has some type of coverage against these events, and 26.9% of the portfolio exposed to this hydrometeorological event located near the Gulf of Mexico and the Caribbean coast also has some type of coverage. In addition, as mentioned in footnote 4, some financial institutions have insurance related to the occurrence of this hydrometeorological event.

significantly going forward, with the greatest increase coming from coastal municipalities or those close to the Pacific coast.

These results emphasize the importance of the fact that Banco de México's *Financial Stability Report* has begun to analyze portfolio exposure to environmental risks and, in particular, to physical risks of a destructive nature. Going forward, Banco de México will be attentive to the evolution in methodological modifications that reflect climate changes and will incorporate these changes and modifications in its portfolio exposure analysis. This effort is in addition to a series of other actions that Banco de México has been undertaking, including its participation in international and national forums, such as the G-20 Sustainable Finance Working Group, the Network for Greening the Financial System (NGFS) and the Mexican Sustainable Finance Council.

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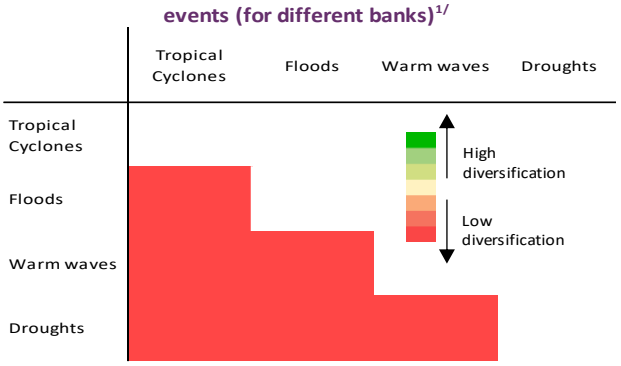
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Physical Risks: Housing and Consumer Loan Portfolio

The analysis of physical risks is extended to mortgage loans and some consumer loans (payroll, automotive, personal and revolving). The same four hydrometeorological events as in the previous section are considered, and a similar process is used to identify the loan exposure, based on the municipality and sector in which the loan is granted.[106]

In housing loans, the banks' portfolio continues to be very poorly diversified in view of the possible occurrence of several events in a short period (Graph 145). In reference to the characteristics of the banks that could amplify damages, unlike those observed in the business portfolio, in the housing portfolio there is no increase in the number of amplifiers for cyclones, despite the fact that some municipalities are now considered at greater risk (Graph 146).

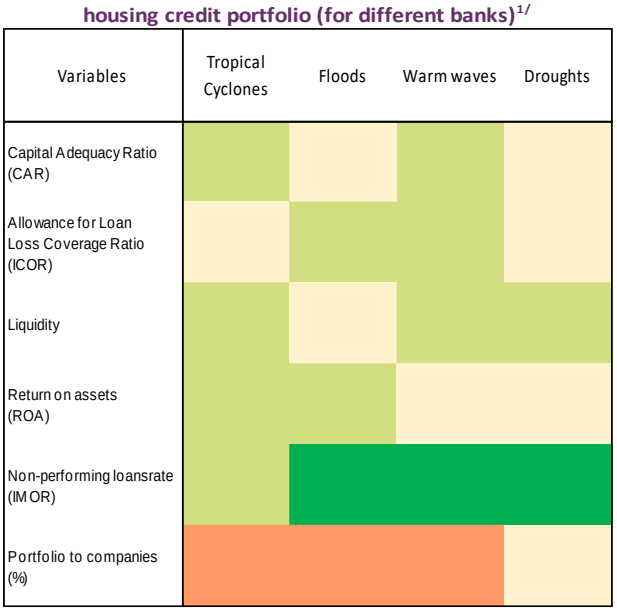
Graph 145
Housing loan portfolio diversification among sectors and municipalities vulnerable to different hydro-meteorological events (for different banks)[1/]



Data as of December 2022.
Source: Banco de Mexico, CENAPRED, CNBV and INEGI.
1/ The colors show how diversified the portfolio is against these risks. The red color means less diversification, while the green color means more diversification. Diversification is based on the correlation coefficient between each bank's share of loan portfolios exposed to different hydro-meteological events.

[106] As with the corporate portfolio, credit is identified in regions and sectors exposed to the same type of hydrometeorological phenomenon. However, in this case, the proportion of the portfolio in at-risk sectors is estimated by following two steps. First, for each municipality, the proportion of the portfolio in high and low salaries is identified. Second, this information is combined with employment data from the latest census. Specifically, for each wage level, the portfolio in at-risk sectors is estimated as the share of formal employment in them.

Graph 146
Amplifying and mitigating factors of physical risks in the housing credit portfolio (for different banks)[1/]

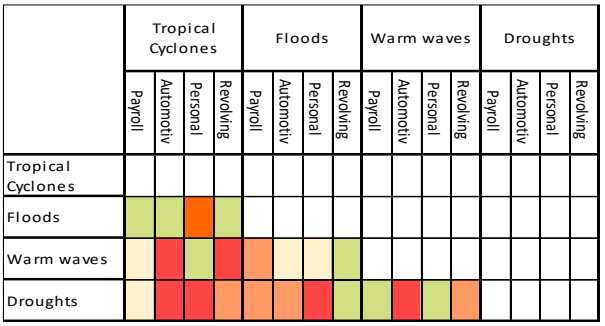


Data as of December 2022.
Source: Banco de Mexico, CENAPRED, CNBV and INEGI.
1/ Shades of green show mitigating effects while shades of red show amplifying factors. The color is determined by the correlation coefficient between each factor and the shares of credit portfolios for each sector and municipality exposed to the different hydro-meteorological events.

In the consumer portfolio, the diversification of banks in the occurrence of various events is a lower risk than in the housing portfolio, but higher than in the corporate portfolio (Graph 147). As for the types of credit, payroll loans are the most diversified while automotive loans are the least. This could be mitigated by the higher income of borrowers in the automotive portfolio compared to other consumer portfolios.

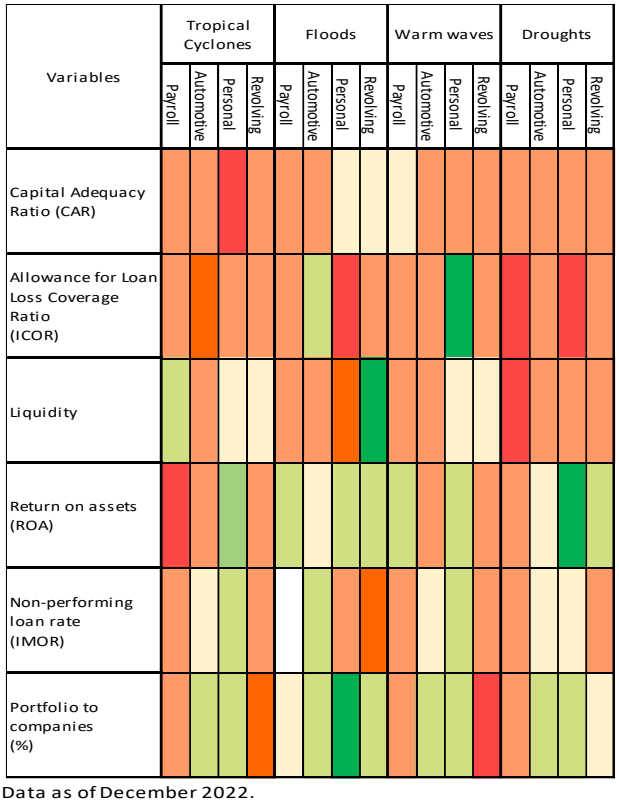
Considering all types of consumer credit as a whole, it is observed that banks with more portfolio exposed to physical risks are also those with lower loan losses coverage ratio with preventive reserves (ICOR, for its acronym in Spanish) and a higher delinquency ratio (IMOR, for its acronym in Spanish). These characteristics of banks could amplify the impact if the risks materialize (Graph 148).

Graph 147
Consumer loan portfolio diversification among sectors and municipalities vulnerable to different hydro-meteorological events (for different banks)[1/]



Data as of December 2022.
Source: Banco de Mexico, CENAPRED, CNBV and INEGI.
1/ The colors show how diversified the portfolio is against these risks. The red color means less diversification, while the green color means more diversification. Diversification is based on the correlation coeffcicient between each bank's share of consumer loan portfolios exposed to different hydro-meteorological events.

Graph 148
Amplifying and mitigating factors of physical risks in the consumer credit portfolio (for different banks)[1/]



Data as of December 2022.
Source: Banco de Mexico, CENAPRED, CNBV and INEGI.

1/ Shades of green show mitigating effects while shades of red show amplifying factors. The color is determined by the correlation coefficient between each factor and the shares of credit portfolios for each sector and state exposed to the different hydro-meteorological events.

Sustainable Finance Committee

The Sustainable Finance Committee (CFS, for its acronym in Spanish), within the Financial System Stability Council, continued to meet in 2023. The working groups established by the Committee continued to develop evaluations, proposals, recommendations, and training on the topics of sustainable taxonomy, integration of environmental and social risks in decision-making by authorities and institutions through scenario analysis, mobilization of sustainable financing, and disclosure of environmental, social, and corporate governance factors by issuers and financial institutions. The members or representatives of the Sustainable Finance Committee, the permanent guest, observers (*ABM, AMIS, AMAFORE, AMIB, AMAI, CCFV*, now Mexican Sustainable Finance Council), and experts convened by the Working Group Coordinators for their knowledge and experience participate in the working groups.

In March 2023, the Ministry of Finance (*SHCP*) presented the Sustainable Taxonomy of Mexico,[107] a classification tool created after a broad, participatory and coordinated process by the CFS Taxonomy Working Group. This instrument identifies and defines activities with positive effects on the environment and society, following technical criteria and international standards. Mexico's Sustainable Taxonomy is unique globally, as it incorporates not only environmental dimensions, but also the social ones, which allows for a comprehensive approach to sustainability to promote the integral wellbeing of people and the environment.

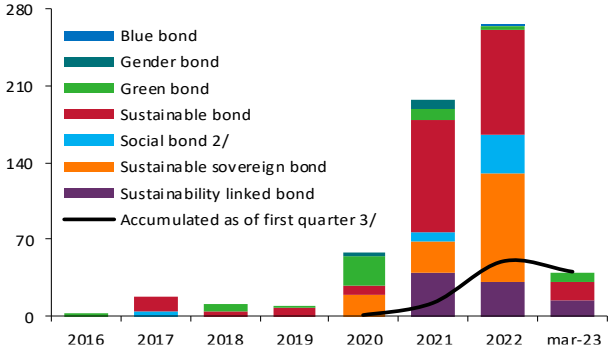
The Sustainable Finance Committee, through Banco de México, continued its work on the creation of a digital repository for learning and collaboration in sustainable finance. Its main objective is to provide free access to virtual guides and a digital repository of current and relevant material for training purposes in sustainable finance. It will target i) financial authorities; ii) financial institutions; iii) non-financial companies; and iv) the general public and will focus on youth and local and indigenous communities for nature preservation and restoration issues.

The Repository has collaborated with national and international experts, with the objective of developing guided tours, by target audience. The process of developing the editorial line and the guided tours consisted of two phases: in the first one, individual interviews were conducted with 25 experts from both foreign and domestic sources; in the second one, Banco de México organized working groups in collaboration with national and international experts. These working groups were held in February and May 2023 and involved more than 60 experts in total. The Mexican Sustainable Finance Council will be in charge of its operation.

Sustainable financial assets

During 2022, the placement of thematic bonds in domestic and international markets, mainly in local currency and dollars, by domestic private and public issuers, amounted to 267 billion pesos, higher than in previous years, with the participation of public entities standing out. As of the first quarter of 2023, thematic bonds were placed for approximately 40 billion pesos. Thus, the issuance of these instruments allows companies and other issuers to further diversify their sources of financing, considering sustainability criteria (Graph 149).

Graph 149
Issuance balance of sustainable, green, social and gender bonds
Billion of pesos



Data as of March 2023.
Source: Consejo Consultivo de Finanzas Verdes and Indeval.
1/ At face value.
2/ Includes as of 2022 COVID-19 social bond.
3/ Accumulated as of first quarter per year not considering bond type, it just refers to issuance amount.

[107] See the first edition of the Sustainable Taxonomy report.

VI. Stress tests and recovery plans

VI.1. Credit stress tests

Stress tests are exercises conducted by Banco de México as part of its work to promote a sound development of the financial system. It is a simulation exercise to assess the capital adequacy of commercial banks in the face of severe but possible macroeconomic and financial shocks that could affect their solvency or financial intermediation capacity.

In the stress exercises, the impact of the four sets of macroeconomic scenarios were evaluated,[108] consistent with the macro-financial risks presented in this document. Likewise, four sets of historical scenarios were considered, which allow observing the resilience to scenarios similar to crisis events faced by the domestic economy in the past.

The results indicate that at an aggregate level the financial system is resilient to the shocks considered in the scenarios examined. Regarding solvency, the system's CAR and leverage ratio remain above the regulatory minimum over the stress horizon.

Although the stress scenarios are based on the macro-financial risks contained herein, they should not be construed as forecasts about the expected economic performance, nor should they be associated with any likelihood of occurrence. The aim is to identify and analyze the vulnerabilities of the banking system as a whole, therefore, the exercise should be interpreted as a partial balance and counterfactual simulation.

Scenario A: lingering state of tighter global financial conditions

In this scenario, there would be uncertainty and high volatility in international financial markets, putting pressure on the exchange rate and interest rates. This could also lead to higher risk premiums, higher financing costs for households and companies, which could affect credit growth, and cause higher non-performing loan levels.

Scenario B: Slowdown in global economic activity

This scenario considers an environment in which, after prolonged monetary tightening measures, advanced economies, and in particular, the US economy finally slows down and enters recession. This would affect the growth rates of the Mexican economy and would derive in an environment of volatility in the financial markets, affecting the exchange rate. There would be less industrial activity and a drop in imports in that country. The banking system would be affected because the slow growth environment would result in lower demand for credit, and higher unemployment rates could cause credit portfolios to deteriorate more rapidly and result in greater losses.

Scenario C: Occurrence of a systemic event with global impact

In this extreme event, we would expect higher levels of risk aversion, a weakening of global economic activity, lower capital flows to emerging economies, pressure on the exchange rate and a slowdown in global economic activity. The impacts of this type of event tend to be lasting longer, so a slower recovery of economic activity would also be expected.

Scenario D: Weaker domestic aggregate demand

This scenario is consistent with a weakening in domestic consumption and investment, which would lead to lower employment levels and affect capital flows to Mexico, putting pressure on the exchange rate. In this environment, there would be a contraction in credit, which would impact banks profitability.

Historical scenarios

Similarly, four historical scenarios were considered, which replicate the path of the main macro-financial variables during these high stress or volatility events. These scenarios were the 1995 crisis (H1 scenario), the 2008 global financial crisis (H2 scenario), the US Federal Reserve's monetary policy normalization in May 2013, which was an episode of global financial volatility (H3 scenario), and the economic crisis resulting from COVID-19 (H4 scenario).

[108] The variables modeled in the scenarios are derived from a set of simultaneous shocks to all variables. The variables modeled in the scenarios are derived from a set of simultaneous shocks to all variables. Scenario set A encompasses shocks between -1.92 and 2.74 standard deviations for all variables. Of note is a shock of 2.74 standard deviations in the exchange rate and a shock of -1.93 to the annual growth of the IGAE. In the set of scenarios B, the shocks vary between -2.31 and 2.74 deviations. The shocks of 1.11 standard deviations in unemployment, 2.74 standard deviations in the exchange rate and -2.31 in the annual growth of the IGAE are relevant. In the set of C's scenarios, the shocks for all variables fluctuate between -2.39 and 3.24 standard deviations. The shocks of 1.24 standard deviations in unemployment, 3.24 standard deviations in the exchange rate and -2.31 in the annual growth of the IGAE stand out. Finally, in the set of Scenarios D the shocks fluctuate between -1.78 and 1.76 standard deviations with respect to their historical values. The shock of 1.76 standard deviations corresponds to the exchange rate and the shock of -1.78 to the annual growth of the IGAE.

Methodological considerations

A series of scenarios were developed using the same methodology presented in previous editions of the Report.[109] The scenarios are generated using a vector auto-regression model (VAR) over a 36-month horizon, based on a central path that reflects the main movements in macroeconomic and financial variables. With this model it is possible to generate random and simultaneous shocks that affect the central path of the macro-financial variables, while maintaining the estimated internal consistency of the covariances and the dynamics of the variables.

It should be noted that, despite the benefits of this approach, the model may underestimate the occurrence of extreme events resulting from the simultaneous interaction of shocks from different scenarios, feedback effects from the financial sector onto the real sector or unexpected non-linear effects.

Based on the scenarios generated, the possible market losses that banking institutions would incur in a stress scenario were evaluated. The losses contemplate the financial contagion effects that could propagate and increase the magnitude of the shock through the interbank network.

Besides, an econometric model is used to estimate the impact of macroeconomic variables on reserve formation, the probabilities of a default of the loan portfolio and the dynamics of each bank's loan portfolio.

In addition, the exercise considers differentiated effects by risk level for each economic activity, based on each sector's economic growth and its non-performing loan level to non-financial private companies.

Similarly, a simulation process is used to model low probability and high severity events to consider the effect that the default of the largest borrowers would have on the system's capital levels.

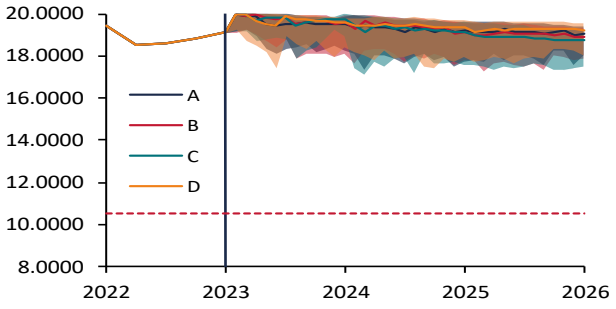
Finally, the effect on operating income and solvency is calculated. For this purpose, on the one hand, the financial margin is estimated based on the elasticities of each bank's lending and deposit interest rates with respect to the cetes-treasury certificates rate. On the other hand, non-interest income and administrative expenses are modeled, assuming that both are proportional to each bank's loan portfolio. Based on the results of the operation, market and contagion losses and credit losses, the shock absorption capacity and the evolution of the net capital of the banking system in each scenario are evaluated.

The exercise assumes that no bank or regulator behavioral changes are accounted for by the occurrence of the simulated stress events. That is, on the one hand, banks do not make changes in their business strategy, capital contributions or adjust their derivative or repo positions over the stress horizon. On the other hand, regulators do not take any corrective measures or grant facilities that would allow mitigating shocks. Therefore, the stress exercise is a counterfactual and partial equilibrium exercise.

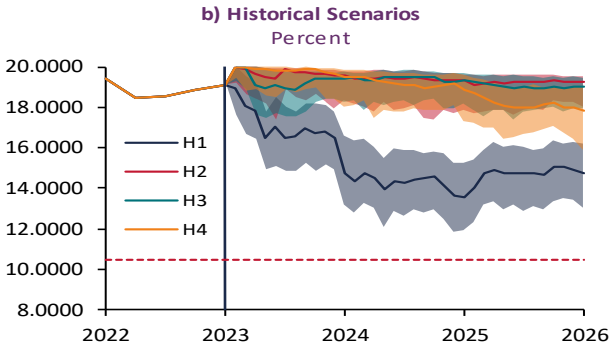
Key findings

In the simulated scenarios, the system ends the stress horizons at levels above the regulatory minimum plus capital add-ons (Graph 150). In the short term, a reduction in net capital is observed, while in the medium term it tends to stabilize or even, in some scenarios, to return to its initial value (Graph 151). Risk-weighted assets (Graph 152) follow a similar pattern starting in the second year of the simulation. This suggests that in these scenarios, despite the fact that bank capitalization levels would remain at relatively high levels, banks would resort to a deleveraging process, reducing credit granting.

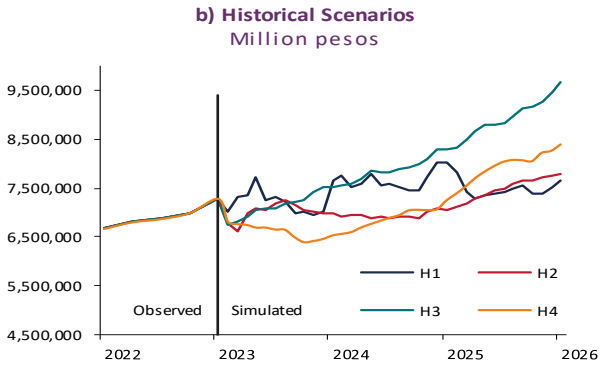
Graph 150
System's Capital Adequacy Ratio (CAR)
a) Scenarios A, B, C and D
Percent



[109] See Figure 3 Outline of stress testing methodology, published in the December 2019 Financial Stability Report.

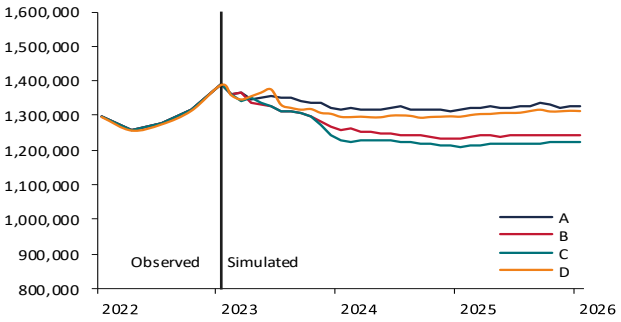


Data as of March 2023 and simulations 3 years thereafter.
Source: Banco de México.

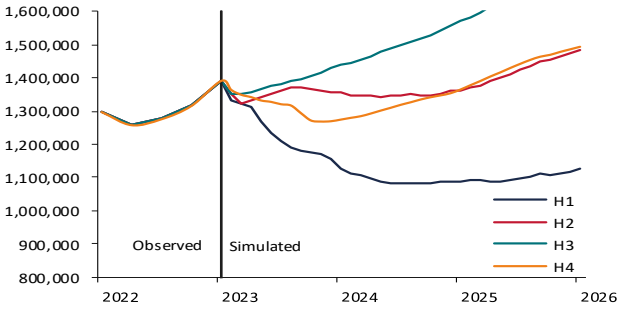


Data as of March 2023 and simulations 3 years thereafter.
Source: Banco de México.

Graph 151
Evolution of the average net capital of the system
a) Scenarios A, B, C and D
Million pesos

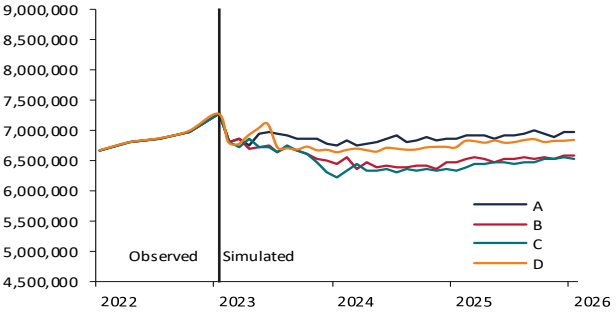


b) Historical Scenarios
Million pesos



Data as of March 2023 and simulations 3 years thereafter.
Sourcee: Banco de México.

Graph 152
a) Scenarios A, B, C and D
Million pesos

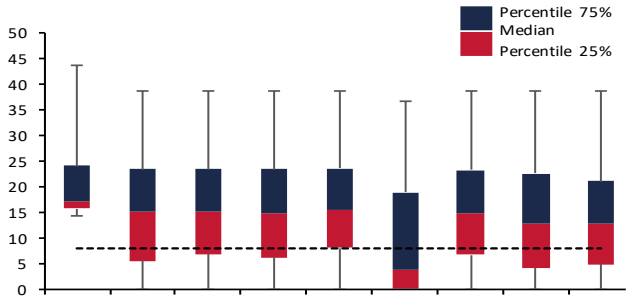


It is important to note that, although at an aggregate level the financial system is resilient to these extreme shocks, there are some intermediaries that would end the year at lower levels of capitalization (Graph 153). However, these banks represent a small proportion of the total system's assets.

One of the elements that helps to better understand the impact of these scenarios is analyzing how they would affect the banks' non-performing loan levels through an increase in the probability of default (Graph 154). The financial system starts this exercise with very low default probability levels, so, despite the fact that in relative terms the increase in probability is considerable, the levels remain low. This contributes to the relatively low levels of bank losses.

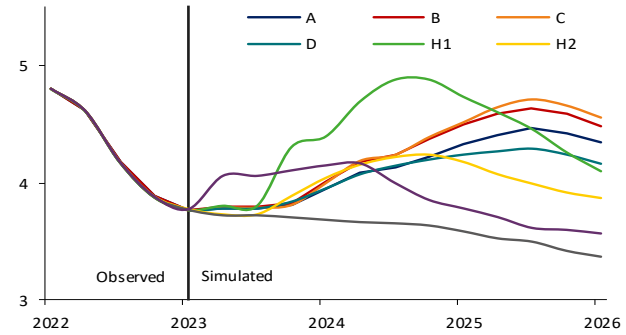
On the other hand, in order to explicitly consider the effect of credit portfolio concentration, an exercise was carried out, in which defaults of the largest borrowers in the corporate loan portfolio would occur. This exercise shows greater effects on banks' aggregate capitalization levels, but still above the regulatory minimums (Graph 155).

Graph 153
Distribution of the average CAR at bank level at the end of the test[1/]
Percentage



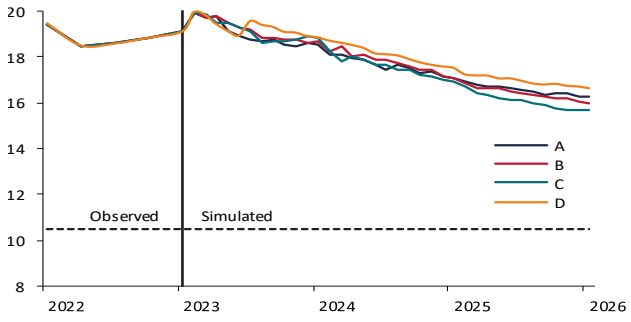
Data as of March 2023 and simulations 3 years thereafter.
Source: Banco de México.
1/ The dotted horizontal line corresponds to the minimum CAR without considering capital supplements. In the box and arms diagram, the arms represent 10 and 90% of the distribution.

Graph 154
Average probabilities of default of the system's credit portfolio
Weighted by the current portfolio of each bank, percent

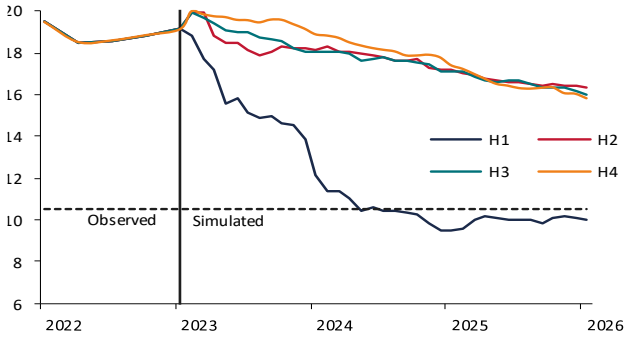


Data as of March 2023 and simulations 3 years thereafter.
Sources: Banco de México.

Graph 155
Average CAR of the system considering an impact per concentration corresponding to 99% of the losses [1/]
a) Scenarios A, B, C and D
Percent

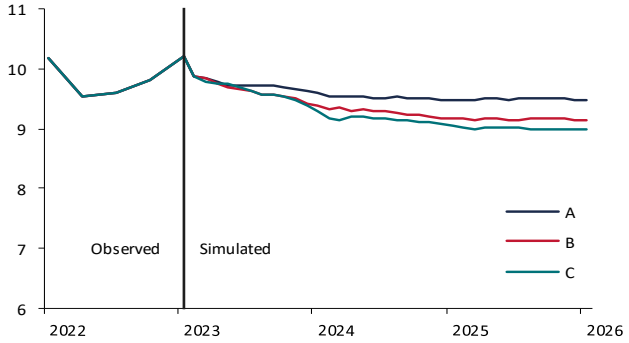


b) Historical scenarios
Percent

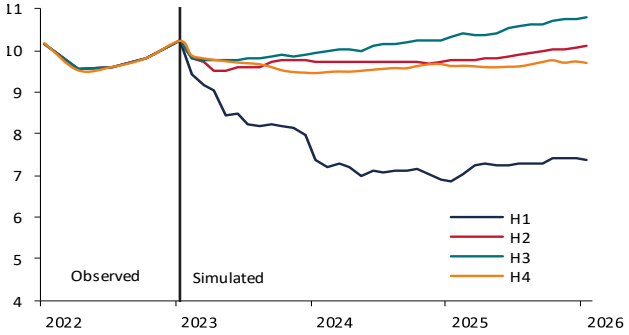


Data as of March 2023 and simulations 3 years thereafter.
Source: Banco de México.
1/ The horizontal line corresponds to the minimum CAR plus capital supplements.

Graph 156
Average leverage ratio of the system
a) Scenarios A, B, C and D
Percent

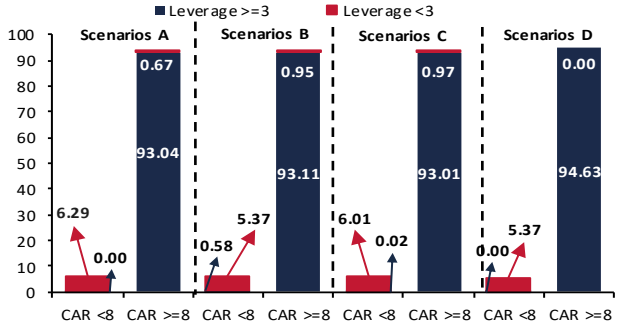


b) Historical scenarios
Percent



Data as of March 2023 and simulations 3 years thereafter.
Source: Banco de México.

Graph 157
Distribution of the average CAR at bank level at the end of the test
Percent of System Assets



Data as of March 2023 and simulations 3 years thereafter.
Source: Banco de México.

The exercise also evaluates the impact on the banks' leverage ratio. In the scenarios simulated in the exercise, the system's average leverage level was above the regulatory 3% threshold (Graph 156); however, at the individual level, some institutions would end the exercise with levels below this threshold. Likewise, those institutions with a CAR lower than the regulatory minimum also tend to present a leverage ratio lower than the regulatory minimum (Graph 157).

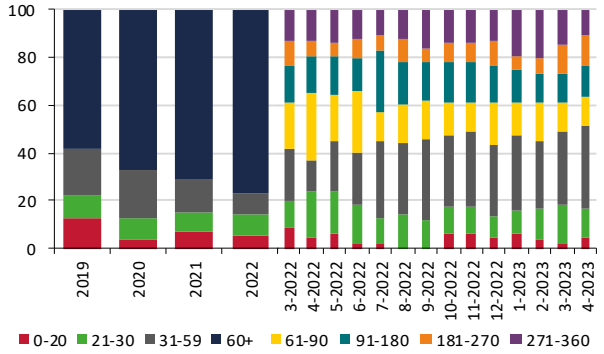
In conclusion, stress tests show that Mexico's banking system has sufficient capital levels to face the simulated adverse scenarios. However, some banks that represent a low percentage of the system's total assets would end the stress horizon with lower capital levels. Likewise, the results show that concentration risk would generate additional pressures on the system's capital. Regarding the system's leverage ratio levels, at an aggregate level, these would also remain above the regulatory threshold. Finally, the exercise did not contemplate any mitigating actions to be taken by the banks included in the test. Therefore, all exercises should be viewed on a system-wide basis and not necessarily for individual banks.

VI.2. Liquidity stress tests

The results of the stress tests presented in this section suggest that the current comfortable liquidity position of banks, in the aggregate, would allow them to face stress episodes higher than both those experienced in the past and the stress exercises presented here. To assess the resilience of banks with respect to liquidity risk, prospective liquidity stress exercises are conducted to evaluate various scenarios complementary to the one considered in the LCR regulatory standard.

According to the liability coverage horizon, with data as of April 2023, most banks would be able to meet their obligations for a period of at least 30 days using only their stock of liquid assets. The liability coverage horizon evaluates funding risk under a more severe scenario than the LCR, as it does not consider banks' contractual inflows to meet their obligations (Graph 158).

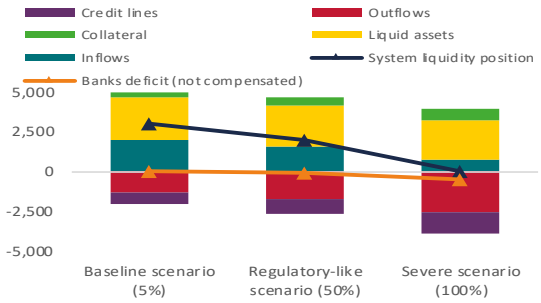
Graph 158
Percentage of banks that could meet their liabilities under the liabilities coverage stress scenario 1/
Y axis: percentage of banks
X axis: date of the calculation
Color: days that banks could cover their obligations



Data as of April 2023.
Source: Banco de México.
1/ For each month, banks are aggregated by range of days according to their monthly average, calculated with daily observations, of the number of days that they could cover their liabilities in a severe stress scenario. Begining in March 2022, the liabilities coverage horizon is calculated with a wider range (See Box 9 of the December 2022 Financial Stability Report).

Stressed cash flows are also modeled for a 90-day horizon. With data as of May 2023, the stressed value of liquid assets and inflows for the bank as a whole would be greater than the modeled stressed outflows, so that the bank would maintain a liquidity surplus (Graph 159). This exercise simulates different degrees of stress on contractual cash flows, both inflows and outflows, on liquid assets and on contingent obligations, assuming increasingly astringent assumptions that, at their most severe level, considerably exceed those established by the LCR regulatory standard. Some institutions, which represent a low percentage of the system's assets, would face a liquidity deficit in the most severe hypothetical scenario of up to 3.66% of the system's assets.

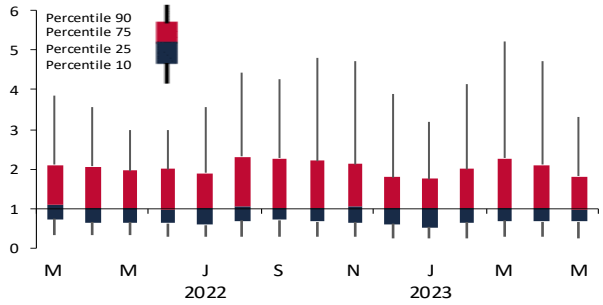
Graph 159
Liquidity stress scenarios over 90-day period 1/
Billions of pesos



Data as of May 15, 2023.
Source: Banco de México.
1/ In the severe scenario (100% severity), a haircut on liquid assets of around 4% is considered. Repos have a roll-over of 45% and released collateral has the same haircut as liquid assets. Inflows from loans portfolio are not considered (100% haircut). Wholesale deposits (demand and term) have a 20% run-off factor and retail deposits (demand and term) have a 10% run-off factor. Contingent liquidity and credit lines granted have a 40% run-off factor. The baseline scenario and regulatory-like scenario consider a 5% and 50% severity compared to the severe (100%) scenario. The regulatory-like scenario estimates an aggregate outflow which is similar in magnitude to the outflow calculated under the LCR (See Box 9 of the December 2022 Financial Stability Report).

The distribution of the Distance to Liquidity Stress Indicator (DLSI), which measures the severity required for an institution to face a liquidity deficit, has remained unchanged in recent months, reflecting the persistence of the ample liquidity position of Mexican banks (Graph 160).

Graph 160
Distribution of the Distance to Liquidity Stress Indicator (DLSI) 1/
Index



Data as of May 2023.
Source: Banco de México.
1/ The DLSI measures the required severity for an institution to face a liquidity deficit. The severe scenario is adjusted to 1, higher values show greater resilience compared to the suggested severe scenario.

Box 6: Recent Developments in the US Banking System

Introduction

In the first half of 2023, financial institutions globally faced tighter financial conditions due to the inflationary environment and the normalization of monetary policy. The tightening of financial conditions exposed certain vulnerabilities and defective risk management by some institutions, which saw their capacity to renew liabilities diminished, experienced imbalances between their assets and liabilities, presented liquidity problems and reduced their credit provisioning.[1] This generated distrust in clients of some medium-sized U.S. banks, which led to stressful situations, including bank runs at Silicon Valley Bank (SVB), Signature Bank and First Republic Bank.

This Box details the main developments related to these events in the United States and the authorities' response to them. The first part discusses the contagion of *SVB* to other banking institutions that led to the failure of Signature Bank and First Republic Bank, emphasizing the differences with respect to the SVB case, as well as the response of the financial authorities to the potentially systemic consequences. The second part addresses the SVB case, under a liquidity risk approach that culminated in a bank run and, subsequently, in contagion to other banking institutions.

I. Recent Bank Runs and the Authorities' Response.

In recent months, after facing significant withdrawals by their depositors, three U.S. regional banks were closed by the Federal Deposit Insurance Corporation (FDIC), which also serves as the resolution authority in the United States.

The first to be affected was SVB, a regional bank focused primarily on technology and healthcare companies. During the pandemic, customer deposits grew significantly. Faced with this excess liquidity, the bank's assets tripled and the bank invested in U.S. Treasury bonds and long-term government-backed mortgage bonds, mostly classified as held-to-maturity, without adequate risk management for changes in the benchmark interest rate. When the US Federal Reserve began to increase its target rate, these assets lost value, thereby increasing the level of unrealized losses on these securities. On March 8, 2023, as some depositors exited, SVB had to sell part of these securities, inducing large losses for the institution. Subsequently, SVB faced a bank run, and in a few days its customers' deposits decreased by more than USD 40 billion (at the time it had total assets of USD 210 billion). Faced with these events, the California Department of Financial Protection and Innovation (CDFPI) decided to intervene the bank to preserve the stability of the financial system, and SVB closed its doors on March 10, 2023, with the FDIC in charge of its resolution. The factors that led to this outcome for SVB are discussed in more detail in the second part of this box. The FDIC established a bridge bank and subsequently a *purchase and* assumption agreement with First Citizens Bank. The agreement included most of SVB's assets and liabilities, although the FDIC holds $87 billion in mortgage-backed securities.

In the days following this event, uncertainty and volatility in the financial markets negatively affected the share price of another regional bank: Signature Bank. This bank, which also experienced a high growth rate (its assets doubled between 2019 and 2022, reaching USD 110 billion), was highly exposed to the virtual asset sector. The bank also suffered a run on its depositors, so the New York State Department of Financial Services (NYSDFS) announced the closure of the institution on March 12, 2023, appointing the FDIC as resolution manager. Similarly, the FDIC entered into a bridge bank and subsequent purchase and assumption agreement with Flagstar Bank. The agreement included most assets and liabilities, although the FDIC retains mortgage-backed securities, the mortgage portfolio, deposits related to the digital business, and equity in the blockchain platform, Signet.

A high percentage of the depositors of both banks had accounts whose funds exceeded the deposit insurance coverage limit (USD 250 thousand). Upon closing these institutions, the U.S. Treasury Department and the FDIC announced that, in order to preserve financial stability, they would pay all depositors (including uninsured depositors) in the event of withdrawal. It is estimated that the cost of covering uninsured deposits will be close to USD 15.8 billion. The FDIC plans to recover this amount through an extraordinary fee that will be paid mostly by banks whose assets exceed USD 50 billion.[2]

In addition to the FDIC extending deposit insurance coverage to all depositors, the Federal Reserve implemented an extraordinary liquidity facility, the Bank Term Funding Program (BTFP), which will be in effect at least until March 2024, in which it grants loans to banks using the face value of the instrument (instead of the market value) as the reference price for the collateral. At the same time, the Treasury Department made available to the Central Bank up to USD 25 billion to absorb losses that the Federal Reserve may face when implementing the BTFP.

The third institution to experience severe financial stress was First Republic Bank (FRB, with USD 212 billion in assets), which faced deposit withdrawals of more than USD 100 billion during the first quarter of the year. To address the situation, FRB obtained USD 30 billion in deposits from a group of 11 large banks. Residential mortgages (fixed-rate) constituted more than half of the institution's loan portfolio, so that, combined with the high proportion of uninsured depositors from which it obtained funding, the institution's financial strength deteriorated. The bank was closed on May 1 by CDFPI, appointing the FDIC as its resolution manager. The FDIC reached an agreement with JP Morgan Chase to acquire most of FRB's assets and deposits -insured and uninsured- through a loss-sharing agreement

[1] For more information on the impact of tightening financial conditions on the financial sector, see: Box 5: Financial Stability Implications of Tightening Financial Conditions, in the Financial Stability Report - December 2022.

[2] The FDIC is considering an extraordinary fee of approximately 12.5 bps on uninsured deposits held by financial institutions that have deposits. The fees are expected to restore the cost of USD 15.8 billion, with quarterly payments over two years beginning in June 2024.

between the two, while the FDIC also provided USD 50 billion in financing to the acquiring bank.

A relevant background to highlight is that, in the US, as of 2018, the prudential regulation applicable to banks with assets of less than USD 250 billion was simplified. For example, such banks are not subject to annual stress tests, the computation of interest rate risk in the banking book, nor are they subject to the liquidity standards suggested by the Basel Committee on Banking Supervision. The following section analyzes, by way of example, the behavior of SVB's liquidity indicators. This highlights the importance of subjecting institutions to regulation and supervision that limits their risks and allows timely identification of their vulnerabilities. It is also important that corrective measures are implemented expeditiously to solve any irregularity, vulnerability or risk detected through supervision.

In the context of these events, although not as a direct consequence of them, Credit Suisse (CS), a global systemically important bank,[3] suffered a run on its depositors that culminated in the announcement of a merger by another global systemically important bank also based in Switzerland: UBS. CS had been experiencing financial difficulties for several semesters,[4] and the rating agencies downgraded its credit rating in October 2022, so the bank experienced a large outflow of funds in that month, which it was able to overcome with its own resources.

In March 2023, in tandem with the events in the United States, CS began to suffer additional pressures. A few days later, the outflow of resources from the institution increased following a negative announcement by one of the bank's major shareholders that it would not inject further capital, as to do so it would have to obtain approvals from regulators to exceed investment thresholds under Swiss regulation. The Swiss central bank (SNB) granted a CHF 50 billion credit line to CS and by March 19 it was announced that UBS would buy CS.

The transaction was government-backed, with a loss-sharing scheme, UBS-CS would assume the first losses of up to CHF 5 billion and the Swiss government would absorb subsequent losses of up to CHF 9 billion. SNB would grant unrestricted access to existing central bank liquidity facilities as well as liquidity assistance loans on extraordinary terms. [5]

II. Liquidity Risk: The Case of Silicon Valley Bank

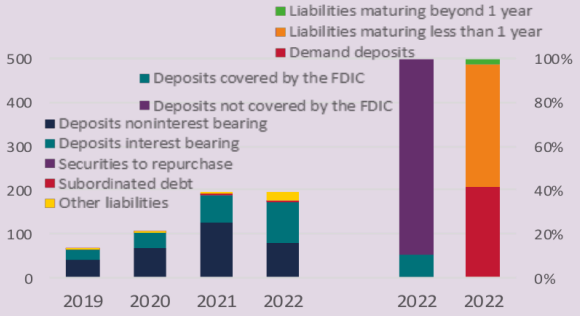
The U.S. banking system has, in the aggregate, ample liquidity levels, with liquid assets exceeding those observed prior to the pandemic.[6] However, some banks such as SVB maintained a riskier liquidity profile.[7] In this context, the tightening of financial conditions in 2022 exposed these pre-existing financial vulnerabilities, coupled with ineffective risk management by their management. This limited the ability to lend, raise capital or restructure liabilities.

At year-end 2022, SVB's funding was concentrated in wholesale counterparties that were not covered by deposit insurance. In addition, derived from SVB's business model,[8] such counterparties were concentrated in the same technology sector. In previous years, the ample availability of cash and capital from technology startups was reflected in rapid growth of SVB's deposits, however that trend reversed in late 2022 and early 2023.

Graph 1

SVB's liabilities composition

Left axis: billions of dollars, right axis: percentage



Source: Regulatory return FR Y9-C y 10-K

On the asset side, SVB invested a large portion of its resources in long-term instruments, mainly mortgage-backed securities, with the intention of holding them to maturity. Based on accounting rules, held-to-maturity instruments should not be revalued until they are sold (when the loss is realized). In this context, the loss in the value of SVB's assets due to increases in interest rates did not impact its balance sheet, although they were considered for its financial statements.[9]

[3] The list of the 30 global systemically important banks is available at: https://www.fsb.org/2022/11/2022-list-of-global-systemically-important-banks-g-sibs/.

[4] For example, see the CS press release available at: https://www.credit-suisse.com/about-us-news/en/articles/media-releases/cs-appoints-ulrich-koerner-new-ceo-announces-comprehensive-strategic-review-202207.html.

[5] See CS press release available at: https://www.credit-suisse.com/about-us-news/en/articles/media-releases/credit-suisse-and-ubs-to-merge-202303.html

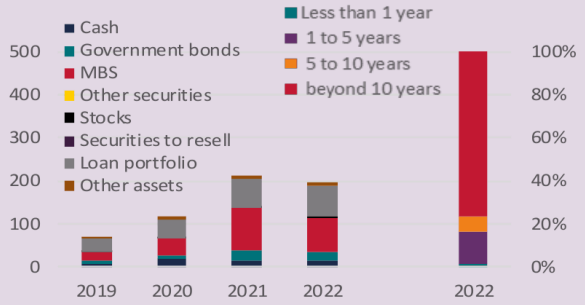
[6] Federal Reserve System (November 2022) Financial Stability Report.
Federal Reserve System (May 2023). Financial Stability Report

[7] Liquidity risk in this context refers to the risk that an institution's financial position will be affected by its inability (or perceived inability) to meet its short-term obligations. It is a risk inherent to a bank's business model and intrinsic to the term transformation involved in financial intermediation.

[8] Silicon Valley Bank's business model was primarily aimed at providing products and services to companies (mostly *startups*) in the technology and health sciences industries.

[9] It is worth mentioning that, according to the Basel standard, assets eligible for the LCR prudential measure must be considered at market value, i.e., capturing losses due to the change in price derived from rate changes. Likewise, mortgage-backed securities are considered as level 2A liquid assets to which a 25% write-off is applied, reflecting their lower liquidity in adverse scenarios.

Graph 2
SVB's assets composition and bonds by maturity
Left axis: billions of dollars, right axis: percentage



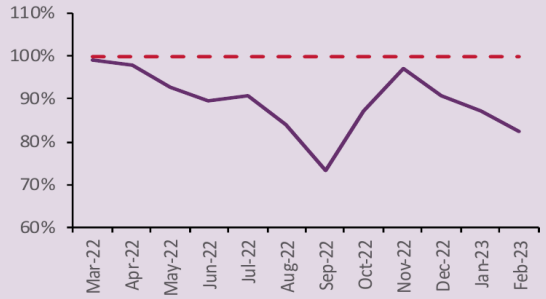
Source: Regulatory return FR Y9-C y 10-K

Between January 1 and March 8, 2023, SVB faced depositor outflows that led it to sell its entire Available for Sale (AFS) portfolio for USD 21 billion at a loss of USD 1.8 billion. On March 8, SVB announced plans to restructure its balance sheet, seeking to increase funding by USD 15 billion and raise capital of USD 2.25 billion. It also warned of a possible credit rating downgrade by Moody's and S&P. It is worth mentioning that, up to this moment, the stress observed in SVB assets (outflows equivalent to 8.5% of the total of these deposits) was lower than the 25% assumed by the LCR for mortgage-backed assets. Likewise, it is estimated that outflows between January and February, prior to the bank run, were around 17% of the total balance of these deposits, which compares to the 40% implied by the LCR for wholesale depositors not covered by deposit insurance. In this context, prudential liquidity requirements may have helped SVB to cope with the adverse scenario between January and February that led it to sell its entire portfolio and seek more capital.

SVB's restructuring plans, amid uncertainty in the technology sector, increased concerns about the bank's viability among depositors. On March 9, SVB experienced a run by uninsured wholesale depositors, marked by panic and the speed of social media. Outflows on March 9 reached USD 40 billion and management expected withdrawals on March 10 of USD 100 billion, approximately 85% of the two-day intake, resulting in the intervention and closure of the institution by the authorities.

Another determining factor in SVB's failure was less assertive supervision stemming from the proportional approach set forth in the Economic Growth, Regulatory Relief, and Consumer Protection Act (EGRRCPA), effective in 2019, which prevented capturing business model risks, rapid asset growth, and liquidity risks.[10] At the time of the bankruptcy, SVB was not subject to either of the Basel framework's prudential liquidity requirements: Liquidity Coverage Ratio (LCR) or Net Stable Funding Ratio (NSFR).[11] According to the Federal Reserve's calculations, the LCR would have been less than 100 from March 2022 to February 2023, showing a deterioration of almost 10% between December 2022 and February 2023 when it stood at 82%. The NSFR, on the other hand, would have been above 100% according to the aforementioned Federal Reserve calculations.

Graph 3
LCR SVB
Percentage



Source: Federal Reserve

However, with the advantage of analyzing the figures after the crisis event, the composition of SVB's balance sheet shows a deterioration in the bank's liquidity in the same years that showed accelerated growth. In other words, growth was not accompanied by a congruent financial risk management policy. This is also demonstrated by the results of internal liquidity tests, which pointed to insufficient liquidity. However, this was not addressed by management.

Finally, SVB's poor risk management was reflected in ineffective preparation for crisis events. SVB was unable to execute its funding contingency plans and access manuals for standing liquidity facilities with the Federal Reserve. SVB had not proven its technical and operational ability to obtain liquidity.

IV. Conclusions

Although no bank is fully prepared to face a bank run, maintaining an adequate market risk (interest rate) and liquidity risk management strategy that is dynamic and adjusts to the movement of financial markets could have prevented the accumulation of risks that led to the sale of the entire portfolio available for sale at a loss. In this context, prudential requirements could have prevented the hasty search for capital, which created uncertainty and led to the run on the banks. While maintaining certain levels of indicators contributes to the resilience of institutions, these indicators must be complemented with the principles of liquidity risk management, in accordance with business strategies. In the case of liquidity risk, liquidity

[10] Federal Reserve System (April 2023): Review of the Federal Reserve's Supervision and Regulation of Silicon Valley Bank.

[11] The prudential framework in the United States uses a proportional approach effective as of 2019, *Economic Growth, Regulatory Relief, and Consumer Protection Act (EGRRCPA)*, which classifies banks into five categories based on their size: Fed Proportionality Summary Table. In June 2021, *SVB* exceeded the threshold of USD 100 billion in consolidated assets, thereby classifying it as a Category IV bank, which in terms of liquidity required it, among others, to report on liquidity form FR 2052a and to conduct internal liquidity tests. In December 2022, *SVB* exceeded the threshold of USD 50 billion in short-term wholesale deposits, which in terms of liquidity would have required it to meet a LCR of 70% as of the fourth quarter of 2023.

monitoring should be complemented with different tools, among others, those established by the Basel Committee such as LCR, NSFR and liquidity monitoring tools, as well as liquidity stress tests. The different tools for risk managers and supervisors are complementary and seek to explain different aspects of liquidity risk.

In Mexico, all banks must comply with the same general liquidity provisions, which helps the banking system to maintain a sound liquidity position. The SVB event highlights the importance of strengthening liquidity supervision based on lessons learned, as well as subjecting institutions to regulation and supervision that effectively limits their risks and allows for the timely identification of their vulnerabilities.

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VI.3. Stress tests of physical risks associated with climate change.

This section presents the results of the stress tests of physical risks associated with climate change. The exercise evaluates the impact on the financial system of the occurrence of extreme hydrometeorological events.

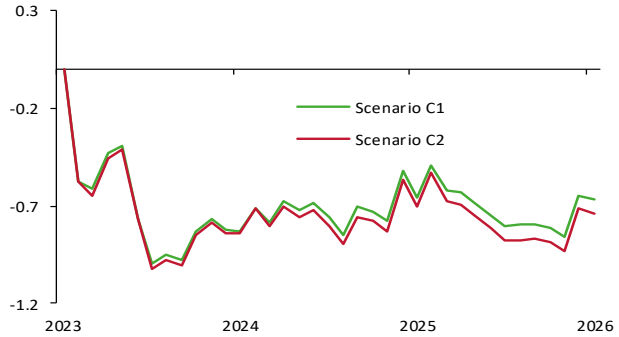
The methodology follows an approach similar to that of historical scenarios, i.e., it is assumed that recent historical events, in this case, the materialization of extreme hydro-meteorological events, repeat and occur simultaneously. The impact on banks would occur through two channels: some borrowers affected by the shocks would not be able to repay their loans, and the magnitude of the shock would cause a drop-in economic activity, where impacts of 1% and 2% drop in output, respectively, are evaluated. The methodology used is the one described in previous releases of the report.[110]

VI.3.1. Main results

The results of this exercise are reported in comparison with the levels that would be observed in a baseline scenario in which the trajectories have no adverse shocks, because climate shocks are independent of macro-financial shocks, and the severity of losses is lower compared to that observed in macro-financial scenarios. This allows to interpret the losses as the additional loss to other scenarios in case macro-financial and climate shocks occur simultaneously.

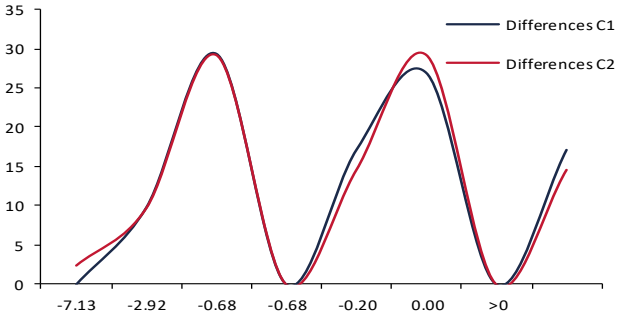
The results of both climate scenarios are very similar. The first scenario shows a difference in the drop in the CAR at the end of the test of 0.67% with respect to the baseline, while in the second scenario the difference in the drop is 0.74% (Graph 161). In both simulated climate scenarios, there is heterogeneity in terms of the impacts on different intermediaries so that some banking institutions end the exercise with a lower level of capitalization compared to the base scenario (Graph 162).

Graph 161
System's CAR with respect to the baseline scenario
Percentage points



Data as of March 2023 and 3-year simulations thereafter.
Source: Banco de México.

Graph 162
Distribution of banks' capitalization index in relation to the baseline scenario
Percentage points



Data as of March 2023 and 3-year simulations thereafter.
Source: Banco de México.

In conclusion, the results of the exercise suggest that extreme hydro-meteorological events could affect the capitalization levels of the Mexican banking system. Although this impact is moderate compared to what would be observed in exercises with macro-financial shock scenarios, the impacts are not negligible, especially if interpreted as additional potential losses. In addition, some institutions with credit concentration in high-risk regions or sectors could have a greater loss of capital.

VI.4. Recovery plans

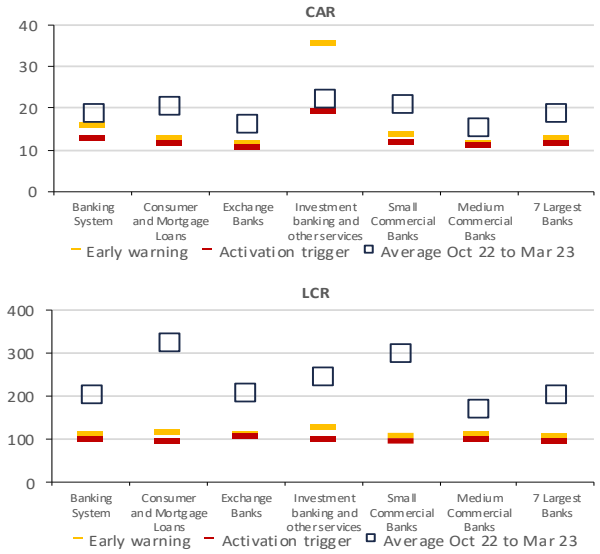
The recovery plans of commercial banks continue showing improvement in relation to those of previous years. This should strengthen their capacity to respond to shocks that could jeopardize their liquidity, solvency or operations in general.

During the last quarter of 2022 and the first quarter of 2023, the observed levels of CAR and LCR of the banking

[110] See section VI.3. Stress testing of physical risks associated with climate change, published in the *June 2022 Financial Stability Report.*

sector remained above the activation threshold established in the contingency plans of different groups of banks (Graph 163).

Graph 163
Activation thresholds and observed data of CAR and LCR [1/]
Percentage



Data of CAR and LCR from October 2022 to March 2023.
Source: Banco de México and CNBV.
1/ The averages of thresholds and data observed by type of institution are presented. The most recent threshold available is considered. For the observed data, capped averages are presented due to scale issues, the LCR is capped to 350 and the CAR is capped to 25.

The institutions' recovery actions continue showing heterogeneity in the execution times and in the expected impacts on their solvency and liquidity. However, the margin of recovery of their solvency and liquidity is reasonable, in the event that: i) the institutions manage to correctly execute the measures within the expected timeframe; ii) the potential impact of the recovery actions on their financial situation is not diminished; and iii) no other shocks occur.

As of 2023, institutions will have to update their plans under the new requirements established in the recently updated regulation. The first plans in compliance with the new regulation correspond to systemically important banks. It is important for institutions to keep their recovery plans updated and integrated into the comprehensive risk management process, so that they constitute a relevant tool for prevention and response to stress scenarios.

VII. Final considerations

Since December 2022, when the latest Report was published, the Mexican financial system has shown a sound and resilient position, in which commercial banks maintain capital and liquidity levels that comfortably exceed regulatory minimums. This has occurred despite the complex global environment, particularly during March and April 2023, characterized in part by greater uncertainty and an environment of high volatility in global financial markets. This was associated with the difficulties experienced by some banking institutions in developed countries, more persistent global inflationary pressures than expected, the response of the main central banks and financial conditions that continued to be tight. In addition, concerns prevail that the recovery process of the global economy may be delayed by a greater-than-anticipated slowdown.

In this environment, the International Monetary Fund's (IMF) growth forecasts for the world economy were revised marginally downwards for 2023 and 2024. These adjustments are related to the possible adoption of tighter monetary policies to combat inflation, a further tightening of financial conditions, a prolonged military conflict between Russia and Ukraine, and the potential risk of a fragmentation of global production chains. In addition, global inflation generally remains at levels above central banks' targets.

It is therefore appropriate to continue monitoring the vulnerabilities and imbalances that could arise in the financial system and could affect its proper functioning, given that certain external risks have intensified and some domestic risks persist. Thus, this Report considers the following macro-financial risks to financial stability: i) a greater and longer-lasting tightening of financial conditions; ii) lower-than-anticipated global economic growth with a downward trend; iii) the occurrence of a systemic event affecting the global financial system; iv) the weakening of aggregate demand; and v) new adjustments in the credit ratings for the sovereign and *Pemex* debt.

Based on these risks, stress tests were conducted for the Mexican banking system. The results show that the banking system has sufficient capital levels to face the simulated adverse scenarios. However, some banks that represent a small percentage of the system's total assets would end the stress horizon with lower capital levels than the regulatory threshold. Similarly, the concentration risk could generate additional pressures on the system's capital. Regarding the system's leverage ratio levels, at an aggregate level, these would also remain above the regulatory minimum.

During the first half of 2023, liquidity, credit, contagion and market risks for commercial banks have remained stable and limited. In particular, both level of capitalization and liquidity position of the Mexican banking system in the aggregate have remained well above the regulatory thresholds.

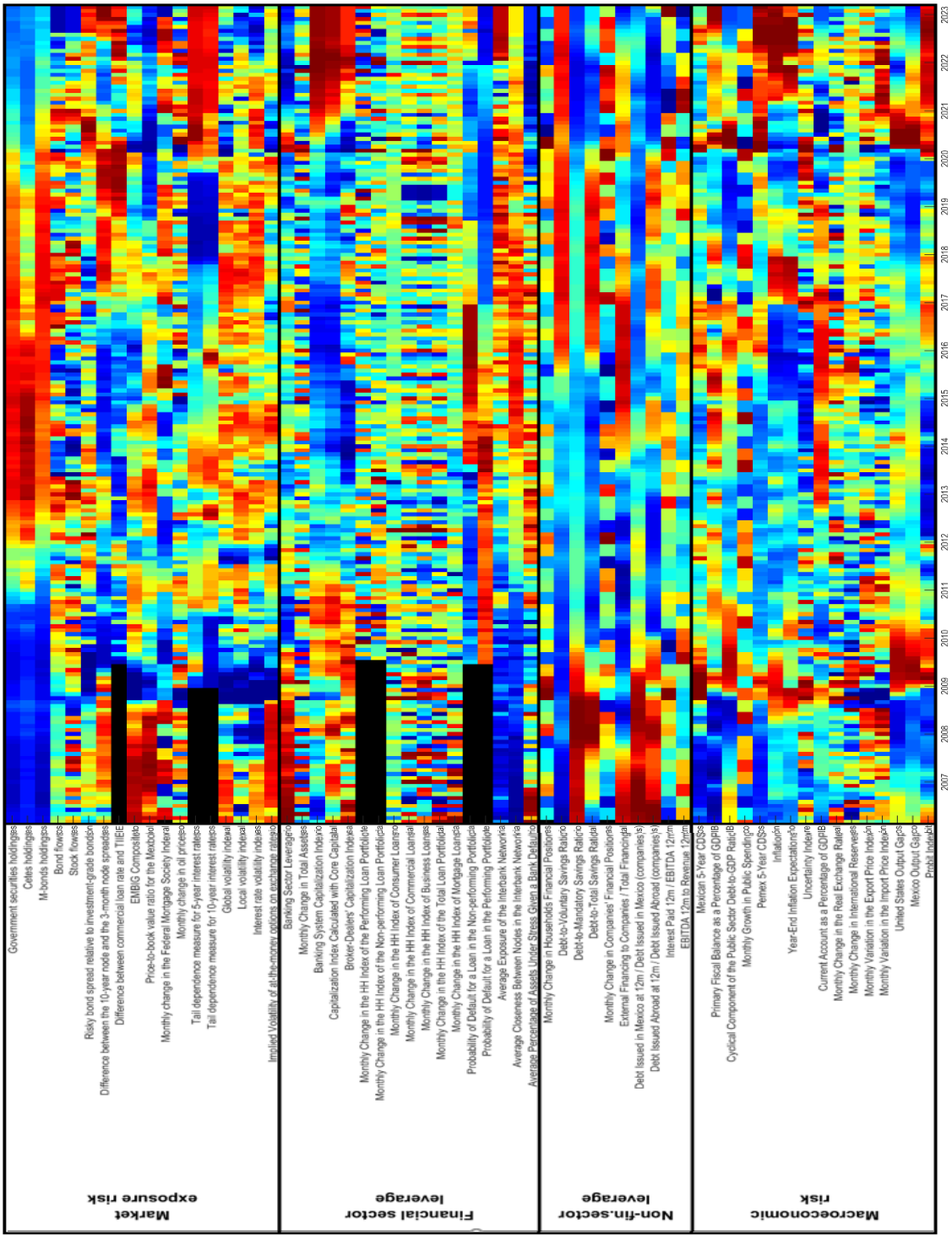
Other non-bank financial intermediaries (*OIFNB*, for its acronym in Spanish) continue facing challenges, particularly related to tighter financial conditions, which have affected both the cost and access to new financing for these institutions. The situation of the non-regulated sector shows complex challenges, including the refinancing of their debt in a context of increased risk aversion among investors. However, the sector's assets represent a small fraction of the financial system and these entities have a low interconnection with the country's banks and other institutional intermediaries. Hence, they do not constitute a systemic risk at this time.

During the period covered by this Report, the financial authorities kept working on continually improving the regulatory framework and adopting international standards and best practices to maintain a robust and updated regulatory framework. In this context, the financial authorities carried out regulatory modifications in the areas of market, credit, and concentration risks, as well as sustainable taxonomy and derivatives markets.

Banco de México will monitor the evolution of Mexican financial markets and will continue taking actions, if necessary, in compliance with the legal framework and in coordination with other financial authorities, to preserve the stability of the financial system and the proper functioning of the payments system.

Annex 1

Disaggregated Heat Maps of Mexican Financial System Risks



Preliminary data as of March 2023.
Source: Banco de México.

List of acronyms and abbreviations

AMIB	Mexican Association of Stock Market Institutions *(Asociación Mexicana de Instituciones Bursátiles)*
AMIS	Mexican Insurance Institutes Association *(Asociación Mexicana de Instituciones de Seguros)*
Asigna	Asigna default and settlement *(Asigna Compensación y Liquidación)*
Bancomext	National Foreign Trade Bank *(Banco Nacional de Comercio Exterior)*
Banobras	National Public Works and Services Bank *(Banco Nacional de Obras y Servicios Públicos)*
BCBS	Basel Banking Supervision Committee
BIVA	Institutional Securities Exchange *(Bolsa Institucional de Valores)*
BMV	Mexican Stock Exchange *(Bolsa Mexicana de Valores)*
BONDES	Federal Development Bonds *(Bonos de Desarrollo del Gobierno Federal)*
BPAS	Savings Protection Bonds *(Bonos de Protección al Ahorro)*
CAR	*Capital Adequacy Ratio*
CCE	Special Accounting Criteria *(Criterios Contables Especiales)*
CCD	Certificates of Capital Development *(Certificados de Capital de Desarrollo)*
CCV	Mexican Central Securities Counterparty *(Contraparte Central de Valores)*
CDS	Credit Default Swaps
Cerpis	Senior Trust Bonds for Investment Project *(Certificados bursátiles fiduciarios de proyectos de inversión)*
Cetes	Federal Treasury Bills *(Certificados de la Tesorería de la Federación)*
CF	28-Day Equilibrium Interbank Interest Rate (*TIIE*) Deposit Cost *(Costo de captación a plazo en veces tiie 28 días)*
CFE	Federal Electricity Commission *(Comisión Federal de Electricidad)*
CNBV	National Banking and Securities Commission *(Comisión Nacional Bancaria y de Valores)*
CNSF	National Insurance and Bonding Commission *(Comisión Nacional de Seguros y Fianzas)*
CVAR	Conditional Value at Risk
DALI	Securities Deposit, Administration and Settlement System *(Sistema de Depósito, Administración y Liquidación de Valores)*
D-SIBS	Domestic Systemically Important Banks
Fibra	Real Estate Infrastructure Trust -REIT *(Fideicomisos de infraestructura y bienes raíces)*
FIRA	Agricultural Trusts *(Fideicomisos Instituidos en Relación con la Agricultura)*
FND	National Farming, Rural, Forestry and Fisheries Development Bank *(Financiera Nacional de Desarrollo Agropecuario, Rural, Forestal y Pesquero)*
Fovissste	State Workers' Social Security and Services Institute Housing Fund *(Fondo de Vivienda del ISSSTE)*
FSB	Financial Stability Board
IBA	ICE Benchmark Administration
IBOR	Interbank Offered Rate
ICF	Financial Conditions Index *(Índice de Condiciones Financieras)*
ICRCS	Capital Solvency Requirement Coverage Index *(Índice de Cobertura del Requerimiento de Capital de Solvencia)*
ICRT	Technical Reserves Coverage Index *(Índice de Cobertura de Reservas Técnicas)*
IEMF	Financial Markets Stress Index *(Índice de Estrés de los Mercados Financieros)*
IFNB	Non-Banking Financial Institutions *(Instituciones Financieras No Bancarias)*
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
Imora	Adjusted non-performing loans rate *(Índice de morosidad ajustado)*

INEGI	National Geographical Statistics and Information Institute *(Instituto Nacional de Estadística y Geografía)*
Infonavit	Federal Housing Fund *(Instituto del Fondo Nacional de la Vivienda para los Trabajadores)*
IPCC	Intergovernmental Panel on Climate Change
LCR	Liquidity Coverage Ratio
LIBOR	London Interbank Offered Rate
LIF	Federal Income Law *(Ley de Ingresos de la Federación)*
LRITF	Financial Technology Institutions Regulation Law *(Ley para Regular las Instituciones de Tecnología Financiera)*
LTV	Loan to Value
Nafin	Mexican Development bank *(Nacional Financiera)*
OIFNB	Other Non-Banking Financial Brokers *(Otros Intermediarios Financieros No Bancarios)*
PEF	Federal Expenditure Budget *(Presupuesto de Egresos de la Federación)*
Pemex	*Mexican state oil company (Petróleos Mexicanos)*
PRLV	Promissory Notes with Interest Payable on Maturity *(Pagaré con Rendimiento Liquidable al Vencimiento)*
RCS	Capital Solvency Requirement *(Requerimiento de Capital de Solvencia)*
RFSP	Public Sector Financial Requirements *(Requerimientos Financieros del Sector Público)*
ROE	Return On Equity
SAR	Retirement Savings Fund *(Sistema de Ahorro para el Retiro)*
SHCP	Ministry of Finance and Public Credit *(Secretaría de Hacienda y Crédito Público)*
SHF	Federal Mortgage Society *(Sociedad Hipotecaria Federal)*
SHRFSP	Historical Public Sector Financial Requirement Balance (*Saldo Histórico de los Requerimientos Financieros del Sector Público)*
siefores	Pension Funds *(Sociedades de inversión especializada en fondos para el retiro)*
SMES	Small and Medium-sized Enterprises
socaps	Savings and Loan Cooperatives *(Sociedades cooperativas de ahorro y préstamo)*
sofipos	Popular Finance Corporations *(Sociedades financieras populares)*
***sofomes* enr**	Non-Regulated Multi-Purpose Financial Companies *(Sociedad financiera de objeto múltiple entidades financieras no reguladas)*
TIIE	Interbank Equilibrium Interest Rate *(Tasa de interés interbancaria de equilibrio)*
VSM	Minimum Salary Multiple *(Veces Salario Mínimo)*



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