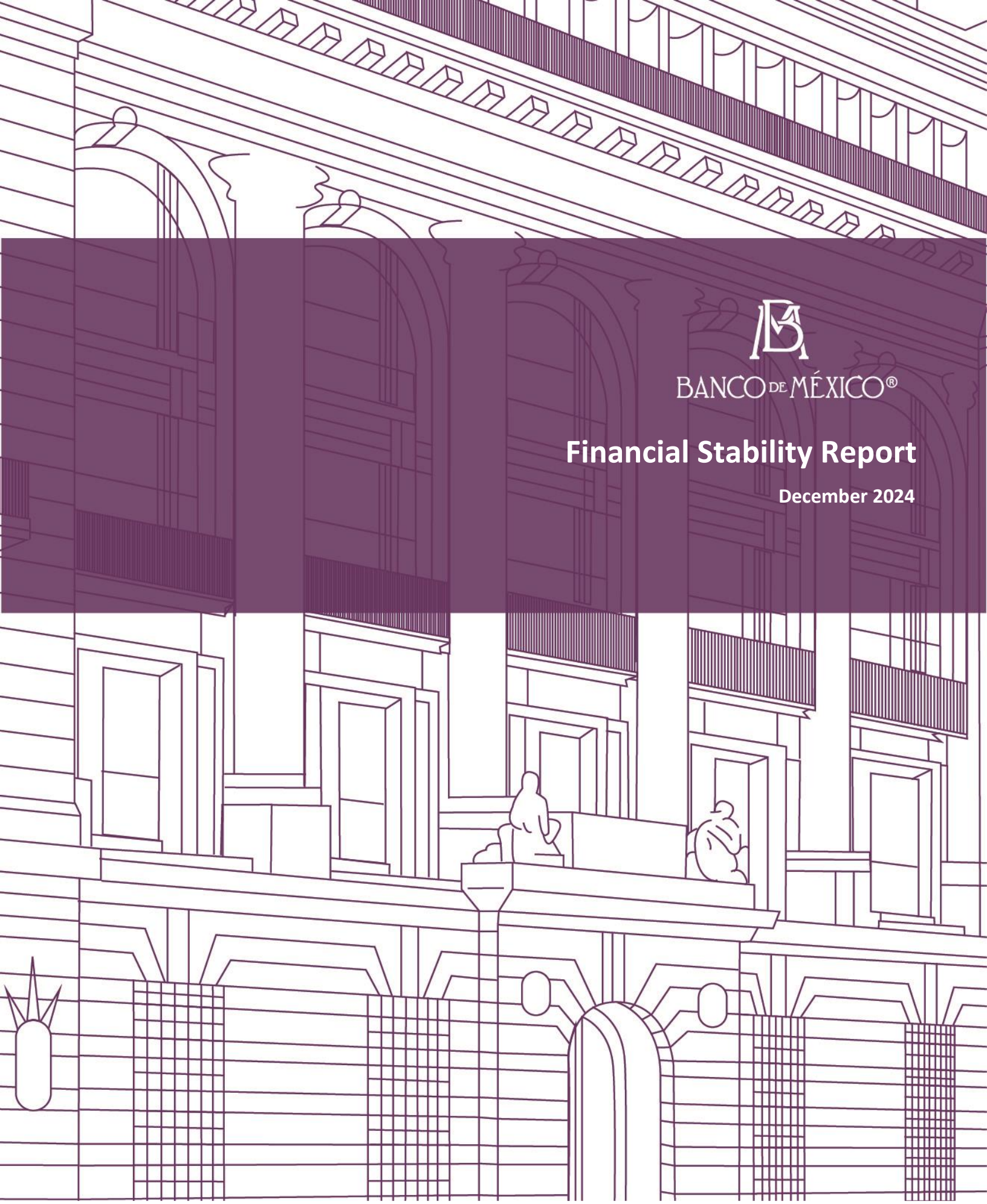


BANCO DE MÉXICO®

Financial Stability Report

December 2024

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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 specified, this document has been prepared using information available as of December 9, 2024. 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

Banco de México, considering its purposes of promoting the sound development of the financial system and fostering the proper functioning of the payments system, 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 it also contributes 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 since 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. Therefore, 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 made known to the public every six months through the Financial Stability Report. The identification and monitoring of risks that could affect the stability of the financial system, as well as their timely disclosure, are essential to mitigate them and, thereby, to reduce vulnerabilities and enhance the resilience of the system.

Executive summary

The Mexican financial system maintains a solid and resilient position, in the context of an international environment characterized by slower global economic growth, rising geopolitical tensions, and the beginning of a cycle of monetary policy adjustments in advanced economies towards less restrictive stances. The global economy has demonstrated resilience in light of the disinflation process and has thus far avoided a recession.

Domestic economic activity exhibited marked weakness during the second quarter of 2024, although GDP registered seasonally adjusted quarterly growth of 1.1% in the third quarter. The domestic financial system has remained stable due to the soundness of its institutions. Commercial banks have maintained capital and liquidity levels above the regulatory minimums, as well as increasing assets and profitability. While vulnerabilities and risks to financial stability are considered to be limited overall, unexpected or severe shocks could disrupt the proper functioning of the financial sector. Therefore, it is necessary to remain vigilant and to monitor potential risks in the context of the current complex and uncertain global environment.

This *Report* groups the main identified risks in two categories:

1. **Macrofinancial risks**: risks that could arise from the deterioration of aggregate financial and macroeconomic variables, both domestically and internationally.

2. **Risks inherent to the financial system**: these include vulnerabilities and risks emanating from different sectors of the economy that the financial system serves, namely, households, firms, the public sector, and financial institutions. In addition, this risk category also includes disruptions that could occur in the financial markets and payment systems.

This *Report* analyzes the following macrofinancial risks that, if realized, could affect the stability of the Mexican financial system: i) unexpected shifts in global financial conditions relative to expectations; ii) the escalation of geopolitical tensions or trade conflicts; iii) a systemic event with implications for the global financial system; iv) a further weakening of the domestic economy, and v) unforeseen adjustments in the credit ratings of key domestic issuers.

Aggregate risk indicators show that, first, financial conditions in Mexico have tightened further and remain restrictive. Second, based on Banxico's macro-financial vulnerabilities index (a forward-looking, early-warning indicator), the Mexican economy as a whole does not exhibit significant vulnerabilities in any of the analyzed sectors: financial, real, external, and public. Third, Banxico's financial market stress index for Mexico increased slightly and remains at high levels, mainly due to increased volatility in variables associated with debt, foreign exchange, and stock markets. Finally, risks in the Mexican financial system, tracked using heat maps, remain at levels similar to that observed in the previous *Report*.

Macrofinancial Conditions

International Environment

Global economic activity decelerated during the second quarter of 2024, with slower growth registered in emerging economies and faster growth in advanced ones. Global growth is expected to have remained stable in the third quarter, with mixed performance across countries. The International Monetary Fund's (IMF) projections for annual global growth for 2024 and 2025 remained unchanged. The IMF highlighted the resilience of the global economy amid disinflation, avoiding a recession, and foresaw stable growth ahead. US growth prospects also improved, compensating for the declines in other advanced economies. However, downward risks persist, especially in emerging economies, mainly due to geopolitical tensions and potential financial volatility.

During the second and third quarter of 2024, inflation diverged significantly across countries. In some advanced economies, such as the United States, annual inflation decreased due to declines in services and energy prices. In contrast, some emerging economies registered an increase in inflation in the second quarter, although in most of them it declined during the third quarter.

In light of the above, some of the main central banks in advanced economies began a rate-cutting cycle, and some emerging economies continued lowering their reference rates. The US Federal Reserve (Fed) kept its target range for the federal funds rate unchanged in June and July 2024, but implemented rate cuts in September and November, reflecting its readiness to adjust monetary policy according to economic conditions.

Domestic Environment

In the second quarter of 2024, economic activity exhibited weakness, with GDP growth of 0.4%. However, in the third quarter, GDP rose at a rate of 1%, reflecting an increase in activity in the three major economic sectors. Inflation accelerated from 4.77% in the second quarter to 5.04% in the third, driven by atypical pressures on energy prices and on agricultural and livestock product prices. However, these pressures started easing in August, and core inflation continued slowing due to monetary policy tightening measures implemented and the fading effects of global shocks. For the month of November, headline inflation decreased to 4.55%.

Banco de México's Governing Board maintained the reference rate at 11% in June and lowered it by 25 basis points at each of the August, September and November meetings. Since November 15, the reference rate has been at a level of 10.25% and, based on the latest Quarterly Report, headline inflation is expected to converge to its target by the fourth quarter of 2025. The Governing Board reaffirmed its commitment to ensure monetary policy remains consistent with the trajectory needed to achieve their price stability goal.

The Mexican peso exhibited considerable volatility and a sizable depreciation, largely attributable to global influences and the evolving idiosyncratic risk environment. Notwithstanding these circumstances, the Mexican financial markets remained relatively stable.

The economic environment will continue to be complex, with multiple risk factors at play. Despite the encouraging rate of economic growth observed in the third quarter, projections suggest a challenging outlook. This highlights the need to focus vigilantly on the risks that could affect the Mexican financial system.

Total financing to the Mexican economy increased in real terms to a level of 97% of GDP, 57% of which went to the public sector, 25% to non-financial companies, and the remainder to households (consumption and housing).

Risks identified in the financial system

Banco de México employs a dual approach to risk assessment, using both qualitative and quantitative indicators to evaluate macrofinancial risks and inherent risks within the financial system. The main findings are summarized below:

Households

- As of September 2024, average household leverage, measured as the ratio of monthly income available to pay down debt, remained at levels similar to those a year ago. However, said leverage was higher among lower-income borrowers.

- The total stock of consumer loans increased in real annual terms, albeit at a lower rate than in the previous *Report*. In the banking sector, non-performing loan rates on payroll and personal loans trended downwards, as a result of growth of their performing portfolios. Non-performing loan rates on credit card and automotive loans showed little change.

- These data suggest that, despite the complex economic environment, demand for consumer credit remains strong. Stability in the probability of default for most new loans suggests resilience among borrowers. However, the modest uptick in revolving credit defaults merits close observation, though it remains at relatively moderate levels.

- In September, total mortgage loans rose slightly, with a rebound in the *Infonavit* housing portfolio and stability in bank loan originations. Non-performing loan rates in this segment of the bank loan portfolio remained at historically low levels, although exhibiting an upward trend. The non-performing loan rate in *Infonavit* decreased; however, in *Fovissste*, it increased and is at high levels relative to its previous performance.

Businesses

- Total financing to non-financial private firms in Mexico increased in real annual terms up until September. Domestic credit has grown through its main sources: bank credit, non-bank credit, and debt issuance. In contrast, external financing to this sector has contracted for sixteen consecutive quarters, affected by a decrease in international bank credit and lower debt issuance abroad.

- Despite lower growth rates since the beginning of 2024, lending to non-financial private firms

increased, among both large- and other types of companies. Non-performing loan rates remained stable in the banking portfolio, although non-performing loans rose marginally for smaller firms. Banxico's vulnerability index of listed non-financial private companies deteriorated slightly, which was related to those firms' leverage, profitability, and debt-service capacity. The annual operating cash flow generation of these companies has declined in real terms for the ninth consecutive quarter, although at a slower pace of contraction. Despite these challenges, the banking system's exposure to vulnerable businesses is low in relation to its regulatory capital.

Public Sector

- The Public Sector Borrowing Requirements (RFSP, for its acronym in Spanish) are expected to reach 5.9% of GDP by the end of 2024, based on Federal government projections. Public debt, as a share of GDP, remains within an adequate range, while state and local government debt levels are considered, for the most part, sustainable.

Banking Sector

- Commercial banks maintain high capitalization and liquidity levels that exceed regulatory minimums. The stress tests confirmed that the banking system, in aggregate, has the capacity to absorb significant shocks.

- Liquidity and credit risks remained stable and limited, while market risk decreased slightly and contagion risk increased marginally.

Cyber and Climate-related Risks

- Cyber risks related to the increasing use of Artificial Intelligence (AI) and the digitalization of finance are a global concern. However, cybersecurity levels in Mexico are adequate.

- Climate-related risks pose a threat to the stability of the financial system as a whole, which is why Banco de México, in collaboration with other authorities, monitors and assesses their adverse impact on the economy and the financial sector. This analysis is shared with financial institutions for their knowledge and to promote risk mitigation. In particular, the latest analysis identified that commercial banks decreased their direct exposure to transition risks, while indirect exposure increased.

Policy Measures Implemented

Banco de México introduced exceptions to facilitate the transition to reference rates based on real operations, allowing the use of the Interbank Equilibrium Interest Rate (TIIE, for its acronym in Spanish) in certain operations until 2026. Amendments were also made to regulate hedge funds and improve the supervision of derivative transactions. The *CNBV* updated the *Circular Única de Bancos* (CUB, for its acronym in Spanish) to strengthen internal controls, regulate technological commission agents, as well as to adjust capital requirements for operational risk. Finally, guidelines for the simplified registration of securities in the National Securities Registry were released for public consultation through the National Regulatory Improvement Commission (Conamer, for its acronym in Spanish), which will facilitate access to financing through simplified issuances.

Final Remarks

Banco de México remains vigilant about the health of Mexico's financial markets and will take the necessary measures, in coordination with other authorities, in exercise of its powers and in strict compliance with the legal framework, to preserve the stability of the financial system and the proper functioning of the payment systems.

Introduction

One of Banco de México's objectives is to promote the sound development of the financial system and promote the proper functioning of the payment systems. To this end, this central bank monitors, according to its attributions, financial markets and entities, as well as other participants in the Mexican financial system. The performance of these entities is constantly evaluated.

A proper-functioning of the financial system is instrumental in enabling Banco de México to achieve its primary objective of safeguarding the purchasing power of the national currency., Effective monetary policy transmission mechanisms are more readily facilitated under these conditions. Furthermore, a stable financial system fosters the attainment oof balanced and sustained economic growth. Conversely, episodes of financial instability can engender systemic risk, which can impede the operation of a significant portion of the financial system could be affected, resulting in adverse economic consequences. Moreover, such episodes have been shown to impose considerable costs on society in terms of activity, employment and income levels throughout history.

Therefore, among Banco de México's primary functions include the identification, monitoring and analysis of potential vulnerabilities or macro-financial imbalances that could amplify an unexpected shock and lead to a systemic disruption, as well as risks that could affect financial stability. In addition, Banco de México publishes its *Financial Stability Report* (FSR) twice a year in order to disseminate the outcomes and findings of such analysis in a timely manner. This enables the relevant economic sectors and other economic agents to access the information, thereby facilitating their contribution to risk mitigation. Furthermore, the implementation of macroprudential policy measures implemented during the period covered by each *Report* is outlined, as these measures also contribute to mitigating vulnerabilities to the stability of the financial system. These measures are implemented with the objective of strengthening the financial system's stability and resilience.

It is noteworthy that, given the prevailing circumstances, the financial system as a whole is sound. It possesses capital and liquidity levels that, in general, amply comply with the regulatory minima. While these elements contribute to the system's capacity to absorb various macro-financial shocks, such as those encountered in a complex and uncertain global macro-financial environment it is crucial to maintain a high level of attentiveness to its evolution, both observed and expected.

Based on the above, it is noteworthy that, within the prevailing global macroeconomic environment, several prominent central banks have initiated a cycle of cuts in their monetary policy rates during the second half of 2024. However, in some countries there is still some resistance from inflation to converge sustainedly to the target. This could cause financial conditions to ease less than expected, or even tighten relative to expectations, which could lead to persistently high financing costs. Thus, another factor of uncertainty that could generate a decrease in economic activity and greater risk aversion in global financial markets is the possibility of an escalation of geopolitical conflicts, particularly those between Russia and Ukraine, as well as in the Middle East, together with a possible worsening of trade tensions between different jurisdictions in the short term.

In Mexico, it is anticipated that annual headline inflation will converge to the target by the fourth quarter of 2025. However, these forecasts are subject to risks, which are currently considered to be biased to the upside. On the one hand, economic activity in the third quarter of 2024, exhibited a higher GDP growth rate, contrasting with the previous three quarters of marked weakness. While a sustained growth trajectory is projected, the prevailing risk assessment inclines towards a negative outlook, largely attributable to the prevailing uncertainty stemming from both domestic and international factors. Domestic financial markets have demonstrated volatility, attributable to both global and idiosyncratic factors. Notably, in the foreign exchange market, while the Mexican peso exhibited a substantial depreciation, it demonstrated a relatively orderly behavior in the face of periods of volatility in the current macro-financial environment.

The structure of this *Report* is divided into five sections. Section I provides a comprehensive review of macro-financial conditions. Section II offers an update on the challenges of the economic environment. Section III describes the policy measures implemented to preserve the sound development of the financial system. Section IV presents the risks to the financial system: aggregate risk indicators are identified, the positioning of the economic agents that participate in the Mexican financial system is detailed and, in addition, the diagnosis of financial and non-financial entities in the system is discussed in depth. Section V shows the results of stress tests and recovery plans for commercial

banking institutions. Lastly, final considerations are presented.

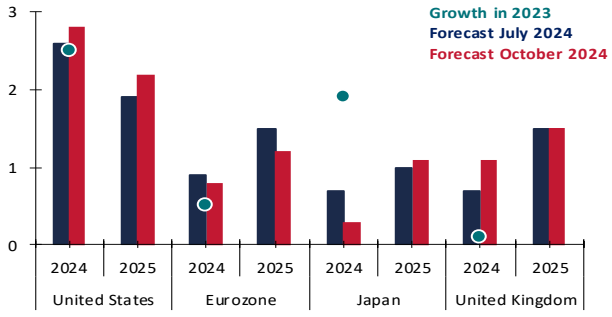
I. Macrofinancial Conditions

I.1. International Economic Outlook

In the second quarter of 2024, global economic activity showed a slowdown compared to the first quarter, with lower economic growth in emerging economies and higher growth in advanced economies. In the third quarter, global economic activity expanded at a similar pace to the second quarter, albeit with heterogeneous performance among countries.

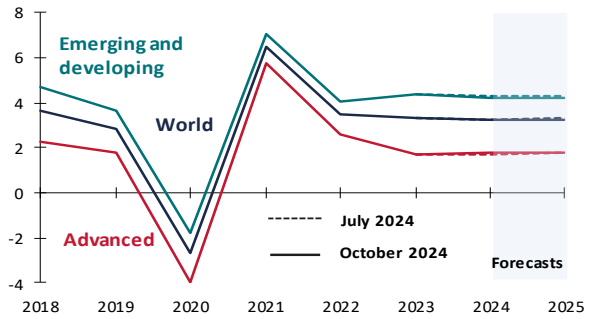
The International Monetary Fund (IMF) has maintained its global growth projections for 2024 and 2025 in its October report, which aligns with the data presented in the April and July reports (Graph 1 and Graph 2). The IMF highlighted that the global economy has demonstrated resilience in the context of the disinflation process, successfully avoiding a recession and maintaining stable growth projections. It has also noted that growth prospects in the United States have improved, offsetting declines in other advanced economies; however, downside risks persist, particularly in emerging economies, due to rising geopolitical tensions and financial volatility.

Graph 1
Growth in 2023 and forecasts for 2024 and 2025
Annual variation in percent



Data as of October 2024.
Source: IMF, World Economic Outlook July and October 2024.

Graph 2
GDP growth forecasts
Annual percentual change



Data as of October 2024.
Source: IMF, World Economic Outlook, July and October 2024.

In the second and third quarters of 2024, global inflation exhibited divergent trends across economies. In several advanced economies, annual inflation declined, notably in the United States, where lower prices of services and energy contributed to this reduction. On the one hand, headline inflation increased in the second quarter in emerging economies but declined in the third quarter in a significant number of them. Consequently, inflation has continued to approach the targets of respective central banks, prompting them to begin adopting less restrictive stances.

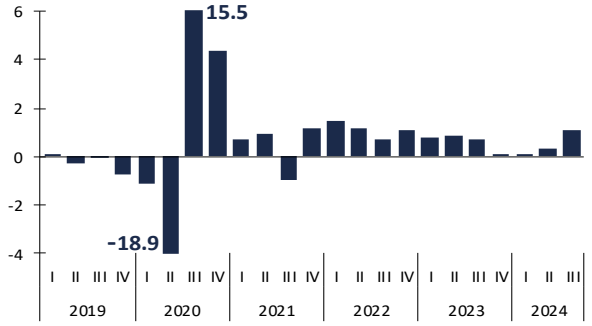
During the period covered by this *Report*, the Federal Reserve (Fed) maintained the target range for the federal funds rate at its June and July 2024 meetings; in September, the Fed reduced the target range by 50 basis points (bp) and in November, reduced it by an additional 25 bp. The current target range is between 4.50 and 4.75%. In its latest monetary policy statement, the Fed reaffirmed its commitment to adjusting its monetary policy stance as needed to address potential risks that could impede the achievement of its objectives. It also outlined that it will consider a range of information to assess its monetary policy stance, including data on labor market conditions, inflationary pressures, inflation expectations, and the behavior of financial markets and the international environment.

I.2. Domestic economic outlook

In the second quarter of 2024, economic activity demonstrated a notable decline, with seasonally adjusted quarterly growth of 0.4%. This was attributed to a lack of momentum in industrial activity and a slowdown in services (Graph 3). For the third quarter, GDP recorded a seasonally adjusted quarterly growth of 1.1%, indicating a recovery in economic activity. Primary activities made a notable contribution to growth during the period, while secondary and tertiary activities

expanded more than in the previous quarter. Additionally, domestic private consumption and wage bill performance improved, while the national unemployment rate remained at historically low levels.

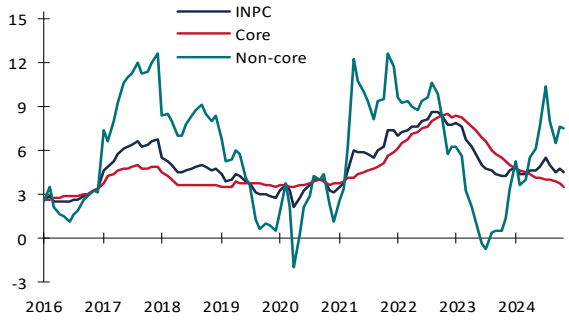
Graph 3
Gross Domestic Product [s.a./]
Quarterly variation in percent



Data as of third quarter of 2024.
Source: INEGI.
s.a./ Seasonally-adjusted figures.

The annual headline inflation rate was 4.77% during the second quarter of 2024, rising to 5.04% in the third quarter (Graph 4). This increase was driven by the rise in non-core inflation due to the atypical pressures simultaneously affecting energy and agricultural prices. However, these pressures began to ease in August. On the one hand, core inflation continued to decline due to the monetary policy actions implemented and the fading effects of global shocks. In November inflation decreased to 4.55%. Looking ahead, while the disinflationary process is expected to continue, the risk outlook remains tilted to the upside, as the effects of inflation shocks have not fully dissipated, while some risks have become more evident.

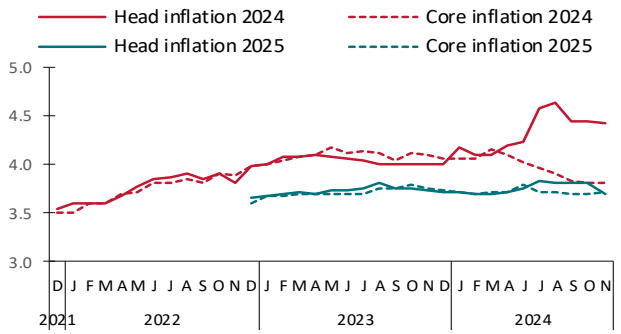
Graph 4
National consumer price index
Annual variation in percent



Data as of November 2024.
Source: INEGI.

The headline inflation projections published by Banco de Mexico in the Quarterly Report for July-September 2024 were 4.7% for the end of 2024 and 3% for the end of 2025. The median expectations for headline inflation from the November Survey of Private Sector Economic Specialists were 4.42% and 3.8% for the end of 2024 and 2025, respectively (Graph 5).

Graph 5
Inflation expectations[1/]
Percent



Data as of November 2024.
Source: Banco de Mexico, Survey of Private Sector Economic Specialists' Expectations.
1/ Median of annual inflation expectations.

During the period covered by this *Report*, the Banco de Mexico Governing Board maintained the reference rate at 11% at its June 2024 meeting and reduced it by 25 basis points in each of its August, September and November meetings. In its latest Monetary Policy Statement, the Governing Board determined that the impact of non-core inflationary pressures will continue to subside over the coming quarters, anticipating a downward trajectory for core inflation. Furthermore, the Board noted that, while the inflation outlook still warrants a restrictive stance, the current trajectory justifies a reduction in the degree of monetary tightening. It also indicated that future actions will ensure the reference rate remains aligned with the necessary trajectory to facilitate the orderly and sustained convergence of headline inflation towards the 3% target within the expected timeframe.

I.3. Financial Market

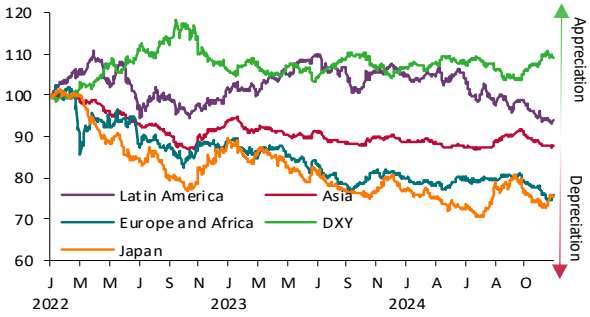
During the second semester of 2024, the performance of global financial markets was influenced by several factors: a more benign inflation dynamic combined with some signs of a moderate economic slowdown, led to a loosening of the monetary stance in major developed and some emerging economies. In addition, the idiosyncratic factor associated with geopolitical and electoral risks also influenced investor sentiment at the global level.

In this environment, emerging countries' financial markets performed differently by region. Since June 2024, the currencies of these countries presented a mixed performance, with a positive performance in the Asian region and significant depreciations in Latin America. The latter is explained, among other factors, by the Bank of Japan's decision to increase its reference rate by 25 basis points in July, which led to a decrease in the carry trade positions using Latin American currencies (Graph 6).

Graph 6

Foreign exchange indexes performance [1/2/]

Index (January 2022 = 100)



Data as of December 2024.

Source: Calculations by 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.

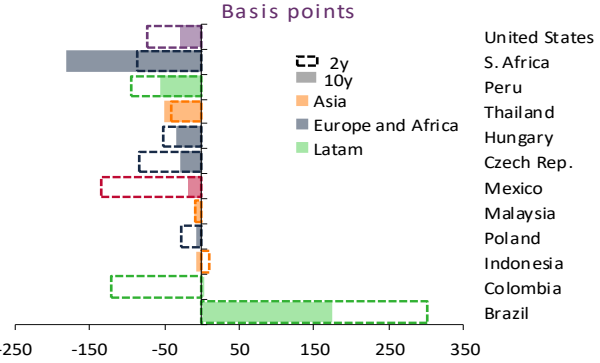
2/ DXY refers to the US Dollar Index calculated by the Intercontinental Exchange (ICE) as a weighted average of the nominal exchange rates of six currencies: Euro, Japanese Yen, British Pound, Canadian Dollar, Swedish Krona and Swiss Franc.

On the one hand, interest rates in the emerging countries were volatile, although they are expected to continue their downward trend associated with the less restrictive monetary policy stance that is anticipated in most of these countries (Graph 7). Finally, most stock indexes showed gains, due to the resilience in economic publications that moderated the probability of an economic recession scenario in the following quarters (Graph 8).

Graph 7

Change in 2 and 10-year rates of emerging economy sovereign bonds denominated in local currencies

Basis points



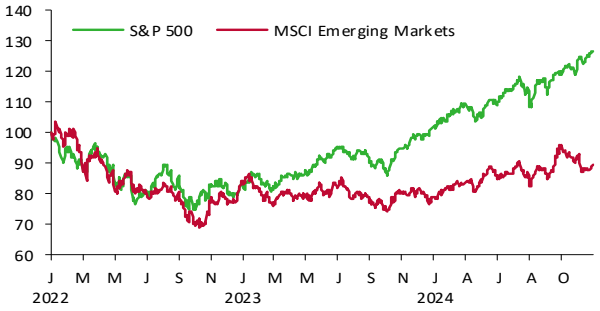
Data as of December 2024.

Source: Bloomberg.

Graph 8

Performance of equity indexes

Index (January 2022 = 100)



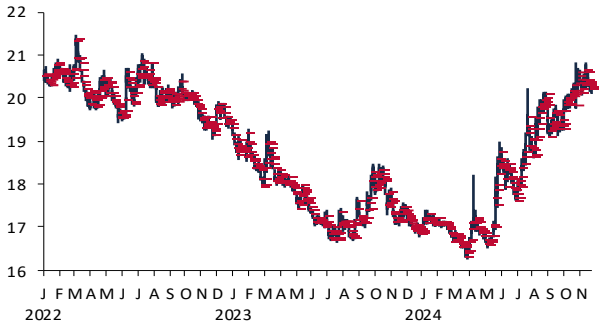
Figures as of December 2024.

Source: Calculations by Banco de México with data from Bloomberg.

I.3.1. Foreign Exchange Market

During the period, the Mexican peso registered high volatility, derived from some global factors, as well as the evolution of the idiosyncratic risk landscape. During the third quarter of the year, the Mexican peso depreciated significantly, associated with local risk factors, as well as with the settlement of carry positions that used the Mexican peso as an investment currency. Additionally, the uncertainty associated with the US presidential elections contributed to the depreciation of the Mexican peso. Thus, during the period covered by this *Report*, the exchange rate reached a maximum of 20.83 pesos per US dollar, which was momentarily observed after the US president-elect announced his intention to impose tariffs on imports from Mexico and Canada. (Graph 9).

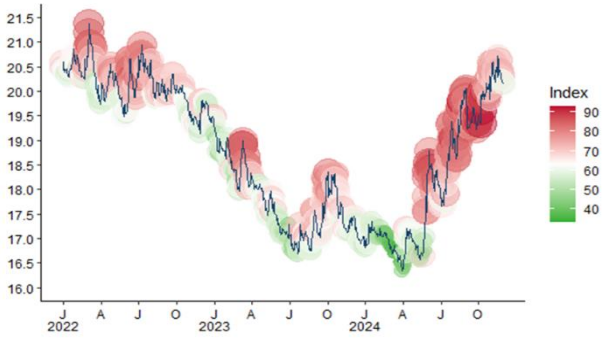
Graph 9
Mexican peso daily trading range [1/]
Foreign exchange mexican peso-US dollar



Data as of December 2024.
Source: Bloomberg.
1/ The red lines indicate the closing exchange rate, while the blue bars indicate the trading range.

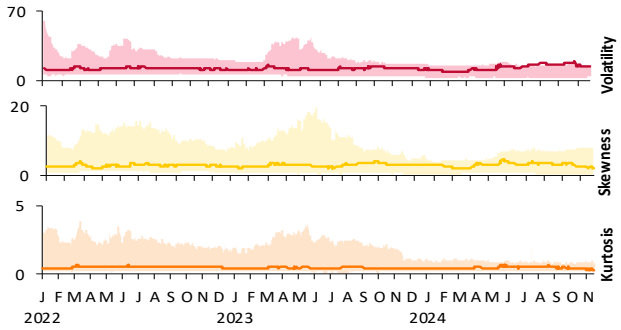
Although liquidity and depth conditions deteriorated and remain suboptimal, this did not limit the transactionality of the currency (Graph 10). Prospective trading conditions also deteriorated, especially volatility in the short term, on dates associated with the US election process (Graph 11).

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



Data as of December 2024.
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



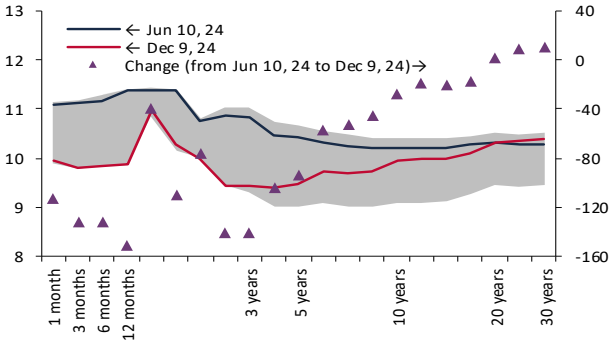
Data as of December 2024.
Source: Bloomberg.
1/ The emerging countries included in the shaded area (range between the maximum and minimum values) are Brazil, Chile, Colombia, the Philippines, Hungary, India, Indonesia, Malaysia, Poland, South Africa, and Turkey. The solid line represents the value of Mexico. The implicit skewness is measured through Risk Reversal strategies at 25 deltas. Kurtosis is measured with Butterfly strategies at 25 deltas.

In this complex environment, on November 1, 2024, the IMF's Executive Board ratified that Mexico still meets the eligibility criteria to access, if required, the Flexible Credit Line, and therefore ratified the availability of this instrument for up to an approximate amount equivalent to 35 billion US dollars.

I.3.2. Fixed-income Market

In Mexico, since the publication of the last *Report*, the yield curve of government securities decreased in most maturities, with downward adjustments of up to 142 basis points in the three-year node and 20 basis points in the medium term, while the 30-year nodes reflect increases of up to 10 basis points (Graph 12). This caused a steepening of the curve, leading the spread between the 3- and 30-year terms to trade in positive territory for the first time since mid2022. This behavior differentiated by term is explained in a context in which the short end of the yield curve responded to the expected path of Banco de México's monetary policy, while the long end of the curve was affected by global and local factors that led to an increase in term premia.

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

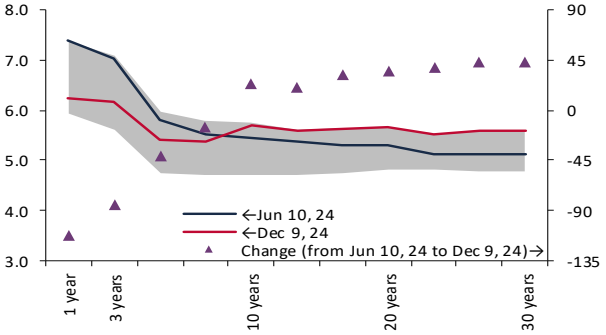


Data as of December 2024.
Source: Calculations by Banco de México with data from PIP.
1/ The grey area is the yield curve range since June 10th, 2024.

The movements in the government securities yield curve occurred in a context in which trading conditions deteriorated. Trading volume increased, while bid-ask spreads and volatility also increased. Other factors that influenced the behavior of this market were the evolution of US Treasury Note rates, as well as the capacity of the local investor base to absorb the increase in government debt issuance.

On the other hand, the real yield curve showed a slightly lower steepening than that observed in nominal rate instruments, where the three-year node decreased 84 basis points, while the 30-year node increased 45 basis points (Graph 13). Thus, inflation breakevens showed decreases in all maturities.

Graph 13
Inflation-linked Bonds' yield curve
Left axis: Percent
Right axis: Basis points

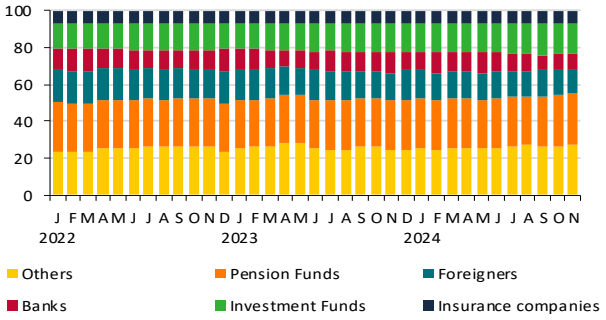


Data as of December 2024.
Source: Calculations by Banco de México with data from PIP.
1/ The grey area is the yield curve range since June 10th, 2024.

Flows to peso-denominated assets from the external sector showed high volatility and recorded outflows during the period covered by this *Report* (Graph 14).

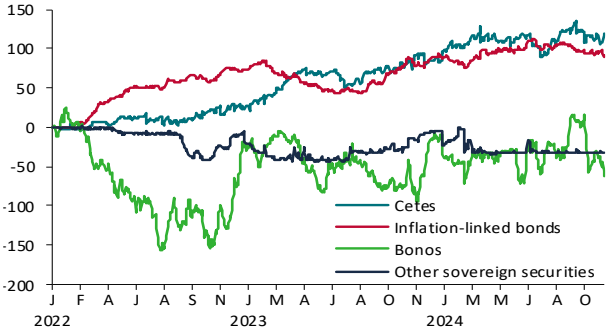
During the second half of 2024, foreign investors continued to increase their interest in zero-coupon instruments or *Cetes*, while Bonos M and Udibonos showed outflows (Graph 15).

Graph 14
Mexican sovereign debt holdings by sector, as a percentage of the total amount outstanding [1/]
Percentage



Data as of November 2024
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 15
Sovereign securities' investment flows by foreign investors since 2022
Billion pesos

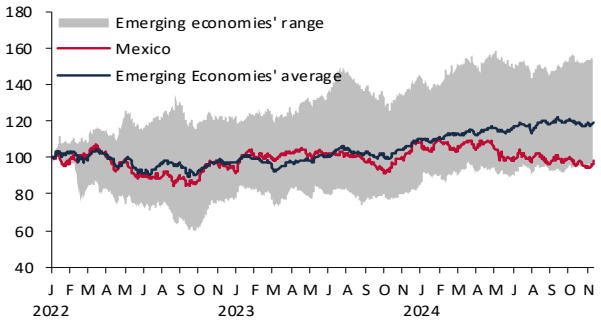


Data as of November 2024.
Source: Calculations by Banco de México with data from Indeval.

I.3.3. Equity Market

Since the last publication of this *Report*, equity markets in Mexico have shown a moderate negative movement. The Mexican Stock Exchange Index (IPC) has diverged from the movements of this asset class at a global level, due to the increase in local uncertainty (Graph 16).

Graph 16
Equity indexes' cumulative performance for selected emerging economies 1/
Index (January 2020 = 100)



Data as of December 2024.
Source: Calculations by Banco de México with data from Bloomberg.
1/Emerging countries included are Brazil, Chile, Colombia, Philippines, Hungary, India, Indonesia, Malaysia, Poland, and South Africa.

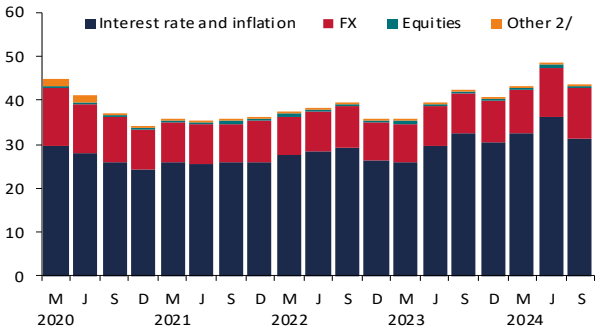
Regarding the positioning in this market by foreign investors, during the second semester of 2024, a negative cumulative flow focused on companies in certain sectors, such as the consumer sector, was observed.

Finally, there were no initial public offerings (IPOs) of Mexican companies during the period.

I.3.4. Derivatives Market

Between March and July 2024 there was a growing trend in the notional value of the derivatives portfolio, mainly in operations with foreign currency as the underlying. However, in August there was a contraction caused by a reduction in interest rate *swaps* (*IRS*) on domestic rates. This is partly explained by the portfolio compressions carried out by some institutions (Graph 17).[1]

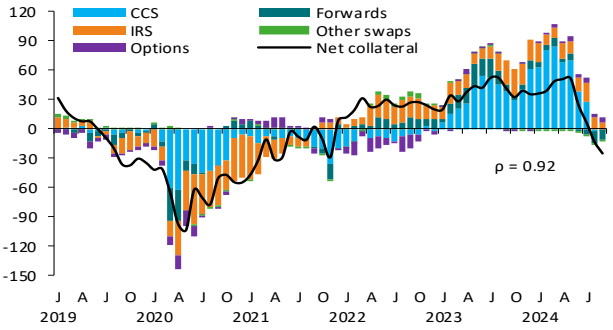
Graph 17
Outstanding notional amount by type of underlying 1/
Trillions of pesos



Data as of September 2024.
Source: 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.

Against this backdrop, as of March 2024 the positions of derivative portfolios, together with exchange rate volatility and the effects on interest rate curves associated with the beginning of the monetary policy easing cycle, led to a reduction in the capital gains of such portfolios, mainly from foreign currency transactions, particularly in *Cross Currency Swaps* (*CCS*), although capital gains from interest rate transactions also decreased. Likewise, in this environment, there was an increase in the guarantees provided by financial institutions, such that net guarantees (received minus provided) turned negative in the third quarter of 2024 (Graph 18 and Graph 19).

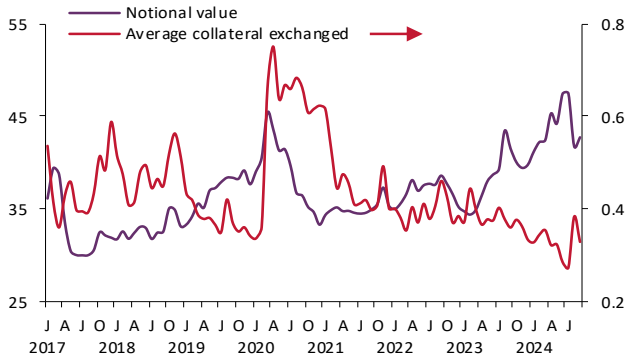
Graph 18
Relationship between the net value of the derivatives portfolio and the net value of collateral
Billions of pesos



Data as of September 2024.
Source: Banco de México.

[1] The main objectives of compression in derivative instruments are: to facilitate operational management, optimize the use of assets that guarantee these instruments, reduce the complexity of flow management, and reduce the costs associated with portfolio management, which allows entities to make more efficient use of their capital and reduce their operational and financial risks.

Graph 19
Portfolio notional value and collateral amount divided by the outstanding notional amount

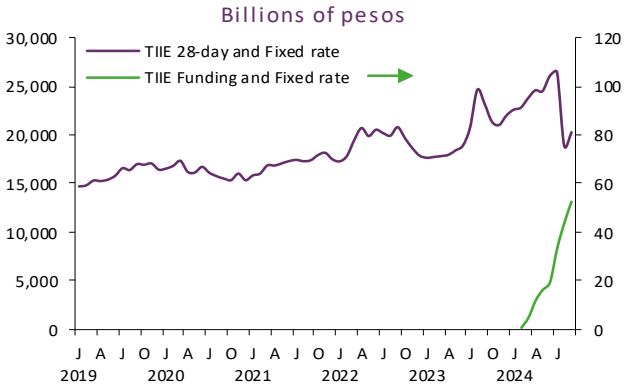


Data as of September 2024.
Source: Banco de México.

On the other hand, Banco de México has continued its efforts to promote the adoption of the TIIE Funding Rate (TIIE-F) in the financial system, which complies with international methodological standards. On September 2, 2024 it issued a call for market participants to use the TIIE-F as a reference for new operations as soon as possible. Additionally, in the last quarter of 2024, the TIIE 28-day rate (TIIE 28) will be replaced by the TIIE-F in recognized markets, and it is expected that the notional value of transactions linked to the TIIE-F rate could increase by the end of the year (Graph 20). Thus, the amount of contracts with TIIE 28 underlying traded in recognized markets, as well as those traded in the OTC market that are centrally cleared, could be subject to the process of substitution of the TIIE 28 for the TIIE-F rate.[2] It should be noted that these contracts represent around 57% of the total number of transactions in force in the domestic market and that around 8% are cleared in ASIGNA. In particular, ASIGNA contemplates two dates to carry out the reference rate substitution process: November 22 and December 20, 2024. On the other hand, the CME contemplated a primary conversion event on November 22, 2024, and subsequently, any new operation with a maturity greater than December 2025 will go through the same primary conversion process.

It should be noted that, at the close of this Report, the ASIGNA and the CME announced the successful conversion of contracts with underlying TIIE 28 for contracts with underlying TIIE-F, carried out simultaneously by both entities on November 22, 2024. ASIGNA reported that 7,000 *swaps* were converted for a notional value of 1.1 trillion pesos, while the CME reported the conversion of 90,000 *swaps* equivalent to 42 trillion pesos. Thereby, the total substitution involved transactions for a notional value of approximately 2.1 trillion US dollars.[3] It should be reiterated that this process represents a key step forward in the transition toward the adoption of the TIIE-F as a reference rate aligned with international standards.

Graph 20
Evolution of outstanding notional amount for swap operations on TIIE 28-day and TIIE Funding



Data as of September 2024.
Source: Banco de México.

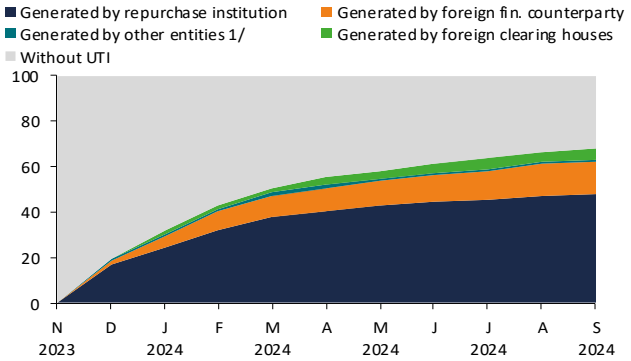
On the other hand, in line with the adoption of international best practices, as well as in response to G20 commitments and in order to continue promoting the sound development of the financial system, Banco de México established, as of December 2023, the use of the unique transaction identifier (*UTI*) in all new derivative transactions entered into as of that date. As a result, as of September 2024, close to 68% of current operations already have a *UTI* (Graph 21). With respect to the unique product identifier (*UPI*), on November 8, 2024, Banco de México published the recognition of the provider of this identifier, so that, in accordance with the provisions of the applicable regulation, the entities subject to its use will have 360 days to incorporate it into their processes, as well as in the information they

[2] The process of substitution to TIIE F consists of the cancellation of the transaction with underlying TIIE 28 for two new transactions; a short-term *swap* on TIIE 28 -which will include all coupons maturing before January 1, 2026- and a *Forward Starting Swap* that will maintain the same fixed rate and maturity date as the original TIIE 28 *swap* and whose variable portion will pay TIIE F plus a spread. Additionally, a cash adjustment will be made, which will be the difference between the valuation of the *Forward Starting Swap* and its opening value.

[3] Press releases from ASIGNA and CME announcing the results of the TIIE 28 to TIIE-F conversion.

send to Banco de México on their derivative transactions.[4]

Graph 21
Outstanding derivatives operations with UTI since november of 2023
Percentage

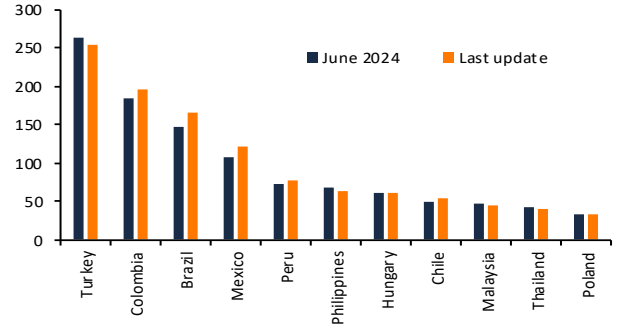


Data as of September 2024.
Source: Banco de México.
1/ Includes generation by foreign entities non-involved in the transactions or national clearing houses.

I.3.5. Risk Premiums

Mexico's credit risk premiums, as measured by the price of the Credit Default Swaps (CDS), showed a moderate increase during the period, in line with what has been observed for other emerging countries (Graph 22).

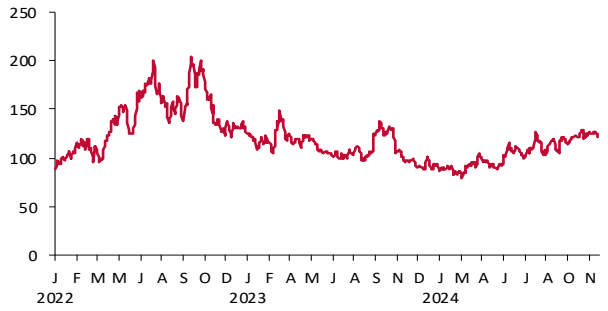
Graph 22
5 year CDS for selected emerging economies
Basis points



Data as of December 2024.
Source: Bloomberg.

Thus, the 5-year term CDS of Mexico's sovereign debt is located around 119 basis points, after having been slightly below 100 basis points at the beginning of the year and reaching levels of up to 127 basis points during the period covered by this Report (Graph 23).

Graph 23
5-year Mexico's CDS
Basis points

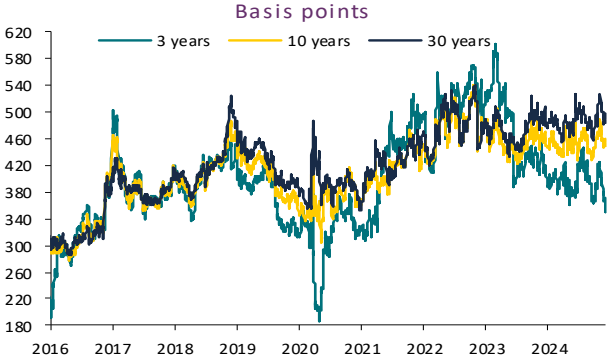


Data as of December 2024.
Source: Bloomberg.

Similarly, interest rate spreads between Mexican and US government bonds widened from those observed at the beginning of 2024.

Finally, inflation breakevens decreased in all terms, especially in the short term, consolidating below 350 basis points. Additionally, the medium- and long-term compensation is below 500 basis points (Graph 24).

Graph 24
Sovereign breakeven inflation rate
Basis points



Data as of December 2024.
Source: Calculations by Banco de México with data from PIP.

I.4. Macrofinancial Risks

The Mexican financial system maintains a solid and resilient position. Although its potential vulnerabilities are generally considered limited, unexpected or severe shocks could affect its proper functioning, so it is necessary to pay due attention and monitor the risks that, from a macro-financial perspective, could be faced in a complex and uncertain global environment such as the current one.

[4] The Banco de México's press release recognizing the UPI's supplier is available at: https://www.banxico.org.mx/publicaciones-y-prensa/miscelaneos/%7B4BFB87A7-C809-99EC-391A-23121FE73ED0%7D.pdf

Unexpected Shifts in Global Financial Conditions Relative to Expectations

Given the recent onset of a cycle of monetary policy rate cuts by major central banks, global financial conditions are likely to show a generally easing trend going forward.

However, in a context in which there is simultaneously a certain resistance of inflation to converge sustainedly to the target in some countries, as well as concerns about the evolution of their economic activity, there is a high level of uncertainty regarding the future path of their reference rates.

Consequently, if the pace or magnitude of adjustments in global monetary policy deviates substantially from expectations, in conjunction with other factors, financial conditions may ease less or even tighten relative to expectations.

The materialization of this risk could have adverse implications for the world economy and the stability of its financial system. Among these, the persistence of elevated financing costs could exacerbate the vulnerabilities derived from high levels of indebtedness, both public and private, in some countries.

Escalation of geopolitical tensions or trade conflicts

The escalation of geopolitical tensions on various fronts, particularly those related to the armed conflict in the Middle East and the war between Russia and Ukraine, could adversely affect the expected performance of the world economy and international financial markets.

In addition, it is necessary to consider the possible worsening in the short term of trade conflicts between different jurisdictions.

The occurrence of these shocks would introduce downwards pressure on economic activity and upwards pressure on inflation, increase risk aversion in international financial markets and, in short, contribute to a volatile macro-financial environment. Ultimately, financing costs would rise across the board as a result of increases in the associated risk premiums, which in turn could lead to higher non-performing loan ratios and lower credit growth.

Materialization of a Systemic Event with Implications for the Global Financial System

Although the possibility of experiencing a global systemic event remains latent, as at all times, its probability of occurrence could increase in the medium term. This, given a possibly heterogeneous implementation of internationally agreed financial regulation. The materialization of such an event could have relevant implications in several areas, including possible direct or indirect effects on global financial stability.

Firstly, the associated spikes in volatility and risk aversion in financial markets would cause an immediate deterioration in financial conditions, which, secondly, could be transmitted and even amplified through the financial system and financial markets due to potential vulnerabilities that already existed.

Further weakening of the domestic economy

Projections for domestic economic activity have deteriorated and become more uncertain, primarily as a result of an expected weakening in virtually all components of aggregate demand, both domestic and external, as well as public and private.

A less dynamic economic activity could have negative implications for real income in the economy. In turn, this could lead to a decrease in the income of Mexican financial intermediaries due to lower demand for financing, as well as a greater probability of losses due to increased credit risk given the lower payment capacity of borrowers and the foreseeable decrease in the profitability of the projects financed.

In addition, there is a risk that this could feed back into the loss of dynamism in domestic demand, particularly in private consumption and investment, and that this could continue for a prolonged period of time. Likewise, the long-term performance of the economy could be affected by a scenario in which physical investment is persistently low and insufficient, given its implications for the level and growth rate of potential output.

Unforeseen adjustments to the credit ratings of key domestic issuers

Since the publication of the last *Report*, one of the main rating agencies ratified both its credit assessment and outlook for sovereign debt, while another lowered its outlook. In this regard, it should be noted that, in all cases, the sovereign debt credit rating remains at investment grade. On the other hand, both Pemex's debt rating, and its outlook, remained unchanged during the period (Graph 25).

Regarding sovereign debt, the agencies highlight that its investment grade rating is supported by a prudent macroeconomic policy framework, as well as by the strength and soundness of a diversified economy and an expected trajectory for public debt as a proportion of

GDP in an adequate range. However, according to the same agencies, Mexico's credit rating could be constrained by a weakening institutional and governance framework, a limited long-term growth track record, as well as fiscal risks related to Pemex's contingent liabilities and increasing budgetary rigidities.

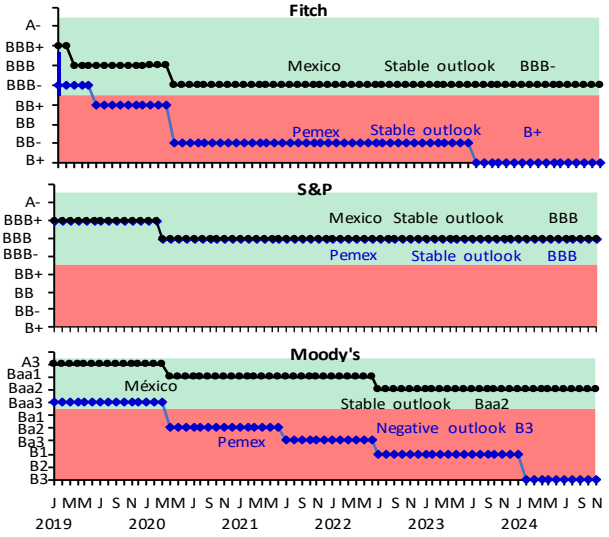
With respect to Pemex, the agencies mention that reclassifying it as a state-owned enterprise could result in stricter oversight of its operations and financial strategies, which would affect Pemex's debt issuance activity. While noting that this decision could make it easier for the company to obtain government financing, they also point out that unless structural changes are implemented in its operating strategy, it will continue to require additional support.

In a scenario in which adjustments to national ratings materialize unexpectedly, a deterioration of the country's macro-financial risk profile could be anticipated, as a result of increases in the associated risk premiums and a possible decrease in net capital inflows.

Graph 25

Mexico and Pemex's foreign currency rating performance 1/

Fitch, S&P and Moody's scales



Data as of December 2024.

Source: Fitch, S&P, and Moody's scale.

1/ The green areas show investment-grade ratings, while the red areas show speculative-grade credit ratings.

II. Update on Economic Environment Challenges

Consumer credit risk amid a slowdown in employment in the United States and remittance flows to Mexico

In recent months, employment indicators in the United States have shown some signs of easing in the labor market,[5] which could affect the employment of Mexican migrants and, consequently, impact remittance flows to Mexico.[6]

A slowdown in the growth of remittances could impact the financial system, particularly in regions that are most reliant on these transfers. Analyses suggest that a reduction in remittances could result in a decline in retail deposits at banks within these areas.[7] On the asset side, a reduction in remittances could result in a decline in borrowers' income and their capacity to meet financial obligations. Empirical evidence indicates that this upward effect on non-performing loan ratios could be greater in segments such as personal loans, durables

[5] Non-farm job creation slowed down in the second quarter and then contracted further in July and August. However, in September, this indicator saw a notable expansion above expectations, with upward revisions to the previous two months. In October, this indicator demonstrated the slowest pace of growth since late 2020. Meanwhile, there has been an increase in unemployment insurance claims since April, with a spike in October due to disruptions caused by hurricanes. Additionally, job vacancies have declined since June, reaching their lowest level in September since January 2021. The unemployment rate increased from 3.8% in March to 4.3% in July, marking four consecutive periods of growth. In October, it stood at 4.1%.

[6] "*The impact of the US recession on immigrant remittances in Central America*" by Borja, K. (2012) reveals that significant disruptions in the *US* economy result in immediate and significant impact on remittances to El Salvador. In "*US Migrant Employment and Remittances to Central America: A Cointegration Approach. Financing the Family: Remittances to Central America in a Time of Crisis*" by Inchauste, G., and Stein, E. (2013), it is explained how remittance income is one of the channels of vulnerability to United States economic cycles.

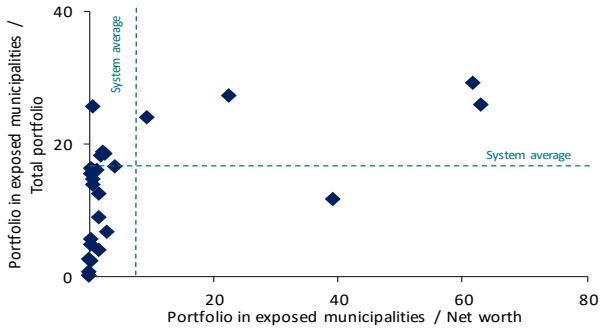
[7] In this regard, Box 3 of the June 2022 *Report* shows that remittances lead to an increase in bank deposits in the municipalities that receive them, particularly those of women.

goods financing (ABCD) and microcredit, where borrowers' income is more dependent on remittances. Additionally, according to the evidence, the impact could be greater for women, as they are the main recipients of these transfers.[8]

This section analyzes the extent to which Mexican commercial banks are exposed to a potential decline in remittance growth. To this end, the personal loan, ABCD and microcredit portfolios of each bank that are particularly vulnerable to this risk are identified.[9] This portfolio is defined as the credit granted by banks to the top tercile of municipalities with the highest dependence on remittances.[10]

The results suggest significant heterogeneity in banks' exposure to slower remittance growth. While the majority of banks have minimal exposure to this risk, a small group of financial intermediaries demonstrates elevated levels of exposure (Graph 26). These banks' exposure is high as a percentage of their net capital, and for a subset of them, it is also high as a percentage of their portfolio. Moreover, these financial intermediaries are small-and-medium-sized institutions. [11]

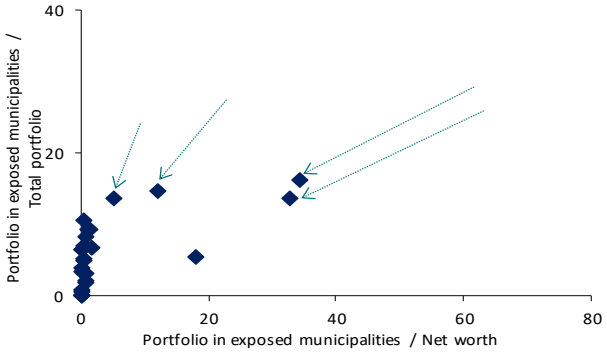
Graph 26
Exposure of consumer credit to a lower growth in remittances
Percent



Data as of June 2024.
Source: Banco de Mexico, CNBV and INEGI.

It is worth noting that the exposed banks have a portfolio with a high share of women, who are the primary recipients of remittances and, therefore, could be more adversely affected by a slowdown in their growth. However, a mitigating factor is that the exposure of these banks decreases significantly when a stricter criterion is applied to identify the municipalities that depend on remittances. In particular, when the exposed portfolio is defined as that granted to the quartile of municipalities most dependent on remittances, rather than the top tercile, the exposure decreases significantly, both as a percentage of net capital and as a percentage of the total portfolio (Graph 27).

Graph 27
Exposure of consumer credit to a lower growth in remittances: without municipalities less dependent
Percent



Data as of June 2024.
Source: Banco de Mexico, CNBV and INEGI.

Geopolitical uncertainty, trade tensions abroad and credit risk to companies

One of the current risks is that an intensification of trade tensions could affect trade and global economic growth. This could negatively impact the profitability of economic sectors with a higher percentage of their sales abroad, thereby increasing non-performing loan ratios in Mexico.

This section analyzes the exposure of the corporate portfolio to the risk derived from an escalation of trade tensions between systemic economies. The results are benchmarked against the analysis of global economic slowdown presented in the *Financial Stability Report* of June 2023.

[8] In "*Do Remittances Complement or Substitute for Consumer Credit? The Relevance of Heterogeneous Effects in the Mexican Context*" by Heres, D., Jaume, D., Tellez de la Vega, E., and Tobal, M. (2022) shows that remittances play a crucial role in preventing default in personal loans, ABCD and microcredits. This impact is particularly pronounced for women, who are the primary recipients of international transfers. In payroll and automotive loans, remittances facilitate an increase in current credit. In this regard, Cervantes, J. (2019) in "Remittances and the measurement of poverty in Mexico" notes that remittances are especially relevant when they are sent to the spouse or spouse and children, as in 84.6% of those cases, they represent the primary source of income.

[9] The Other Loans category is also considered, which encompasses any non-revolving consumer credit that falls outside the scope of the ABCD, Automotive, Microloans, Payroll and Personal loan categories.

[10] The regions most reliant on remittances are the third of municipalities that receive the highest proportion of remittances relative to the size of their banking system.

[11] These banks represent only 3.6% of the system's total assets.

The evidence suggests that exposure is moderate, with 16.1% of the total corporate portfolio exposed to risk, which is comparable to the data reported in June 2023 (16.4%).[12] Of this exposure, only a small portion, around a quarter, comes from credit granted to SMEs. This share, which represents 4.3% of the total corporate portfolio, is also similar to that of June 2023 (4.1%) and implies that the impact on the financial system could be limited if the risks materialize.

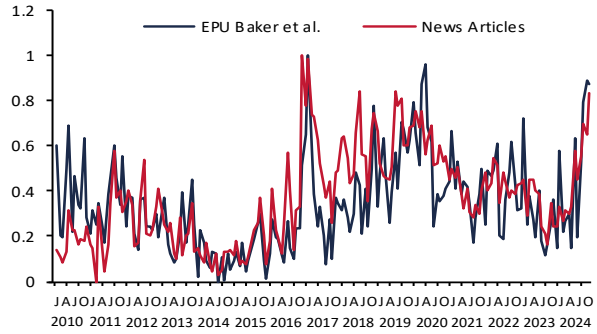
Evolution of Uncertainty

In the second half of 2024, the level of the timely Economic Policy Uncertainty Index, calculated using information from news *websites*, increased. In November, the index reached similar levels to those observed in late 2016 and early 2017, associated with the electoral process of those dates in the United States of America (Graph 28).

Graph 28

Economic Policy Uncertainty Index[1/]

Uncertainty level



Data as of November 2024.
Source: Banco de México.

1/ The methodology proposed by Baker et al. (2016), was used to calculate the Economic Policy Uncertainty Index based on publications from news *websites*. In particular, the aggregated number of news articles including terms related to uncertainty, policy, and economy, is calculated. This series is divided by the total number of news released in each period and then is rescaled between 0 and 1, based on January 2010 to November 2024 period. The articles considered are extracted from various newspaper *websites*, in sections related to economics, finance, markets and business: Capital México (Economía), Diario 24 horas (Negocios), EFE Noticias (México), El Economista (Economía, Finanzas, Mercados), El Financiero (Economía, Mercados), El Heraldo (Economía), El Sol De México (Finanzas), El Universal (Cartera), Excélsior (Economía, Mercados), Forbes México (Economía, Finanzas, Negocios), Reporte Índigo (Economía), La Crónica (Negocios), La Jornada (Economía), La Razón (Negocios), Milenio (Negocios), Reforma (Negocios) and SDP Noticias (Negocios).

During the period covered by this *Report*, among the main topics in the sources used that contributed to the level of the indicator, the following stand out at the international level: the negative economic impact of the armed conflicts in the Middle East and the electoral process in the United States. Locally, the main contributing factors include: a depreciation of the peso against the US dollar, a deterioration of the security perception in the country, as well as a reduction in economic growth expectations for Mexico.

[12] A portfolio is considered exposed if loans are granted to the subsectors that export the most relative to their GDP, namely those in the top 20% in terms of exports. This group represents the fifth of the subsectors with the highest proportion of exports, meaning they are more dependent on sales abroad and therefore more vulnerable to fluctuations in external demand.

Box 1: Identifying and Monitoring Risks and Vulnerabilities in the Mexican Financial System through Social Networks and News

I. Introduction

Central banks, financial authorities and international organizations, among others, have based their analysis of financial and economic conditions on econometric models calibrated with statistical data. The collection and processing of this data requires a significant operational effort, with potential delays in its publication ranging from weeks to months or even years.[1]

Recent years have been characterized by an unprecedented increase in the quantity, diversity and availability of data, both due to the popularization of the Internet as well as for the emergence of new communication channels, such as digital media and social networks. This rise in data has occurred concurrently and has fostered the development of technology, software and analytical tools designed to process data (from more diverse and less standardized sources and formats), in greater volume and less time.[2]

In particular, text data published on the internet, in news articles and social networks, constitute a useful source of information to analyze the channels and dynamics of information transmission and population expectations regarding specific topics, as well as to identify possible sources of risk.

This Box presents a selection of projects developed by Banco de México which exploit unstructured data sources,[3] primarily text, and which implement Machine Learning (ML) and Artificial Intelligence (AI) methodologies, in order to optimize the identification and monitoring of relevant events that could impact the country's financial stability. In particular, Natural Language Processing (NLP) methodologies are employed to capitalize on data extracted from news *websites* and *X* (formerly *Twitter*), which allow the calculation of high-frequency indicators in a timely manner.

Specifically, the Economic Policy Uncertainty (EPU) Index and some of its variants, and the Banking Risk Index are described. These indexes are constructed based on a variety of sources of information and are constantly updated in response to the speed with which information changes. On the one hand, the EPU index aims to identify and monitor factors that could have a negative impact on the stability and economic expectations in Mexico, with origin and possible impact on any of its sectors. On the other hand, the Banking Risk Index focuses on the specific monitoring of the banking sector, in order to identify early signals of potential risks or vulnerabilities that could affect the stability of the sector or the financial system as a whole.

II. Background

Methods for analyzing unstructured data are not new and cover a wide range of tools and applications. For example, Baker et al. (2016) proposes the creation of the EPU index to exploit the frequency of publication of news related to uncertainty, policy and economics. Similarly, Cookson et al. (2023) analyzes the role of social networks during the period of bank runs in 2023, taking as reference information published in *X*. On the other hand, through the Ellipse Project, the Bank for International Settlements (BIS) develops an early warning system that involves the monitoring and analysis of unstructured data sources, including news, to identify risks and vulnerabilities that could affect financial institutions.

In general terms, NLP techniques allow the analysis of the semantic relationship of the text, by detecting lexical patterns, in order to extract useful information.

III. Economic Policy Uncertainty Index and its refinements

As a starting point, Banco de México has developed methodologies based on the construction of

[1] *BIS* (2022a).

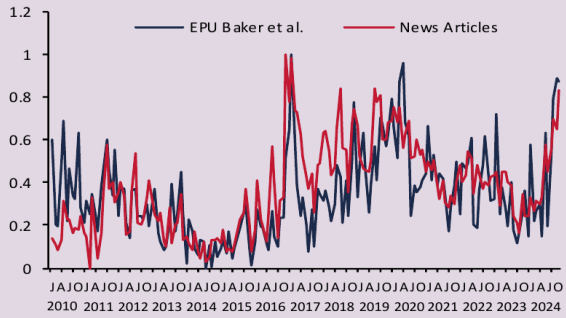
[2] Particularly in recent years, the use of Artificial Intelligence (AI) has become more widespread, through a variety of methods, with different objectives and levels of complexity.

[3] Structured data has a standardized format that allows both software and humans to easily access and exploit this data. These are usually tabular formats, with rows and columns that clearly define the attributes of the data. In contrast, unstructured data is data that does not have predefined model or order, and requires more complex analysis tools; examples include text files, video, images, etc.

dictionaries of key terms. For example, dictionaries were built to analyze the sentiment of public documents, such as the Financial Stability Report, or to develop new versions of its own EPU indexes.[4]

From the first half of 2024, this *Report* includes the update of an EPU index calculated using news from newspaper *websites*,[5] which represents the proportion of news related to economic policy uncertainty with respect to the sum of the total published news; values are then normalized between 0 and 1 to facilitate its interpretation (Graph 1).

Graph 1
Economic Policy Uncertainty Index
Uncertainty level



Data as of November 2024.
Source: Banco de México.

The EPU index can, in turn, be decomposed to analyze how local uncertainty responds to levels of uncertainty in other developed and emerging countries, or to idiosyncratic factors.

To capture more information, the content of the dictionaries has been extended by identifying similar terms based on the *Word2Vec* model,[6] which represents the words in a vector space, by training a neural network, taking into account the context in which they appear, with the aim of extending the coverage of the dictionaries and increasing the generalization of the results.[7]

It is also possible to identify the main topics associated with uncertainty. This is done by implementing unsupervised techniques for clustered segmentation of text datasets, identifying the main topics to which each text belongs. For example, the Latent Dirchlet Allocation (LDA) algorithm[8] can be used in the analysis of news related to specific topics (e.g., elections in other jurisdictions, international trade, etc.) in order to identify, associated to those specific topics, relevant topics for Mexico. Another example is the use of the BERTopic model,[9] which can be used to the disaggregate and identify the uncertainty factors that influence the level of the EPU index, with the advantage that it incorporates a large scale language model, allowing the representation of the text as a whole to contextualize the data.[10] Using the BERTopic model, Banco de México has developed methodologies to obtain an automated classification of the news that constitute the EPU index, optimizing the detection of the determinants of uncertainty in Mexico.

IV. Banking Risk Index

Given the relevance of the banking sector for the soundness of the financial system as a whole, the Banking Risk Index focuses on monitoring such sector.[11]

The objective of this index is to monitor the perception of risk among professionals in relation to the banking sector by analyzing publications in *X* (*X*-posts), given the popularity of this social network among the media, professionals in the sector, and the general public. This is achieved through sentiment

[4] Starting with the *Report* published in June 2020, Banco de México monitors the level of economic policy uncertainty by updating its own EPU indexes, which are constructed using information from *X*, as well as news *websites.*

[5] *Web scraping* techniques were used to extract news content from the *websites* of various newspapers, in sections related to economics, finance, markets and business. For the list of sources, see Section III. Update on challenges of the economic environment, Evolution of uncertainty, in this *Report*.

[6] Mikolov et al., (2013).

[7] For the construction of the EPU index, both the original reference dictionaries and their extensions focus on Spanish terms, since the data sources correspond to national newspapers.

[8] LDA is a generative model for modelling topics in a set of texts. Starting from the calculation of the frequency of words in each document, it infers the probability that each word in the vocabulary and each item in the dataset belongs to a particular group, assigning each item according to the highest probability of belonging (Blei et al., 2003).

[9] The BERT (Bidirectional Encoder Representations from Transformers) architecture allows to directly obtain the vector representation not only of words but also of documents. BERTopic includes the Sentence-BERT model (Reimers and Gurevych, 2020), a retraining of the BERT model that improves the quality of text vectorization and significantly reduces the processing time for similarity calculation and news classification tasks. This model is calibrated for text processing in different languages, including Spanish.

[10] Grootendorst (2022).

[11] Based on the work of Rho et al. (2021).

analysis of the content of the *X*-posts, according to three different methodologies.

Data

To calculate the index, a list of verified accounts belonging to national and foreign newspapers, press and television agencies, and rating agencies is compiled,[12] and the *X*-posts published in these accounts are extracted. Only those *X*-posts that contain the name of a bank or mention the terms "banco(a)" or "bancario(a)" are retained. The text is then cleaned and lemmatized,[13] and the banks are anonymized.

Methodology

The calculation of the Banking Risk Index is based on the classification of *X*-posts, according to the polarity of their content, using an algorithm based on the voting of three different classifiers:

- Dictionary. Constructed by Banco de México, based on the work of Loughran and McDonald (2016).
- B4MSA (Baseline for Multilingual Sentiment Analysis). It is a multilingual sentiment classifier based on a Support Vector Machine (SVM) model for classification.
- ULMFiT (Universal Language Model Fine-Tuning for Text Classification). It is based on a neural network trained for financial text classification.

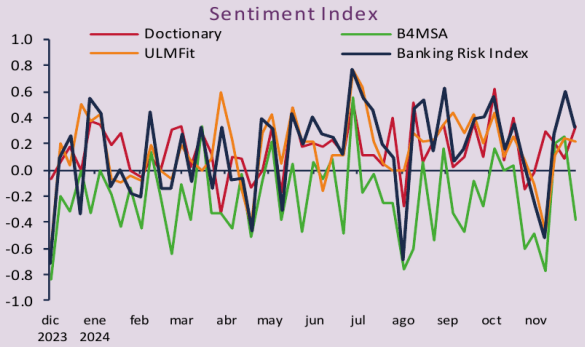
Each model assigns one of three possible scores: -1 (positive polarity), 1 (negative) and zero (neutral). The final ranking for each *X*-post is obtained as the mode of the individual scores, assigning a neutral sentiment if not determined.

Finally, the Banking Risk Index is calculated as the weekly average of the final ranking of the *X*-posts obtained based on the three classifiers, with values oscillating in the interval $[-1,1]$, maintaining a direct relationship between the index and the risk perception.

Results

According to the index, during the period covered by this *Report*, the level of stress in commercial banks remained mostly at a level slightly above the historical average (Graph 2).

Graph 2
Weekly Banking Risk Index



Data as of December 1st, 2024.
Source: Banco de México.

The main factors contributing to the level of the index are also identified. On the upside: digital service failures at some institutions, service disruptions due to the hurricane season, increased political uncertainty, and the risk of a downgrade in Mexico's credit rating. On the downside: positive earnings results, particularly in digital banking, and the inclusion of new entrants in the sector.[14]

V. Final Considerations

Social networks and digital media are becoming increasingly important as channels for the dissemination of information continue to expand. These media channels act as information amplifiers, making information available to millions of people in

[12] In line with Rho et al. (2021), specific accounts were selected to base the analysis on reliable sources that could have an influence on the public's perception of the banking sector. In particular:

- National newspapers: @eleconomista, @Reforma, @reformanegocios, @Milenio, @lajornadaonline, @Excelsior, @elsolde_mexico, @El_Universal_Mx, @diario24horas, @LaRazon_mx, @CapitalMexico, @Reporte_Indigo, @heraldodemexico, @lacronicadehoy, @sdpnoticias.
- Foreign newspapers: @el_pais, @elpais_america, @Forbes_es, @Forbes_Mexico).
- Press and television agencies: @AP_Noticias, @AFPespanol, @XHespanol, @EFEMexico, television @bbcmundo.
- Rating agencies: @MoodysLatAm, @FitchLatAm.

[13] Lemmatization is the technique of assigning to each word in a sentence its lemma, i.e., the canonical form under which it would be found in a dictionary.

[14] During the week from November 25 to December 1st, the indicator associated with the Dictionary methodology shows a divergence from the Banking Risk Index. This is due to the fact that, in certain cases, the presence of terms with a negative polarity leads to the assignment of *X*-posts to this category, as opposed to the sentiment conveyed by the text as a whole. This highlights an advantage of the voting algorithm, which aims to strengthen the model and increase the accuracy of the results.

a matter of seconds. On the one hand, this is an opportunity for the timely identification of potential risk sources. On the other hand, such dissemination capacity represents a source of risk, as it could amplify or trigger reactions in the markets and the public in general. Therefore, it is important for authorities to constantly monitor the trending topics related to the financial system and the way in which changes in information may anticipate or trigger events that may have an impact on financial stability.

In addition, while it is recognized that this type of information sources offer benefits, such as greater availability and frequency of data updates, it is also important to highlight the possibility of interruptions or difficulties in accessing the platforms in question, for which it would be advisable to include contingency measures for any eventuality.[15] Banco de México is constantly evaluating how to make use of new technologies and methodologies to optimally exploit high-frequency data in order to identify vulnerabilities and threats to the country's financial stability in a timely manner. Examples of this are the EPU index and the Banking Risk Index, which complement each other and allow for the monitoring of risks in the financial system. In particular, according to the literature, the increase in economic uncertainty could directly influence the risk perception and behavior of the banking sector (Wu et al., 2020), which highlights the importance of analyzing both indicators together. This in turn would allow for further studies, such as the analysis of the impact of uncertainty on banks' risk appetite and lending, as well as on expectations regarding asset impairment due to the increased probability of debtor default.

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Mikolov, T., Chen, K., Corrado, G. & J. Dean (2013): "*Efficient Estimation of Word Representations in Vector Space*", September 2013.

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[15] For example, during 2023, difficulties were experienced in updating the EPU index prepared with information from *X*, due to changes in the platform subscription schemes and the availability of downloading tools. Therefore, as a contingency measure, an alternative EPU index was created using information from the news portals, which is being published in this *Report* as of the first semester of 2024. This measure makes up-to-date information available, reducing dependence on a specific data provider. In addition, if an alternative data source is not available, it is possible to calibrate *ML* and AI models to obtain robust estimates for periods when not all the information is available, based on historical information and other auxiliary variables.

Yerushalmy, J. (2023): "*'The First Twitter-Fuelled Bank Run': How Social Media Compounded SVB's Collapse*", The Guardian, March 2023.

Reimers, N. & I. Gurevych (2020), "*Making Monolingual Sentence Embeddings Multilingual using Knowledge Distillation*". Technische Universität Darmstadt, October 2020.

Wu, J., Yao Y., Chen, M. & B. Jeon (2020): "*Economic uncertainty and bank risk: Evidence from emerging economies*", Journal of International Financial Markets, Institutions & Money, vol. 68, August 2020.

III. 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 improve the regulatory framework, which include the adoption of best practices and international standards, in order to keep it robust and up to date. Against this backdrop, the financial authorities carried out the following regulatory changes in the areas of credit and market risk, derivatives markets and sustainable finance.

Regulation under the aegis of Banco de México

In order to facilitate the orderly transition to the use of reference rates determined on the basis of transactions actually carried out, Banco de México established certain exceptions to the restrictions that will come into force in January 2025 for the use of the 28-day domestic currency Interbank Equilibrium Interest Rate (TIIE, its acronym in Spanish) as the underlying for certain new derivative transactions. Thus, the following transactions may continue to use the 28-day TIIE as the underlying asset:[13]

- Swaps or standardized derivative transactions undertaken before January 1, 2026, maturing at or before December 31, 2025.
- Swaps that are referenced to 28-day TIIE, on one side of the transaction, and the Interbank Equilibrium Interest Rate with a term of one banking business day, known as TIIE *de Fondeo*, on the other side, undertaken before January 1, 2026, with any maturity date.

In accordance with the amendments to the Investment Funds Law published in 2023, which incorporated hedge funds into the legal framework, Banco de México will make several amendments to its regulations to provide, within the scope of its powers, the regulatory elements applicable to the transactions carried out by such participants. In particular, the regulation regarding repurchase transactions that came into force as of December 16 of this year.[14] Likewise, securities lending transactions[15] and derivative transactions[16] must be subject to the provisions issued by Banco de México for such purpose. These amendments will address the implementation of the regulatory framework for hedge funds, in accordance with the deadlines established in the amendments to the Investment Funds Law mentioned above.[17]

Following the public consultation on the amendment to Circular 4/2012 made in May of this year and in response to the recommendations of the Financial Stability Board (FSB), Banco de México has clarified the regulatory framework under which financial institutions may exchange information on derivative transactions with foreign trade repositories (TR) recognized by the Bank itself. [18]

Regulation under the aegis of other authorities

As of December 2024, the *CNBV* made amendments to the Single Banking Rulebook (CUB, its acronym in Spanish) to:

1. Strengthen the internal control of banking institutions by incorporating observable behaviors such as impersonating or usurping the user's identity, stealing personal data and financial information of the user, among others, for fraud management in their management, prevention, detection and timely response plans. Thus, the banking system is obliged to monitor on such conducts.[19]
2. Regulate the figure of technology-based commission agents, who may offer to the general public, whether banked or not, some banking services and products through digital access channels. Authentication factors and systems were implemented to guarantee the security of the transfer of information, specifying the responsibility of the commission agent over the use of the information and additionally facilitating the authorization and supervision of these operational processes to

[13] Circular 9/2024 of Banco de México, published in the Official Gazette of the Federation on June 7, 2024.

[14] Circular 13/2024 of Banco de México, published in the Official Gazette of the Federation on November 14, 2024.

[15] Banxico consultation draft: "Securities lending rules", closed on October 02, 2024.

[16] Banxico consultation project: "Circular 4/2012", closed on October 4, 2024.

[17] Hedge funds are considered highly relevant in the repurchase, securities lending and derivative transaction markets at the international level, since they use these types of transactions to obtain financing for their investment strategies. The inclusion of these new funds is intended to incentivize the development and depth of the Mexican stock market by generating new investment options for institutional or qualified investors.

[18] Circular 11/2024 of Banco de México, published in the Official Gazette of the Federation on October 11, 2024.

[19] RESOLUTION amending the General Provisions applicable to credit institutions, published in the Official Gazette of the Federation on June 14, 2024.

give legal certainty to the operations carried out through the technology-based commission agents.[20]

3. Incorporate in the capital requirement for operational risk under the business indicator method:[21]

    a. various income statement's concepts, such as the result from valuation of financial instruments at fair value, the result from valuation of foreign currencies and the result from valuation of coined precious metals.

    b. the procedure for calculating the aforementioned requirement in cases of mergers, spin-offs, as well as those arising as new credit institutions and regulated multiple purpose financial companies with equity links to credit institutions, and when there is no prior information of 36 months to determine such calculation (August 2024).

4. Increase the limit established for monetary transactions made through mobile payment, when any public entity or individual makes payments of contributions to accounts of the Treasury of the Federation, as well as eliminate the requirement to register such account when users make transfers using mobile banking or Internet banking. This facilitates the payment of contributions to the Treasury of the Federation, as these are means of payment that allow electronic transfers to be made more efficiently, securely and in real time.[22]

As of December 2024, the following amendments were made to the Credit Institutions Law (LIC, its acronym in Spanish) to:

1. Establish an annual term to perform the Performance Evaluation of the Commercial Banking Institutions, being the object of such evaluation the institutions that have at least one year of operation at the end of the year to be evaluated. Additionally, the possible ratings are clarified; namely: satisfactory result, satisfactory result with observations, or unsatisfactory result.[23]

2. Modify structural aspects of the regime for the prevention of operations with resources of illicit origin and financing of terrorism (AML/CFT); in particular regarding its compliance manual; the risk assessment methodology; the risk classification model of its clients and users; automated systems, and training.[24]

Following the reforms to the Securities Market Law (LMV, its acronym in Spanish) and the Investment Funds Law published in December 2023,[25] the National Commission for the Pension System (CONSAR, its acronym in Spanish) included the figure of "Simplified Issuer" to the investment regime of *siefores*. This inclusion seeks to expand the opportunity for diversification of the portfolios managed by such investment companies. This incorporation will be effective until the *CNBV* issues the applicable general provisions and the corresponding amendments are made to the general financial provisions of the Retirement Savings Systems (SAR, its acronym in Spanish).[26]

Regulation in CONAMER

As a result of the implementation of the Simplified Securities Registration framework in the National Securities Registry, the *CNBV* is working on a project to establish: the guidelines that must be complied with by legal entities that request and maintain the simplified

[20] RESOLUTION amending the General Provisions applicable to credit institutions, published in the Official Gazette of the Federation on July 11, 2024.

[21] RESOLUTION amending the General Provisions applicable to credit institutions, published in the Official Gazette of the Federation on August 14, 2024.

[22] RESOLUTION amending the General Provisions applicable to credit institutions, published in the Official Gazette of the Federation on August 29, 2024.

[23] RESOLUTION amending the Law of Credit Institutions, published in the Official Gazette of the Federation on July 4, 2024.

[24] RESOLUTION amending, adding and repealing several of the general provisions referred to in Article 115 of the Law of Credit Institutions, published in the Official Gazette of the Federation on August 28, 2024.

[25] For further details see Box 1 of the Financial Stability Report of June 2024.

[26] Amendments and Additions to the General Provisions that establish the investment regime to which the Specialized Investment Companies of Retirement Funds shall be subject, published in the Official Gazette of the Federation on October 25, 2024.

registration of securities; the type of securities subject to a simplified issue, the amount per issue and the accumulated amount; as well as the rules for the participation of broker-dealers and stock exchanges in the simplified registration; among other elements that will allow the development of simplified issues.[27]

IV. Risks of the Financial System

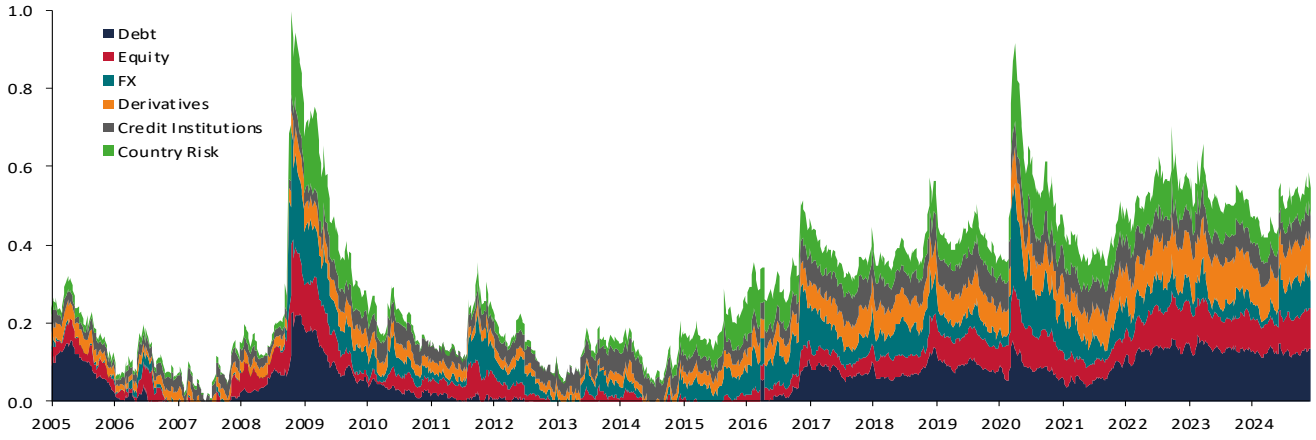
IV.1. Aggregate Risk Indicators

As of December 6, the Financial Market Stress Index (IEMF, its acronym in Spanish) increased slightly and remains at elevated levels since the last *Report*.[28] At the beginning of August, the indicator experienced a spike mainly associated with the increase in the reference rate by the Central Bank of Japan, which had a global effect. Furthermore, the indicator was affected by other idiosyncratic and geopolitical factors. Specifically, the increase in the Financial Market Stress Index is mainly explained by the increase in the volatility of variables related to the equity market and those used to measure country risk. However, although the index showed a decrease during the first half of October, it subsequently spiked due to greater stress in the debt, foreign exchange and equity markets as a result of the electoral process in the US (Graph 29).

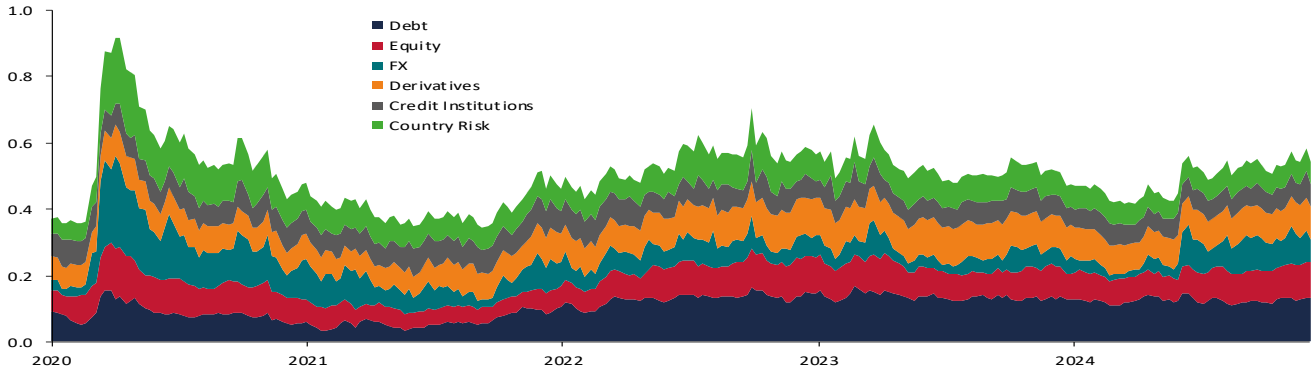
Graph 29

The Financial Market Stress Index [1/]

a) Stress level 2005-2024



b) Stress level 2020-2024



Data as of December 6, 2024.
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, equity 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.

On the other hand, since the last *Report* the financial stress index of emerging countries has decreased, while

[27] Proposed general provisions applicable to simplified issuers and securities subject to simplified registration, published by CONAMER on September 9.

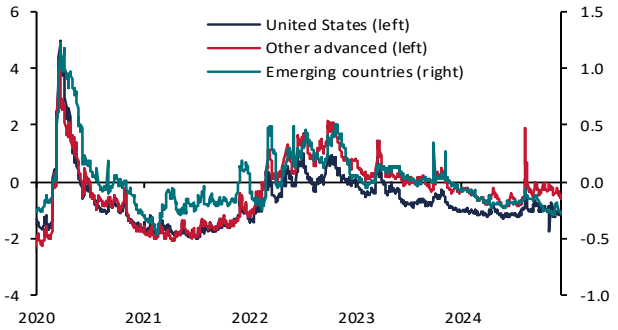
[28] For more detail on the methodology and variables used, see Box 2 of the September 2013 *Report on the Financial System*, pp. 27, available here.

the indices for the US and other advanced countries have increased. Nonetheless, all of them remain below their historical average (Graph).

Graph 30

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

No unit



Data as of December 6, 2024.

Source: Office of Financial Research (OFR).

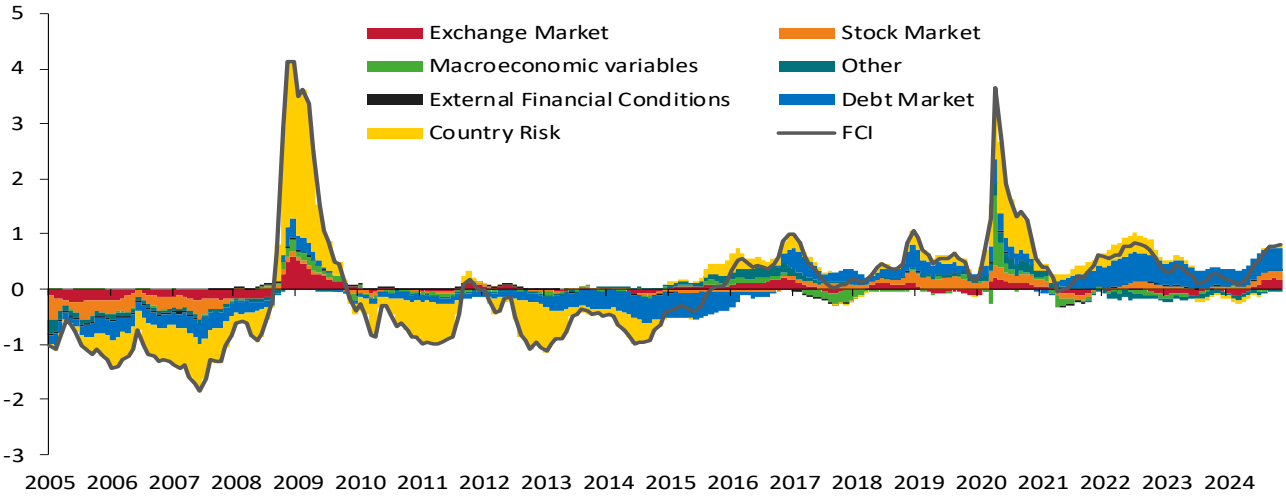
1/ The Financial Stress Index is a daily market-based snapshot of stress in global financial markets. The FSI shows stress contributions by three regions: United States, other advanced economies and emerging markets.

Mexico's financial conditions, as measured by the Financial Conditions Index (ICF, its acronym in Spanish), tightened in November since the last *Report* and remain in the tightening zone. The index reached a level not seen since two years ago, and is primarily explained by the behavior of variables related to the foreign exchange market and country risk (Graph 31). In contrast, the September financial conditions indexes published by the IMF for various countries[29] indicate that financial conditions in advanced and emerging countries remained within the easing zone, although in some regions they experienced slight tightened.

Graph 31

Financial Conditions Index[1/,2/]

Standard deviations



Data as of November 2024.

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.

[29] See IMF Global Financial Stability Report, October 2024, chapter 1, available here.

Regarding the main results of the Systemic Risk Perception Survey,[30,31] the results are described below. Regarding the main sources of risk to the financial system, the most frequently mentioned external financial risks are inflation higher than expected, and deterioration global economic growth outlook. Regarding internal financial risks, the deterioration of the sovereign credit rating is the most mentioned risk, followed by the deterioration of the domestic economic growth outlook. Finally, for non-financial risks, the most mentioned were cybersecurity and IT risks, and political, geopolitical and social risks (Table 1).

Table 1

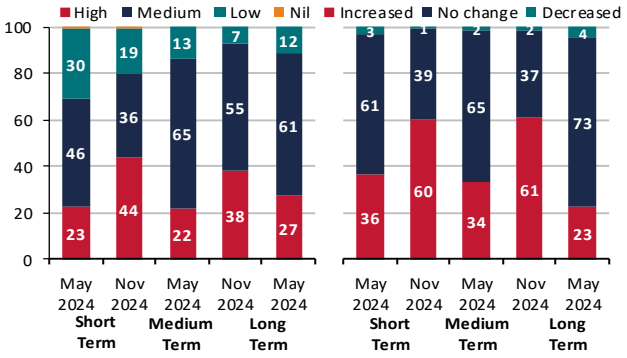
Main sources of financial system risks Percent of total institutions		
	November 2024[1/]	May 2024[2/]
External financial risks		
Inflation higher than expected	78	88
Deterioration of global economic growth outlook	74	73
Disorderly changes in foreign interest rates	64	64
Volatility in commodity prices	57	66
Deterioration of foreign market conditions*	53	61
Domestic financial risks		
Deterioration of sovereign credit rating	70	63
Deterioration of the domestic economic growth outlook	70	71
Deterioration of public finances	65	73
Inflation higher than expected	63	77
Fiscal, financial and economic policies	45	55
Non-financial risks		
Cybersecurity and IT risks	90	81
Political, geopolitical and social risks	88	94
Climate risk	78	73
Violence and insecurity	77	67
Deterioration of the rule of law and impunity	65	49

1/ In the last survey 110 institutions participated.
2/ In the previous survey 113 institutions participated.
* Exchange rate volatility, depreciation and lack of liquidity.

In the section of the survey addressing the probability of the occurrence of an event affecting financial stability in the short-, medium- and long-term (0 to 6 months, 6 to 12 months, 1 year or more, respectively)[32] the following is highlighted (Graph 32):

- Compared to the previous six-month period, the proportion of institutions that consider the probability of the event occurring to be high increased for all terms.
- Compared to the previous six-month period, the proportion of institutions that consider that the probability of the occurrence of said event increased significantly for all terms.

Graph 32
Probability of occurrence of a Systemic Event
Percentage of responses [1/]



Source: Banco de México.
1/ Certain figures may not add up to 100% due to rounding up.

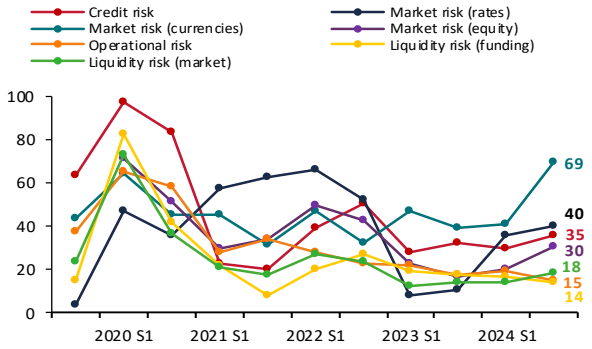
In relation to expectations for the next six months, market risks (foreign exchange, equity and rates), credit and market liquidity are expected to increase, while operational and funding liquidity risk is expected to decrease (Graph 33).

[30] The survey is conducted by Banco de México among risk management directors of several financial institutions. This semester was conducted from October 31 to November 22, 2024. For more information see Box 6 "Semiannual Systemic Risk Perception Survey", from the Financial Stability Report, December 2019.

[31] The survey consists of a series of questions grouped into four blocks: i) main sources of financial (internal 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 132 financial institutions (afores, insurance companies, commercial banks, development banks, broker-dealers and investment funds).

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

Graph 33
Expectations regarding the evolution of risks in the following six months [1/]
Percent

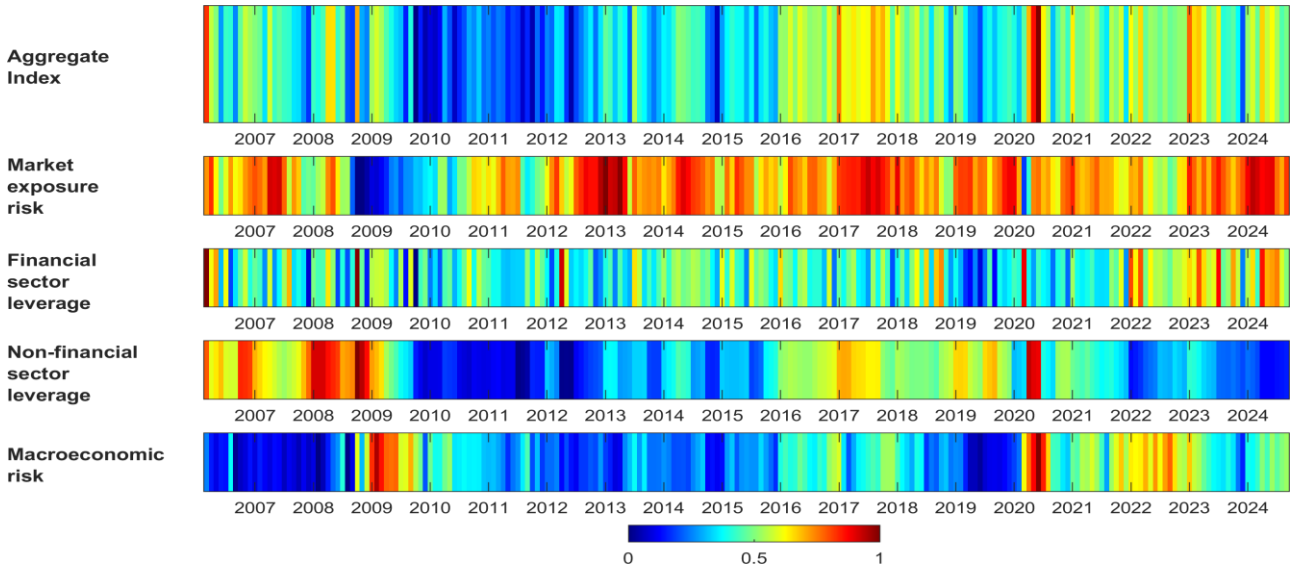


Data as of November 2024.
Source: Banco de México.
1/ The chart shows the difference between the percent of institutions that expect the risk increase and the institutions that expect the risk decrease.

observed in the previous *Report*; however, it showed higher levels during the intervening months. This behavior was mainly driven by an increase in credit concentration within the *financial sector leverage* category. On the one hand, risks related to market exposure and non-financial sector leverage decreased. In contrast, macroeconomic risks increased, reflecting the depreciation of the exchange rate and heightened uncertainty of economic policy (Graph 34).

The aggregate risk of the financial system, as illustrated in the heat map, remained at a similar level to that

Graph 34
Mexican Financial System Risks Heat Maps [1/ 2/]



Data as of September 2024.
Source: Banco de México.
1/ Refer to Box 3 for a description of the methodology: Mexican Financial System Risks Heat Maps, 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.

Macrofinancial Vulnerabilities Index

Early warning indicators are tools frequently used by national authorities and international organizations, such as the FSB and the IMF, to detect macrofinancial vulnerabilities.[33] These indicators assist in identifying areas of fragility in an economy that, in the event of

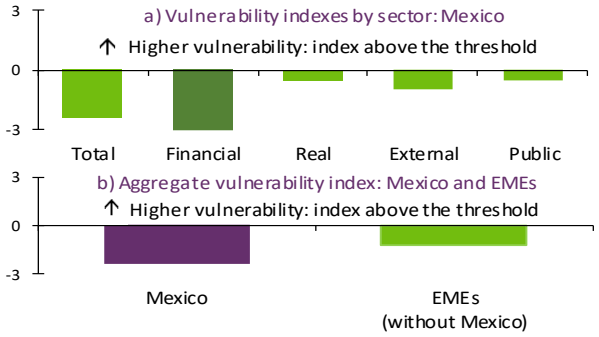
[33] See IMF Methodological Manual (2012). *Strategy, Policy, and Review Department. The IMF-FSB Early Warning Exercise: Design and Methodological Toolkit* of the International Monetary Fund (IMF). Macrofinancial crises are considered to be: abrupt capital outflows, financial stress, and abrupt fiscal adjustments. The 2012 IMF Methodological Toolkit definitions are used for abrupt capital outflows and abrupt fiscal adjustments, while the 2012 Laeven and Valencia definitions are used for financial stress.

adverse economic conditions, could potentially precipitate a macrofinancial crisis.

Early warning indicators for the Mexican economy are calculated across four sectors: financial, real, external and public.[34] The values of these indicators remain below their respective thresholds in all four sectors, indicating that no substantial vulnerabilities are currently identified using this methodology (Graph 35).

Graph 35

Macrofinancial vulnerability indexes [1/]



Source: Banco de Mexico, Haver Analytics, IMF (*World Economic Outlook* and *Financial Soundness Indicators*). The group of emerging economies includes Brazil, Colombia, the Philippines, Indonesia, South Africa, Thailand and Türkiye.
1/ / The index equal to 0 implies the vulnerability threshold has been reached. Negative values imply less vulnerability, while positive values indicate higher vulnerability.

In comparison to the previous *Report*, the external sector has shown an improvement. This is due to the fact that, according to the IMF's World Economic Outlook, the current account deficit is now projected to be smaller at the end of 2024 than it was in April.[35] The anticipated decline in import growth in Mexico is the primary factor contributing to this reduction in the deficit. The public and real sectors show a slight deterioration due to the downward revision of forecasts for fiscal revenue growth and economic activity at the end of 2024.

In terms of the financial sector, the indicators show a slight deterioration compared with the previous *Report*. However, they continue to exhibit values that indicate high levels of solvency and liquidity. Specifically, the four variables considered, the capital adequacy ratio (CAR), the non-performing loan ratio (NPLR), the ratio of return on assets (ROA), and the deposit-to-loan ratio show values that are well below their respective thresholds.

The indicators for the four sectors are combined to create an aggregate indicator that reflects the overall vulnerability of the Mexican economy. This indicator shows that Mexico faces fewer vulnerabilities than other emerging economies.

When interpreting the indicators, it is important to consider that crises rarely originate from a single sector. Instead, they often result from a combination of vulnerabilities within the economy and external shocks. The probability of a crisis depends on both internal vulnerabilities within the economy and the magnitude of the external shock.

IV.2. Credit to Households, Private Non/Financial Sector, and Public Sector

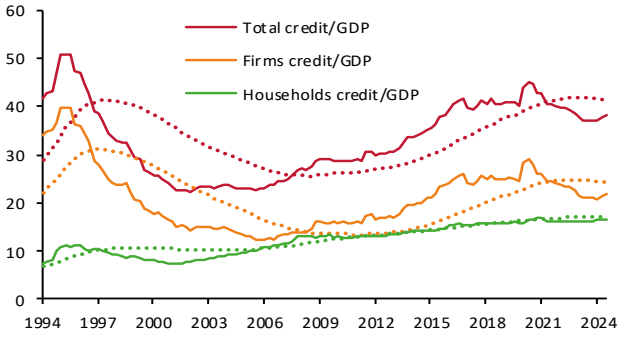
The credit-to-GDP gap has remained negative the last three and a half years; however, it narrowed by 1.3 percentage points of GDP since the previous edition of this Report (Graph 36b). Despite this increase, the credit-to-GDP ratio remains at a level similar to that of 2015, and the credit-to-GDP gap is comparable to levels seen in 2006 (Graph 36a).

Graph 36

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

a) Share of GDP

Percent

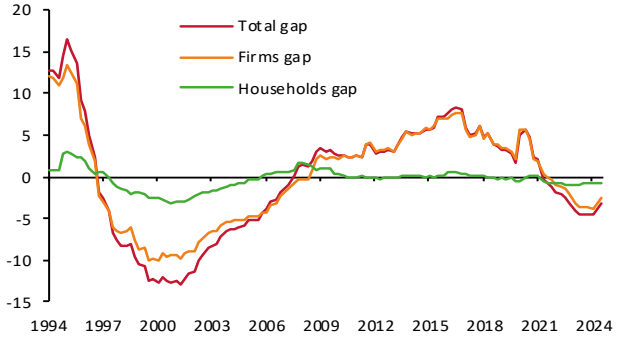


[34] The analysis employs eleven variables as indicators for emerging economies, utilizing the latest available data: current account balance, reserve coverage, export growth, real effective exchange rate, fiscal balance, change in public revenues, Capitalization Adequacy Ratio (CAR), Return on Assets (ROA), non-performing loan ratio (IMOR), loan-to-deposit ratio and real GDP growth. The aggregated indicators are obtained by averaging, in a weighted manner, the distance of each indicator from a specified threshold, with consideration given to the relative importance of each indicator in the crisis prediction.

[35] The variable used to construct the indicator is the expected current account balance as a percentage of GDP.

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

Percent



Data as of September 2024

Source: Banco de México

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

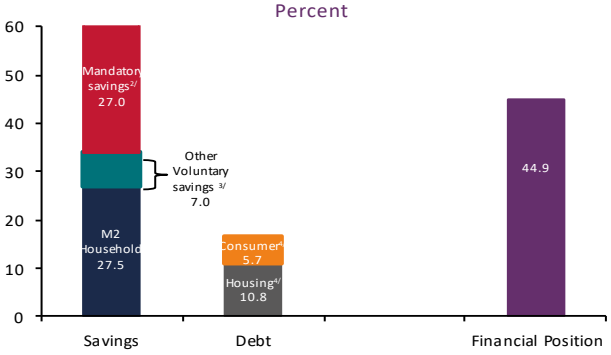
Credit granted to households increased compared to the previous semester. This is mostly due to a rise in mandatory savings and, to a lesser extent, to growth in M2 holdings (Graph 37a). Savings reached a historic high, surpassing levels recorded during the pandemic (Graph 37b).

Graph 37

Households financial position [1/]

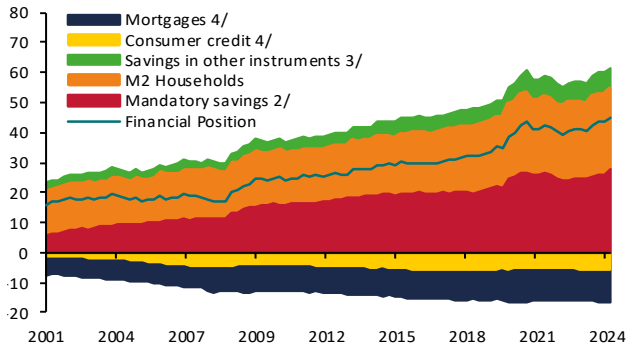
a) Share of GDP

Percent



b) Share of GDP

Percent



Data as of September 2024

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.

In September, total financing to the Mexican economy increased in real annual terms and reached 97% of GDP, of which 57% corresponds to the public sector, 25% to non-financial companies and the rest to households (consumption and housing). Financing to the public sector showed significant growth, explained by the issuance of local and international debt. Total financing granted to the non-financial private sector also increased, mainly that to consumers and non-financial companies (Table 2).

Table 2

Total Financing to Non-Financial Sectors of the Mexican Economy						
a) Figures at September 2024						
	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
				3Q24 vs 3Q23	3Q24 vs 3Q22	
Public sector [1/]	**18,896**	**100**	**55.0**	**11.2**	**1.8**	**75.1**
Securities	**16,215**	**85.8**	**47.2**	**13.3**	**4.2**	**78.9**
Issued in Mexico	12,796	67.7	37.3	13.4	11.3	100.0
Issued abroad	3,418	18.1	10.0	13.0 [4.8]	-16.1 [1.2]	0.0
Bank credit	**1,523**	**8.1**	**4.4**	**-0.7**	**-4.3**	**4.4**
Commercial bank	131	0.7	0.4	0.6	30.0	52
Development bank	1,125	6.0	3.3	-1.9	-1.9	92
Foreign banks	267	1.4	0.8	4.3 [-3.3]	-22.8 [-7]	0.0
Other [2/]	**1,159**	**6.1**	**3.4**	**0.5**	**-15.2**	**41.2**
Private sector	**12,652**		**36.8**	**5.4**	**-0.8**	**77.5**
Non-financial companies	**7,067**	**100**	**20.6**	**6.3**	**-5.3**	**59.8**
Securities	**2,218**	**31.4**	**6.5**	**5.3**	**-12.7**	**36.1**
Issued in Mexico	768	10.9	2.2	9.8	12.6	98.3
Issued abroad	1,450	20.5	4.2	3.1 [-4.4]	-21.5 [-5.4]	3.2
Bank credit	**4,612**	**65.3**	**13.4**	**7.0**	**-2.1**	**72.5**
Commercial bank [3/]	3,484	49.3	10.1	6.3	3.1	74.2
Development bank	510	7.2	1.5	7.8	-4.1	60.4
Foreign credit [4/]	618	8.7	1.8	10.5 [2.5]	-23.1 [-7.4]	0.0
Other [5/]	**237**	**3.4**	**0.7**	**2.6**	**12.5**	**96**
Households	**5,585**	**100**	**16.3**	**4.3**	**5.4**	**100**
Consumer credit	**1,967**	**35.2**	**5.7**	**10.1**	**13.5**	**100**
Commercial bank [3/]	1,656	29.7	4.8	12.5	13.8	100
Development bank	47	0.8	0.1	-0.6	-2.5	100
Other [5/]	**263**	**4.7**	**0.8**	**-1.2**	**15.4**	**100**
Mortgages	**3,618**	**64.8**	**10.5**	**1.4**	**1.8**	**100**
Commercial bank	1,431	25.6	4.2	2.9	5.1	100
Development bank	11	0.2	0.0	-8.7	-7.3	100
Other [6/]	**2,176**	**39.0**	**6.3**	**0.5**	**-0.1**	**100**
Memo: Non-regulated financial entities that grant financing by destination sector [7/]	**1,777**	**100**	**5.2**	**5.8**	**-0.5**	**92.8**
Non-financial companies	1,276	71.8	3.7	3.8	-4.1	91.4
Consumer credit	459	25.8	1.3	11.8	14.1	98.7
Mortgages	21	1.2	0.1	17.2	6.5	100.0
Public Sector	21	1.2	0.1	-2.9	-23.2	41.2
Memo: Crowfunding financing [8/]	1.0	n.d.	0.0	7.1	51.0	n.d.
TOTAL	**33,326**		**97.0**	**8.7**	**0.6**	**76.9**

Data as of September 2024.

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

Note: in order to use comparable data in annual growth figures, they exclude loans from non-regulated entities for which data is not available, as they are in debt restructuring or liquidation processes.

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. As a source of financing, includes those granted by 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.

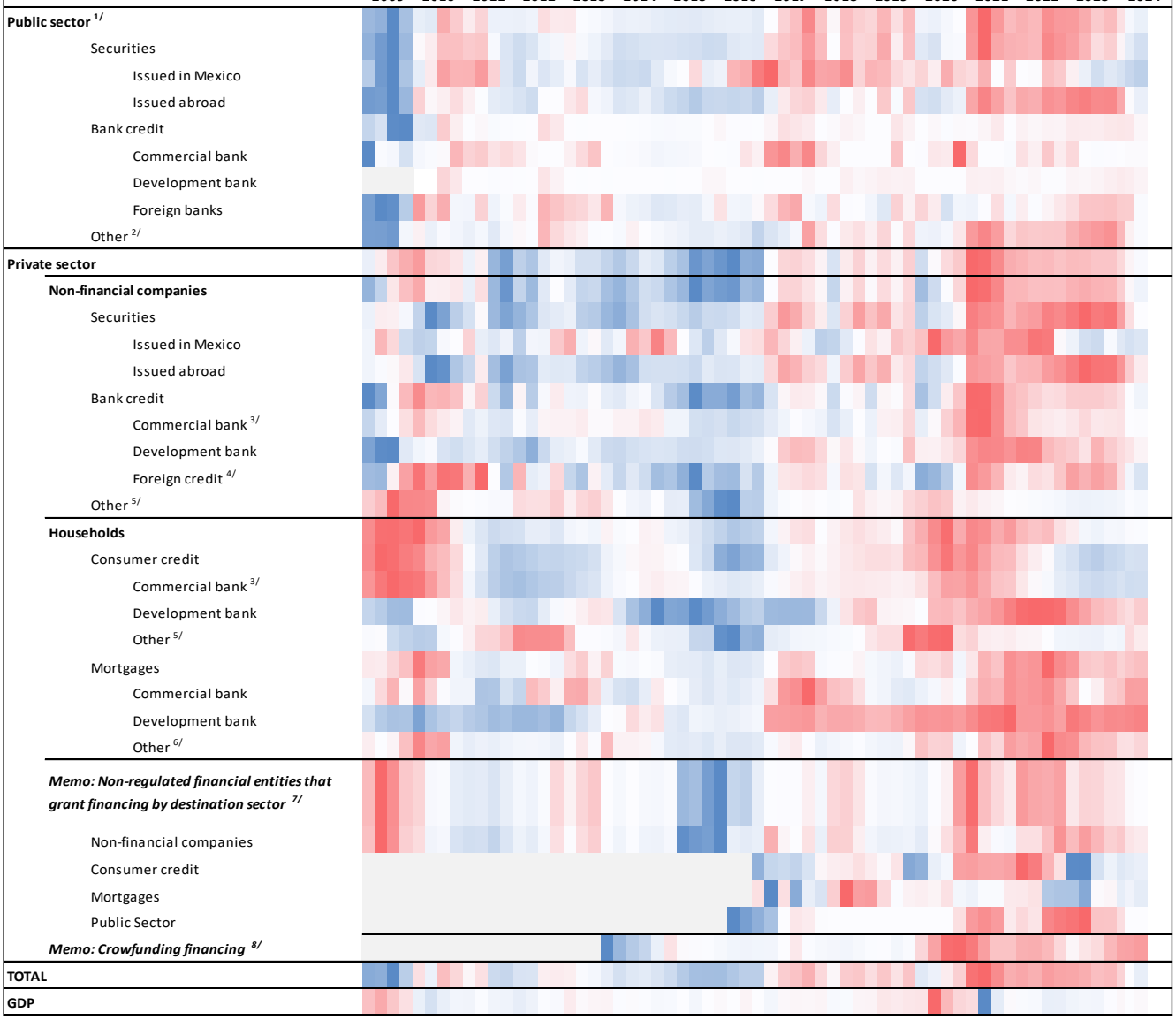
6/ Includes financing granted by the Infonavit, the Fovissste, as well as by regulated non-banking entities.

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). A new and preliminary time series for non-regulated sofomes is now shown from June 2023 onwards due to corrections made by entities in their data submisions.

8/ Includes flow of financing granted by regulated crowfunding institutions over the last two quarters.

Total Financing to Non-Financial Sectors of the Mexican Economy

b) Historical figures: percentil of the distribution of the real annual percent change



Data as of September 2024.

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 Sep 24, with the exception of those shown in gray, whose history is not available. In addition, in order to use comparable data in annual growth figures, they exclude loans from non-regulated entities for which data is not available, as they are in debt restructuring or liquidation processes.

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. As a source of financing, includes those granted by 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). A new and preliminary time series for non-regulated sofomes is now shown from June 2023 onwards due to corrections made by entities in their data submisions.

8/ Includes flow of financing granted by regulated crowfunding institutions over the last two quarters.

IV.2.1. Households

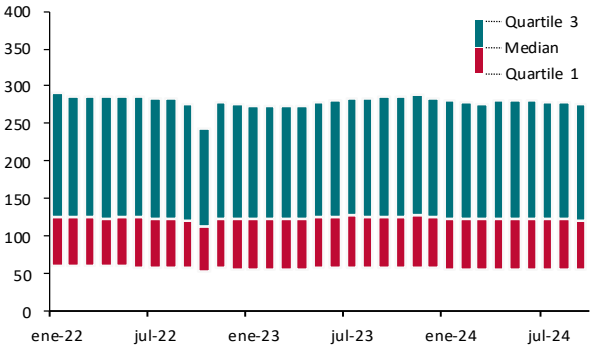
Borrowers' total debt balances, at constant prices, have remained at the same levels in the last two quarters (Graph 38a). Likewise, leverage, which is measured as the proportion of monthly income allocated to debt repayment, remained at similar levels in September 2024 to those prevailing a year earlier. However, leverage is higher among borrowers with lower incomes than that of borrowers with higher incomes.[36] (Graph 38a and Graph 38b).[37]

Graph 38

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 September 2024.

Source: Credit Bureau.

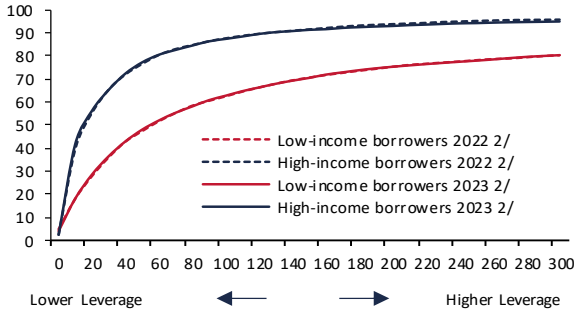
1/ Estimate using information from a sample of Credit Bureau files.

2/ Constant prices (September 2024 base).

b) Monthly payments to monthly income ratio 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 September 2024.

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

Although total consumption financing showed significant annual growth in real terms, the increase was lower than in the previous *Report*. The financing granted by commercial banks and their related sofomes showed a slight increase in dynamism, while the growth of financing granted by the non-bank sector slowed. Particularly, financing granted through department stores credit cards and auto loans granted by non-bank brokers lost dynamism (Graph 39).

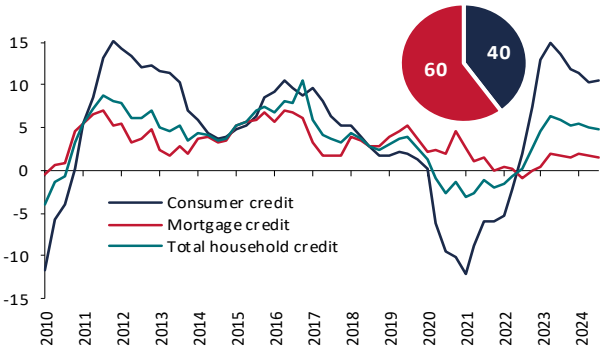
[36] Income is obtained from disaggregated regulatory reports on mortgage loans and consumer loans, provided by the *CNBV* and Banco de México, respectively. To separate borrowers with higher incomes from those with lower incomes, a threshold of 20,000 pesos was used, which approximates the median monthly income of the sampled files.

[37] Balances and leverage were estimated with a panel sample of the total number of files registered in 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 their balances and due payments with sample sizes close to 5,000, 16,000 and 19,000 observations for loans associated with mortgage loans, auto loans, personal loans and credit cards, respectively. Ninety-six percent of bank loans are granted by banks that report to the credit bureau.

Graph 39

Household credit growth [1/]

Real annual percent change



Data as of September 2024.

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, we exclude non-regulated entities figures for which

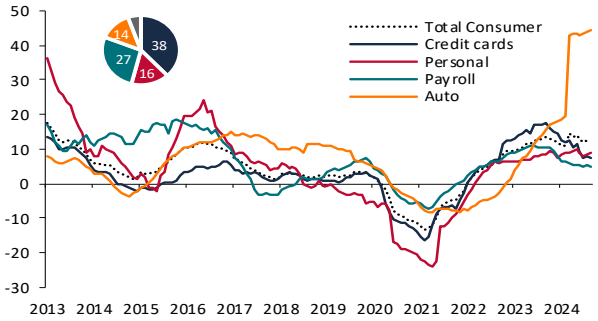
1/ Includes the loan portfolio of commercial banks and regulated non-bank entities such as regulated sofomes, socaps, sofipos and credit unions, as well as non-bank non-regulated entities such as non-regulated sofomes and debt-issuing financial companies such as financial leasing companies or financial 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). A new and preliminary time series for non-regulated sofomes is now shown from June 2023 onwards due to corrections made by entities in their data submisions.

During the second and third quarters of 2024, consumer credit granted by banks and their related multi-purpose financial institutions (sofomes) continued to increase. However, the portfolio growth rate of both segments with the highest participation (credit cards and payroll credit portfolio) was slower. Likewise, as in the previous Report, the real annual growth rate of personal loans remained relatively stable at the same levels, while that of the automotive portfolio increased (Graph 40).[38]

Graph 40

Consumption portfolio of the banking system [1/]

Real annual change in percent



Data as of September 2024.

Source: CNBV.

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

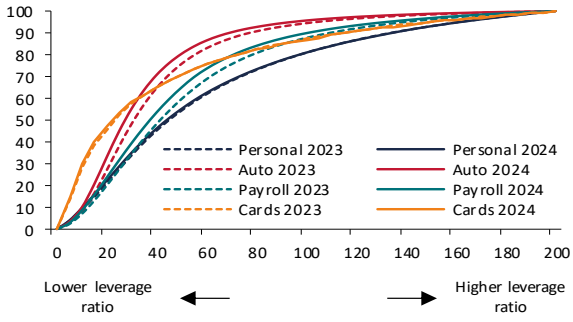
The financial burden of commercial banks' borrowers with consumer credit[39] registered at August 2024 shifted downwards from the levels seen on August 2023 in the payroll and auto loan portfolio. In the case of credit cards and personal loans, the financial burden remained at similar levels during said period (Graph 41).

Graph 41

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 August 2024

Source: Banco de México

The non-performing loan ratio (NPL ratio) of the consumer credit portfolio of commercial banks and their related sofomes remained at relatively low[40] and stable levels. However, it showed certain heterogeneity in the trend of its different segments, while there was a downward trend for payroll credit and personal loans, due to the growth of its performing portfolio, there

[38] The substantial increase in the annual growth of the automotive portfolio in March 2024 was due to the recent acquisition of a sofom's portfolio by a banking institution (noted in last semester's *Report*).

[39] The financial burden is measured as the proportion of income that goes to cover the payment due on all loans that an individual has registered with credit bureaus. This analysis is performed using the income information available in the regulatory reports for revolving and non-revolving consumer bank loans.

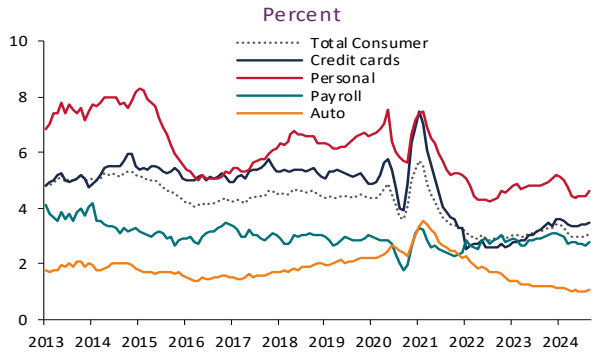
[40] Both the NPL ratio and the Adjusted NPL ratio for the consumer portfolio as of September 2024 are within the first quartile of the historical series since 2000 and 2006, respectively.

were no significant changes in the level of credit cards and the auto loan portfolio. In the case of credit cards, when considering write offs within the NPL ratio (Adjusted NPL ratio), the deterioration of the portfolio continues, both at the system level and in most banks, making it the consumer portfolio segment with the highest Adjusted NPL ratio (Graph 42a and Graph 42b).

Graph 42

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

a) Non-performing loan ratio

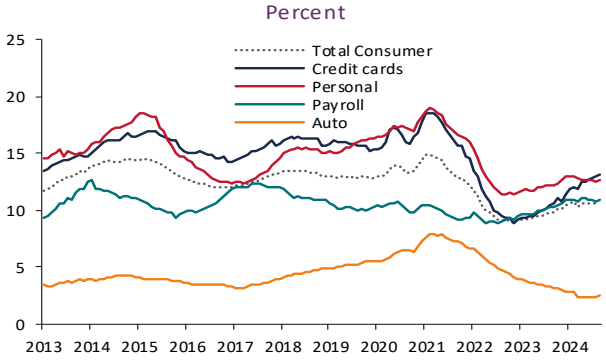


Data as of September 2024.

Source: CNBV.

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

b) Adjusted non-performing loan ratio



Data as of September 2024.

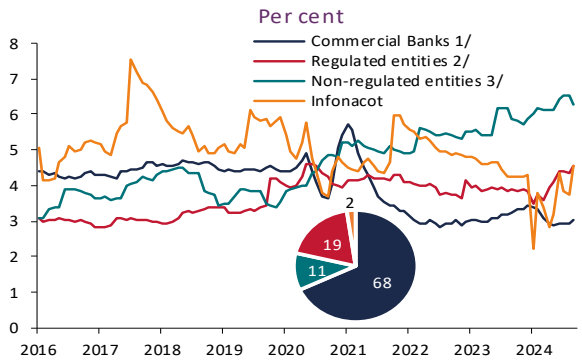
Source: CNBV.

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

The non-performing loan ratio of the consumer loan portfolio granted by non-banking financial intermediaries and the National Fund for Employee Consumption (Infonacot, its acronym in Spanish), as a whole, increased slightly since the last *Report*. The increase is explained by a higher non-performing loan portfolio balance in both regulated and non-regulated entities, as well as that of *Infonacot* (Graph 43).

Graph 43

Non-Performing Loan Ratio of Consumer Portfolio



Data as of September 2024.

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

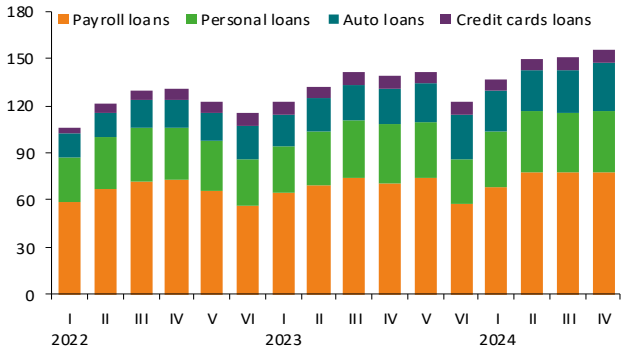
1/ Includes the loan portfolio of regulated sofomes having an equity linked with a bank, whether subsidiaries of the latter or not.

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. A new and preliminary time series for non-regulated sofomes is now shown from June 2023 onwards due to corrections made by entities in their data submisions.

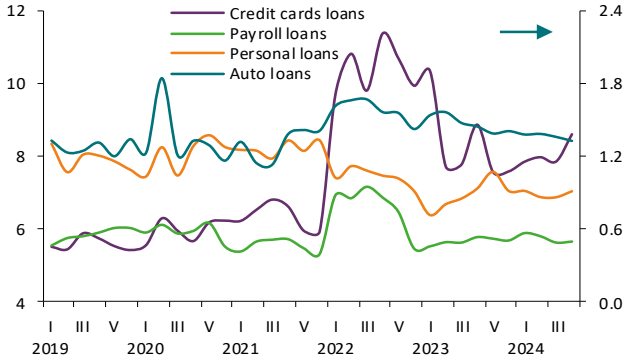
In the first eight months of 2024, there was an increase compared to the same period of 2023 in newly originated consumer loans, in particular personal and payroll loans (Graph 44). Against this backdrop, the slowdown in the Mexican economy that occurred between October 2023 and June 2024 does not seem to have had a significant negative impact on the characteristics of individuals who applied for new loans during the current year, as the probability of default for newly originated loans other than credit cards remained relatively stable. On the other hand, although the probability of default on revolving loans showed a spike in the fourth two-month period of 2024, it is still at moderate levels (Graph 45).

Graph 44
Newly originated consumer loans [1/]
Billions of pesos



Data as of fourth two-month period 2024.
Source: Banco de México.
1/ Includes banks loans and linked sofomes loans.

Graph 45
Probability of regulatory default for newly originated consumer loans [1/]
Percentage



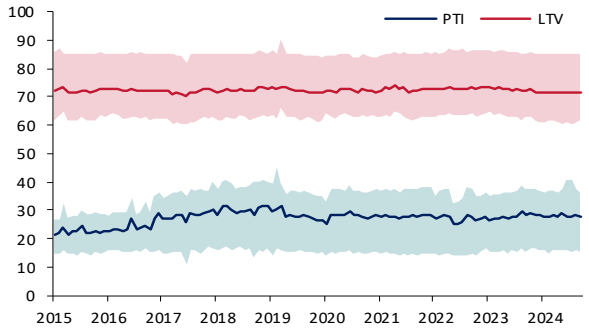
Data as of fourth two-month period 2024.
Source: Banco de México.
1/ Includes banks loans and linked sofomes loans.

Mortgage Loans

In September, total financing for housing showed slight growth, less than that recorded in the previous *Report*. By type of lender, commercial banks and their related sofomes, as well as *Fovissste*, showed lower growth than in March. On the one hand, the housing portfolio of the Institute of the National Fund for Workers' Housing *(Infonavit,* its acronym in Spanish*)* registered a slight spike due to higher loan origination activity during 2024 (Graph 39).

As for newly granted bank mortgage loans, during the second and third quarters of 2024, both the ratio of loan amount to the value of the property (LTV) and the proportion of income allocated to the mortgage payment (PTI) remained at relatively the same levels, both for the system and for most banks, so that the levels of loan down payments and the borrowers' financial burden allocated to the mortgage payment in the new mortgages remained stable (Graph 46).

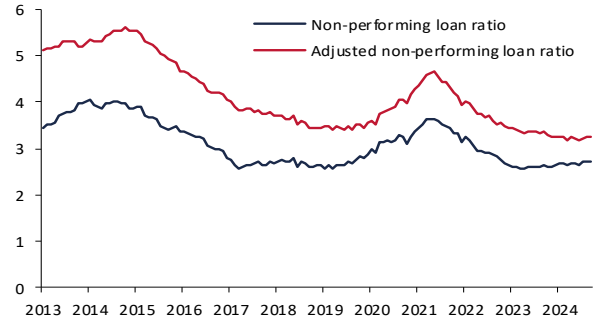
Graph 46
Loan-To-Value (LTV) and Payment-To-Income (PTI) of Mortgage Loans [1/, 2/]
Percent



Data as of September 2024.
Source: CNBV.
1/ Recently-granted commercial bank mortgage loans.
2/ The shaded area represents the interquantile range of the respective metric.

During the second and third quarters of 2024, the non-performing loan ratio of the bank mortgage loans portfolio was at historically low levels, which are largely explained by the decrease in default in recent years, although it maintained its upward trend (Graph 47).

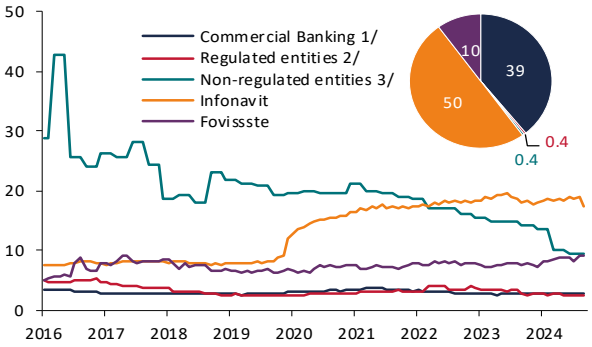
Graph 47
Non-performing loan ratio and adjusted non-performing loan ratio [1/]
Percent



Data as of September 2024.
Source: CNBV.
1/ Total commercial bank mortgage loans.

The non-performing loan ratio of *Infonavit*'s housing portfolio decreased due to a reduction in its portfolio and, to a lesser extent, growth in its performing portfolio. On the other hand, *Fovissste*'s housing portfolio non-performing loan ratio increased, due to a rise in its non-performing loan portfolio, and is at a high level in relation to its previous performance (Graph 48).

Graph 48
Non-Performing Loan Ratio of Mortgage Portfolio
Per cent



Data as of September 2024.

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.

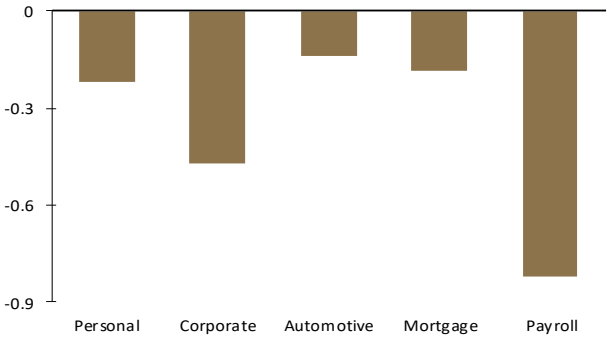
2/ Includes the credit portfolios of the development bank and of non-banking regulated financial intermediaries, such socaps, sofipos and sofomes regulated for issuing debt.

3/ Includes credit portfolio of non-regulated sofomes and financial corporations. A new and preliminary time series for non-regulated sofomes is now shown from June 2023 onwards due to corrections made by entities in their data submisions.

Breakdown of change in non-performing loan ratios and gender

According to international evidence, women tend to face greater difficulties in accessing credit than men.[41] However, those who overcome these difficulties and obtain financing exhibit a lower-risk profile and lower non-performing loan ratios under similar credit conditions (Graph 49). Consequently, this section analyzes the annual variation in non-performing loan ratios across different portfolios, distinguishing between women and men in the performance of this analysis.[42]

Graph 49
Difference between the delinquency rate of women and men according to the credit portfolio
Percentage points



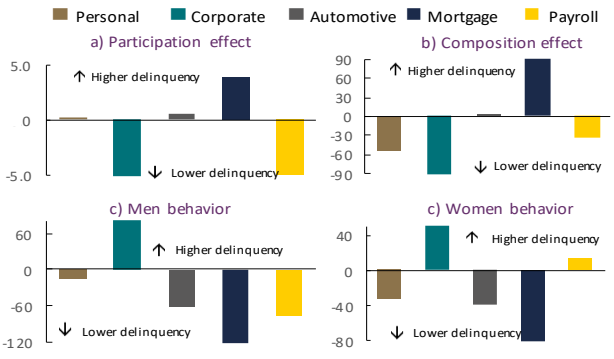
Source: Banco de Mexico.
Note: June 2023 information.

The annual variation in non-performing loan ratios is broken down into three components: 1) increases in the participation of women in a loan portfolio. Women exhibit lower non-performing loan ratios than men, and therefore, their greater participation reduces the overall non-performing loan ratio of a portfolio (participation effect); 2) changes in the non-performing loan ratios of women and men between the beginning and the end of the period, where the share of each gender in each portfolio remains constant (behavior effect); and 3) differences in financing conditions that affect non-performing loan ratios, regardless of the gender of the borrower (composition effect).

[41] Box 3 "Gender gap in credit: widening or narrowing with uncertainty?" of the June 2024 *Financial Stability Report* delves deeper into this question. Moreover, academic studies support this conclusion. For example, Buvinic and Berger (1990) demonstrate that women have less access to credit due to structural and social barriers. Mascia and Rossi (2017) illustrate that women encounter greater difficulties in accessing bank credit for SMEs in Europe. Ongena and Popov (2016) point out that women entrepreneurs have lower credit approval rates. See also Demirgüç-Kunt et al (2013).

[42] In corporate credit, individuals engaged in entrepreneurial activities, for whom gender can be identified, are taken into consideration.

Graph 50
Change in credit delinquency distinguishing between men and women
Percentage



Source: Banco de Mexico.

Note: Difference in non-performing loan ratios between June 2023 and June 2024. Negative values imply downward pressure on delinquency.

With regard to the participation effect, the presence of women increased in two of the five portfolios analyzed, contributing to a reduction in their non-performing loan ratios (Graph 50a). In other words, one more portfolio with an increase in female participation than in the previous *Report*. One of these portfolios is the payroll portfolio, which continues to demonstrate an upward trajectory in female participation. The other portfolio is the corporate portfolio, which, despite the increase, remains the one with the lowest female participation. Both the corporate credit portfolio and the payroll credit portfolio exhibit the most pronounced disparity in non-performing loan ratios between women and men, indicating that it is in these portfolios where an expansion in female participation yields the most substantial reductions in non-performing loan ratios (Graph 49).

Conversely, the three portfolios in which women's participation decreased are personal, mortgage and automotive loans, which contributed to an increase in their non-performing loan ratios. This is despite the fact that women exhibit lower non-performing loan ratios than men for loans with similar levels of amount, rate, and term. Consequently, increasing the presence of women in personal loans, automotive loans and mortgage represents a challenge going forward.

The behavior effect had a differentiated impact among portfolios. In general, the effect contributed to a reduction in non-performing loan ratios, with the exception of corporate loans. In this category of credit, the behavior effect contributed to an increase in non-performing loan ratios for both women and men, potentially reflecting the slowdown in economic activity (Graph 50c). Meanwhile, the composition effect increased non-performing loan ratio in the mortgage and automotive portfolios, but reduced it in personal and corporate portfolios, as observed in the previous *Report* (Graph 50b). However, in this instance, this effect contributed to a reduction in the payroll non-performing loan ratio, reflecting the lower financing costs associated with this type of credit.

IV.2.2. Private Non-Financial Companies

Total financing to the country's private non-financial companies increased in real annual terms with respect to the previous *Report*. By type of source, the external component now shows sixteen consecutive quarters of contraction, which is explained by both lower foreign bank credit and lower international debt issuance by companies. On the other hand, domestic financing registered growth in its three main sources: bank credit, non-bank credit and debt issuance. In addition, their growth rates were high compared to those observed over the last eight years (Graph 51).

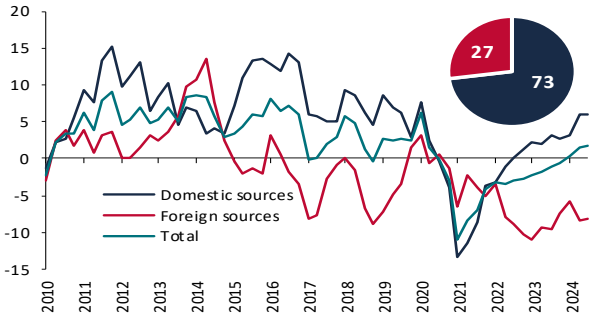
In particular, the placement of local debt by the companies shows significant dynamism: the proceeds from new issues have not been used to refinance local debt, so that the outstanding balance of debt has increased. The maturity structure of the companies' debt for 2024 and 2025 gives them some leeway since, with data as of September 2024, 25% of the local debt outstanding matures in those years, while for international debt this percentage barely reaches 3%.

On the other hand, as of January 1st, 2025, issuers will no longer be able to use the 28-day TIIE as a reference rate and instead will have to adopt the 1-day TIIE funding rate. However, its adoption as a reference rate is still low: only thirteen issues use it out of 3,406 placed since the reference rate started to be calculated and published (March 2022).

Graph 51

Total financing to Private Non-Financial Companies [1/]

Real annual percentage change



Data as of September 2024.

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, figures exclude non-regulated entities for which data stock echange is not available as they are in debt restructuring or liquidation processes.

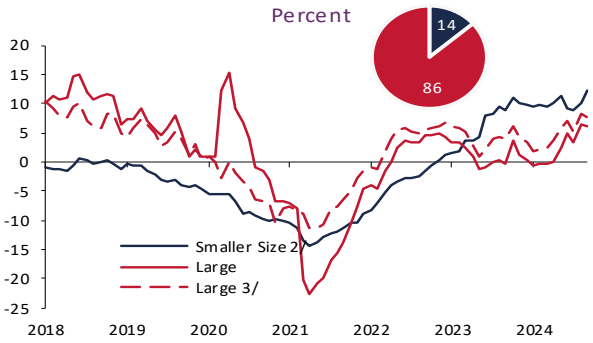
1/ Includes the loan portfolio of commercial banks and regulated non-bank entities such as regulated sofomes, socaps, sofipos and credit unions, ase well as non-bank non-regulated entities such as non-regulated sofomes and debt-issuing financial companies such as financial leasing companies or financial 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. A new and preliminary time series for non-regulated sofomes is now shown from June 2023 onwards due to corrections made by entities in their data submisions.

The country's banks are the main providers of financing to companies. During the period covered by this *Report*, the bank loan portfolio grew at a higher annual rate, explained by the increase in the portfolio of large companies, particularly notable during the third quarter of the year. An important part of this growth is explained by the effect of the exchange rate on the portfolio in US dollars (Graph 52).

Graph 52

Real annual portfolio growth by company size [1/]

Percent



Data as of September 2024.

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.

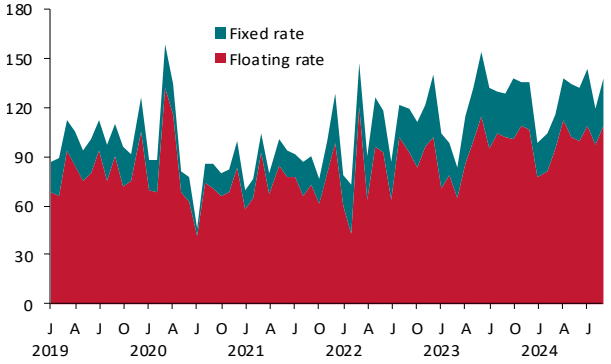
In a context in which the Mexican economy registered lower growth rates at the beginning of 2024, lending to private non-financial companies increased during the first nine months of this year. In particular, both large companies and the rest of the companies increased their newly originated loans (Graph 53).

Graph 53

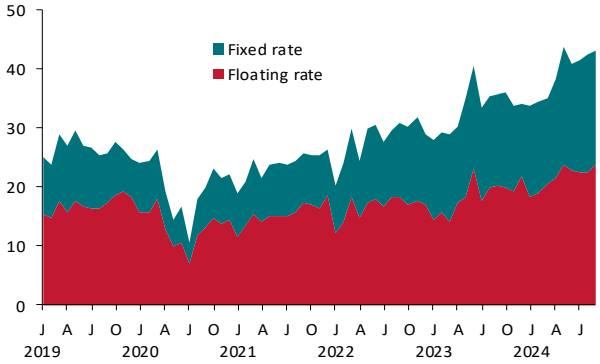
Newly originated companies loans by interest rate type [1/]

Billions of pesos

a) Large companies



b) Other companies



Data as of September 2024.

Source: CNBV.

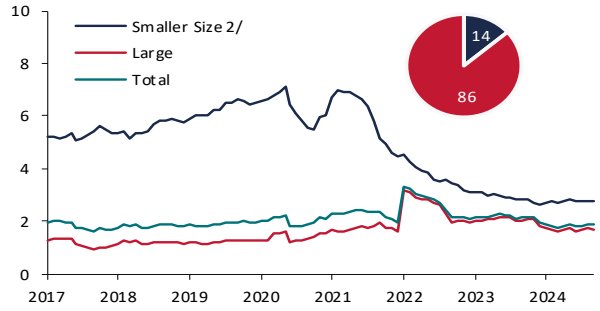
1/ Includes banks loans and linked sofomes loans.

The non-performing loan ratio for credit granted by commercial banks to companies remained at stable levels during the period of this *Report*, behavior that replicates that observed in the non-performing loan ratio of large companies; in smaller companies, the non-performing loan ratio continued with the marginal increase that began in the first quarter of 2024, due to the increase in their non-performing portfolio (Graph 54).

Graph 54

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

Percent



Data as of September 2024.

Source: CNBV.

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

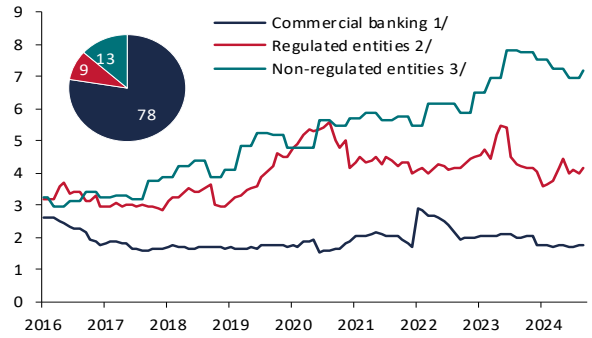
2/ Private-non-financial companies not listed on the Mexican Stock Exchange with maximum historical loans less than 100 million Mexican pesos.

The non-performing loan ratio of the portfolio granted by non-regulated non-bank financial intermediaries to companies decreased with respect to the previous *Report*; while the non-performing loan ratio of regulated non-bank intermediaries slightly increased (Graph 55

Graph 55

Non-Performing Ratio of Corporate Loans Portfolio

Per cent



Data as of September 2024.

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).

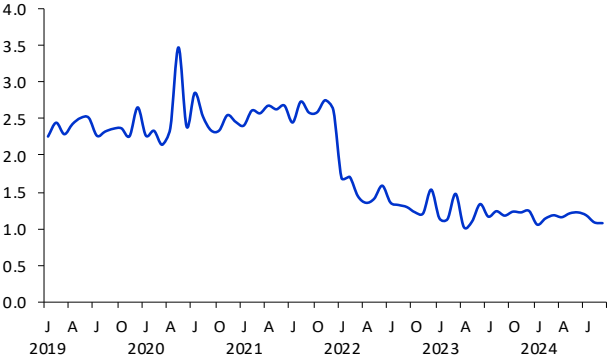
3/ Includes credit portfolio of non-regulated sofomes and debt-issuing financial companies, such as financial leasing companies or financial arms of automotive companies.

Likewise, newly originated loans granted to private non-financial companies presented limited levels of risk, since their probability of default has shown stable levels during 2024 (Graph 56).

Graph 56

Probability of default for loans granted to private companies [1/]

Percentage



Data as of September 2024.

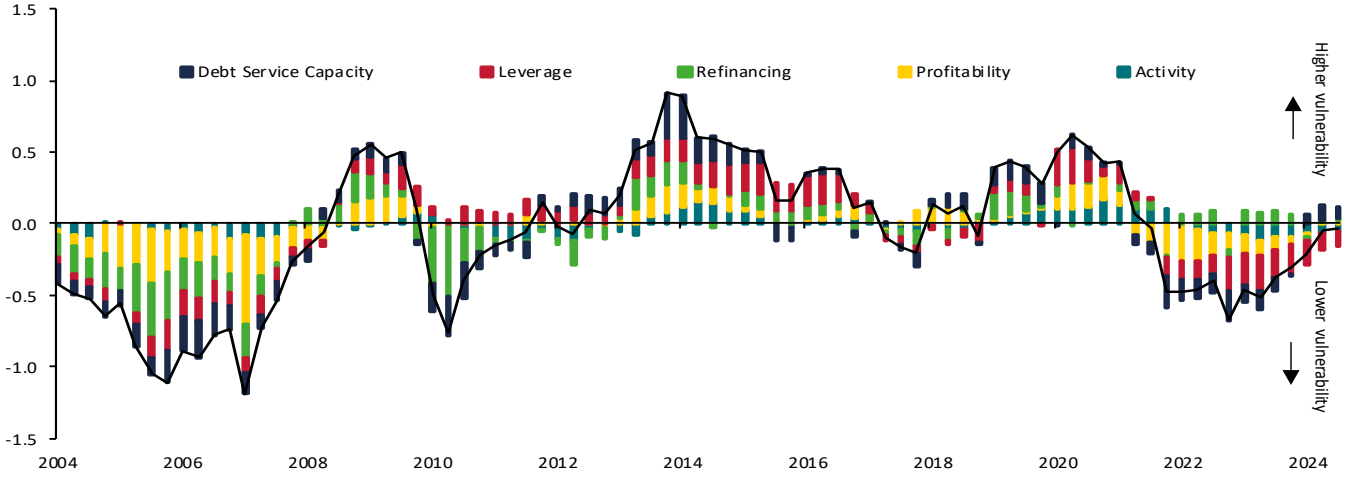
Source: CNBV.

1/ Includes banks loans and linked sofomes loans. Regulatory probability of default.

Listed private non-financial companies[43]

The vulnerability indicator for listed companies (IVEL), which measures vulnerabilities for companies as a whole and can be broken down by economic sector, showed an increase with respect to the last *Report*, and is now in the neutral vulnerability zone. The deterioration in the level of the indicator is explained by the deterioration observed in the variables associated with leverage, profitability and in-debt service capacity (Graph 57).

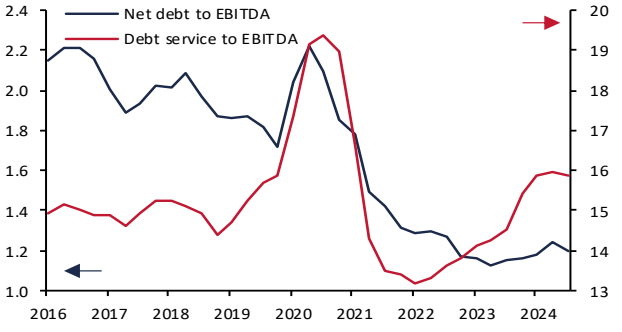
Graph 57
Vulnerability Index for Listed Firms
No units



Data as of September 2024.
Source: Own calculations with data from Bloomberg.

The annual EBITDA generation (UAFIDA)[44] for all private non-financial companies listed on decreased in real annual terms for the ninth consecutive quarter, although the contraction was slowed by the higher quarterly EBITDA in the last two quarters. Likewise, the debt and in-debt-service cost indicators remained stable because the increase in the peso-denominated debt balance, due to the depreciation of the peso against the US dollar which was offset by the increase in EBITDA over the last two quarters (Graph 58). On the one hand, the higher balance of debt due in the next 12 months resulted in a slight decrease in the companies' liquidity position, although it is sufficient to cover maturities. Finally, the use of cash for investment spending by companies increased.

Graph 58
Listed private non-financial companies' indebtedness and debt service 1/
Left axis: times EBITDA
Right axis: percent of EBITDA



Data as of September 2024.
Source: BMV and BIVA.
1/ EBITDA refers to earnings before interest, taxes, depreciation and amortization.

[43] Includes information on companies in the *BMV* and *BIVA*.

[44] The initials UAFIDA refer to earnings before interest income, taxes, depreciation and repayment and are equivalent to EBITDA (*Earnings Before Interest, Taxes, Depreciation and Amortization*).

The number of listed companies with financial indicators suggesting vulnerabilities increased slightly since the last *Report*; however, commercial banks' exposure to these companies is very low in relation to their regulatory capital. Finally, the depreciation of the peso against the US dollar did not generally affect listed companies due to their natural and financial hedges; however, there are a few companies that have some foreign exchange mismatch in their balance sheets. Commercial banks' exposure to these companies is very low in relation to their regulatory capital.

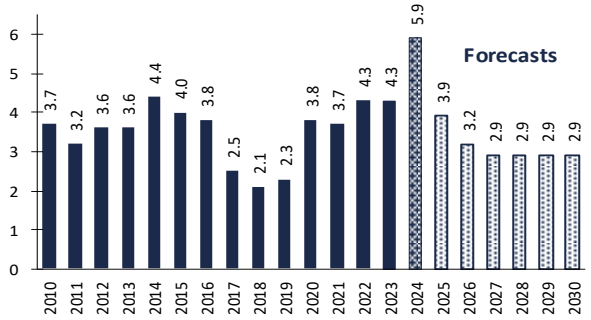
IV.2.3. Public Sector

IV.2.3.1. Federal Government

From January to September 2024, the public balance exhibited a deficit 56 billion pesos lower than that projected in the 2024 Economic Package. Within this balance, both revenues and budgetary expenditures surpassed the program outlined in the 2024 Federal Income Law (LIF) and in the Federal Expenditure Budget (PEF). Thus, in October, the Public Sector Financial Requirements (RFSP) recorded a deficit of 1.2 trillion pesos while the Historical Public Sector Financial Requirements Balance (SHRFSP) reached 16.8 trillion pesos.

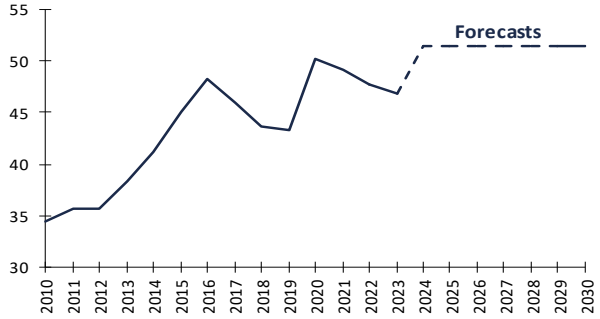
By the end of 2024, the Federal Government anticipates a public balance deficit of 5.0% of GDP. To achieve this, it is expected that budgetary revenues in 2024 (22.1% of GDP) will be higher than those projected in the 2024 *LIF* (21.3% of GDP) and that budgetary expenditure in 2024 (estimated at 27% of GDP) will be higher than that established in the 2024 *PEF* (26.2% of GDP). Accordingly, the RFSP is projected to represent 5.9% of GDP while the SHRFSP is expected to account for 51.4% of GDP (Graph 59 and Graph 60).

Graph 59
Public Sector Financial Requirements [1/]
Percent of GDP



Data as of November 2024.
Source: Source: General Economic Policy Criteria for the Income Law initiative and the Federal Expenditure Budget Project corresponding to fiscal year 2025, SHCP.
1/ Corresponds to the RFSP without a Banco de México operating surplus.

Graph 60
Public Sector Financial Requirements Historical Balance[1/]
Percent of GDP



Data as of November 2024.
Source: Source: General Economic Policy Criteria for the Income Law initiative and the Federal Expenditure Budget Project corresponding to fiscal year 2025, SHCP.
1/ Corresponds to the RFSP historical balance without a Banco de México operating surplus.

Furthermore, a public balance deficit of 3.2% of GDP is projected for 2025, with an anticipated decrease of 594 billion pesos[45] compared to the approved level for 2024. This deficit is calculated with a budgetary revenue of 22.3% of GDP and a budgetary expenditure of 25.5% of GDP. Consequently, it is estimated the *RFSP* and the *SHRFSP* are to be 3.9% and 51.4% of GDP, respectively (Graph 59 and Graph 60).

[45] 2025 Pesos.

IV.2.3.2. State-owned Companies

Petróleos Mexicanos (Pemex)

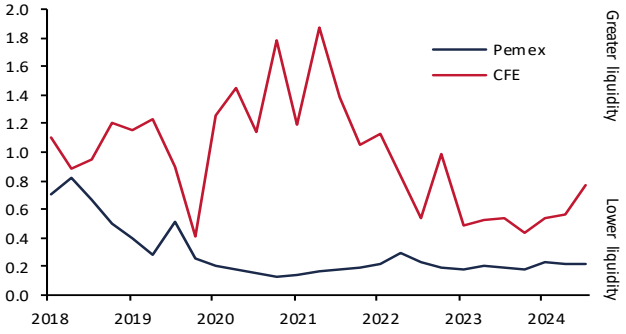
At the end of September 2024, Pemex recorded a quarterly and annual net loss, which contrasts with the net earnings observed in the previous *Report*, and is largely explained by a foreign exchange loss associated with the depreciation of the peso against the US dollar.

The peso balance of Pemex's total debt, which includes debt with suppliers, increased with respect to the last *Report*, mainly due to depreciation, even though the US dollar balance decreased slightly. Although short-term financial debt decreased, the liquidity indicator remained stable as liabilities with suppliers compensated for the decrease (Graph 61). On the other hand, the company faces maturities until 2026 that represent 36.2% of its total debt, and an important part of this corresponds to international debt without considering the liabilities with suppliers (Graph 62). Regarding the bank debt of Pemex's suppliers, an analysis shows that few of them have debt with banks in Mexico and their balances are low relative to the regulatory capital of these creditors.

Graph 61

Liquidity position of Pemex and CFE [1/]

Times

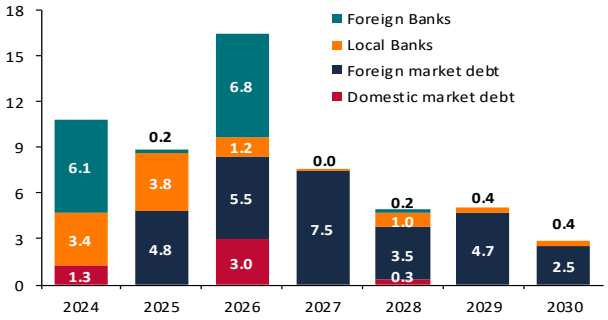


Data as of September 2024.
Source: BMV.
1/ It is defined as the result of dividing short-term cash and accounts receivable by the sum of 12-month liabilities with suppliers and 12-month financial debt.

Graph 62

Pemex debt maturities [1/]

Percent of total debt



Data as of September 2024.
Source: BMV.
1/ It takes into account total debt without suppliers.

On the other hand, at the beginning of October, a constitutional reform was approved that modifies the legal status of the company, which ceases to be a productive company and is now considered a state-owned company.[46] In this regard, some rating agencies announced that they are evaluating the change to comment on its effects on the company's rating .[47] At the beginning of December, Pemex's five-year CDS decreased with respect to the previous *Report*, reaching minimum levels not observed since April 2022 (Graph 65).

Finally, on November 13, 2024, Pemex announced the implementation of strategic lines of action to financially strengthen the company and increase both productivity and operating efficiency. In particular, it considers the integration of its subsidiaries into a single company to reduce costs, as well as a new tax regime. [48]

Federal Electricity Commission (*CFE*, its acronym in Spanish)

At the end of September 2024, *CFE* recorded a quarterly and annual net loss that contrasts with the net earnings observed at the end of the last *Report*, which is largely explained by a foreign exchange loss associated with the depreciation of the Mexican peso against the US dollar.

The company's peso-denominated debt balance increased with respect to the previous *Report*, mainly due to the increase in long-term loans and the depreciation of the peso against the US dollar. The balance of short-term debt decreased slightly and, in turn, cash and cash equivalents increased, which led to an increase in the liquidity indicator (Graph 61). It is

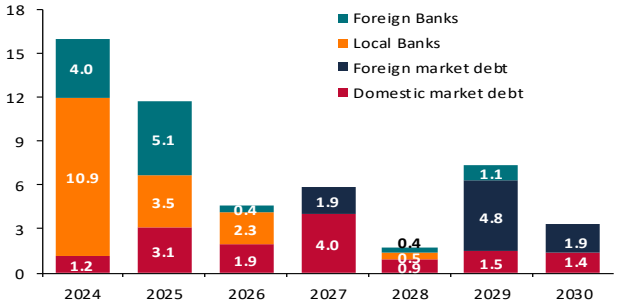
[46] Subsequently, in 180 days, the laws that will make the proposed changes operative will be issued.

[47] See the Fitch Ratings press release here.

[48] See press release here.

noteworthy that, at the end of September, the company issued a bond in international markets to refinance short-term bank loans.[49] On the other hand, without considering liabilities with suppliers, the company faces maturities up to 2026 that represent 32.4% of its total debt; an important part of these corresponds to loans with domestic banks (Graph 63).

Graph 63
CFE debt maturities 1/
Percent of total debt



Data as of September 2024.
Source: BMV.
1/ It takes into account total debt without suppliers.

Also, in early October, a constitutional reform that modifies the legal status of the company from productive to state-owned company was approved. [50] On November 15th a rating agency changed its rating outlook to negative following the change in the sovereign credit rating outlook. Finally, in early December, *CFE*'s five-year CDS registered a slight increase with respect to that of the previous *Report* (Graph 64).

Graph 64
USD 5-year Credit Default Swap of Pemex and CFE
Basis points

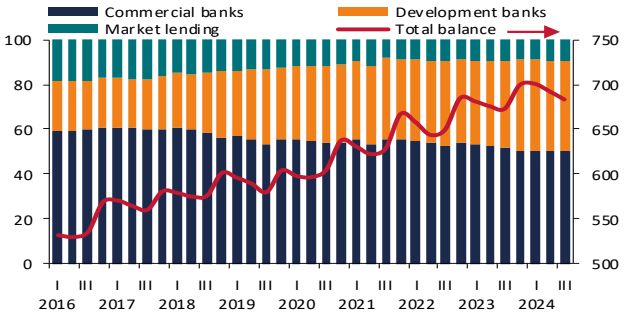


Data as of December 6, 2024.
Source: Markit.

IV.2.3.3. States

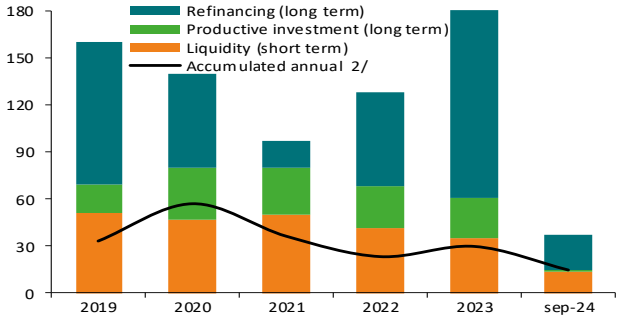
At the close of the third quarter of 2024, financing to sub-national governments registered a decrease in relation to that observed at the close of the second quarter, although when compared to the same period of the last year, it exhibited a growth of around 1.5% (Graph 65). In particular, bank financing to state governments, from January to September 2024, showed less dynamism, compared to that observed in the same period of 2023 (Graph 66). In this regard, there was less long-term credit granted during the first nine months of 2024, a period during which only one state government requested this type of credit, a fact that contrasts with the same period of 2023, when seven state governments obtained long-term credit. Thus, the downward trend that has been observed since 2021 in the contracting of credit by state governments in the first nine months of the year continues.

Graph 65
Subnational government financing
Right axis: Billions of pesos
Left axis: Percentage



Data as of third quarter 2024.
Source: SHCP.

Graph 66
Loans granted to state governments 1/
Billions of pesos



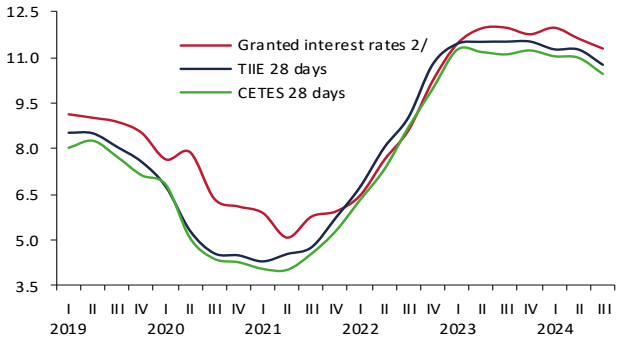
Data as of September 2024.
Source: Prepared from state government released information.
1/ Posted information as of December 2nd 2024 by state governments.
2/ Accumulated as of third quarter per year considering liquidity and productive investment loans.

[49] See press release here.

[50] Subsequently, in 180 days, the laws that will make the proposed changes operative will be issued.

Regarding the source of financing for sub-national governments, as of third quarter of 2024, commercial banks are the main creditor with a share of close to 50% of total financing, while the share of development banks remained at levels of around 40% (Graph 65). In this regard, as of September, the level of concentration of credit to these governments, both granted by commercial banks and development banks, remained unchanged in relation to that observed at the end of the first quarter of 2024. Thus, both commercial banks and development banks registered relatively high levels of concentration. On the one hand, the concentration of bank credit by state remained low. At the end of the third quarter of 2024, state governments presented relatively favorable credit contracting conditions, with a lower interest rate on granted bank credit than that observed in the first quarter (Graph 67).

Graph 67
Weighted average interest rate on offers of bank loan to state governments [1/]
Percentage



Data as of third quarter 2024.
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 December 2nd 2024 by state governments.

Between April and September 2024, the rating agencies reviewed their credit risk assessment of the states. For state governments, nine entities showed an improvement and no entity showed deterioration; regarding municipal governments, eighteen showed an improvement and three showed deterioration. As a result, most sub-national governments showed a lower risk perception.

At September 2024, debt maturity risks and potential pressures on sub-national governments' revenues remain limited. According to the *SHCP*'s alert system, which consists of three indicators that reflect different aspects of debt sustainability, debt has remained stable for most state governments in recent quarters.[51] In this regard, only one state government showed a level of indebtedness under observation (Figure 1a). Furthermore, as of the first half of 2024, sixteen municipal governments exhibited levels of indebtedness under observation and two municipalities continued in high indebtedness (Figure 1b).

Figure 1
Subnational government debt sustainability [1/]
a) State governments, quarterly information [2/]



[51] The indicators considered in the alert system are: i) Debt and obligations over unrestricted revenues; ii) Debt service and obligations over unrestricted revenues; and iii) Short-term obligations, suppliers and contractors minus cash, banks and temporary investments over total revenues. Details of the methodology are available for consultation on the *SHCP* website: Disciplina Financiera de Entidades Federativas y Municipios (hacienda.gob.mx).

b) Municipal governments, half-yearly information

2023-1	2024-1
SUSTAINABLE DEBT	
577 municipalities 3/	585 municipalities 3/
OBSERVATION DEBT	
20 municipalities	16 municipalities
Chihuahua (3), Coahuila (3), Durango (2), Jalisco, México, Morelos (2), Puebla, Quintana Roo, San Luis Potosí, Sonora (3), Veracruz (2)	Aguascalientes, Chihuahua (2), Coahuila, Durango, Jalisco (2), Morelos, San Luis Potosí, Sonora (3), Veracruz (3), Zacatecas
HIGH DEBT	
2 municipalities	2 municipalities
Mapimí, Tlahualilo (Durango)	Mapimí, Tlahualilo (Durango)

Data as of third quarter 2024 for state governments and as of first half-yearly 2024 for municipal governments.
Source: Prepared from SHCP information.

1/ The result of the alert system, for its calculation, considers three indicators: i) Debt and obligations over unrestricted revenues; ii) Debt service and obligations over unrestricted revenues; iii) Short-term obligations, suppliers and contractors minus cash, banks and temporary investments over total revenues. The methodology can be found on the SHCP website:

https://www.disciplinafinanciera.hacienda.gob.mx/es/DISCIPLINA_FINANCIERA/Entidades_Federativas_2024

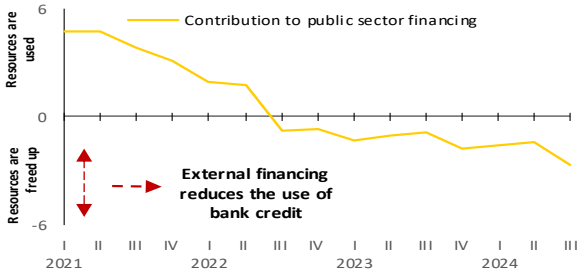
2/ The State of Tlaxcala has no loans and obligations since 2019.

3/ As of first half-yearly 2023, 127 municipalities had failed to provide information and 62 entitites had not been rated, while as of first half-yearly 2024, 109 municipalities had failed to provide information and 76 entities had not been rated.

IV.2.4. External Sector and Capital Flows

Access to the external market enables the public sector to obtain resources from abroad through capital inflows. Such resources could potentially reduce the public sector's demand for domestic bank credit, thereby facilitating access to financing for other economic sectors. During the initial three quarters of 2024, the balance of payments recorded net capital inflows. These inflows are higher than in the previous *Report*, as greater capital entered in the second quarter of 2024 than exited in the third. As a result, the public sector sustained the release of resources for the provision of domestic bank credit to other sectors and, moreover, to a greater extent than in the previous *Report* (Graph 68).

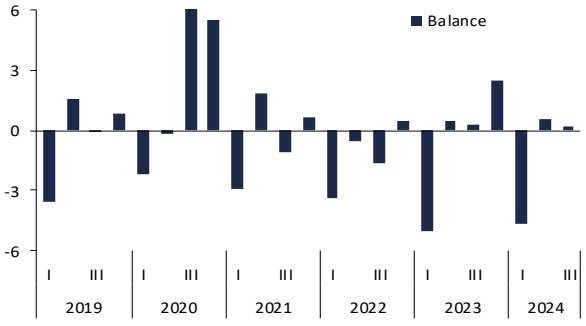
Graph 68
Contribution of net capital flows to real domestic financing growth of the Public Sector 1/
Percentage points



Data as of third quarter 2024.
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 Q1 2010 to Q3 2024 and a moving window of 31 quarters. Capital flows are defined as the sum of net direct, portfolio and other investment flows.

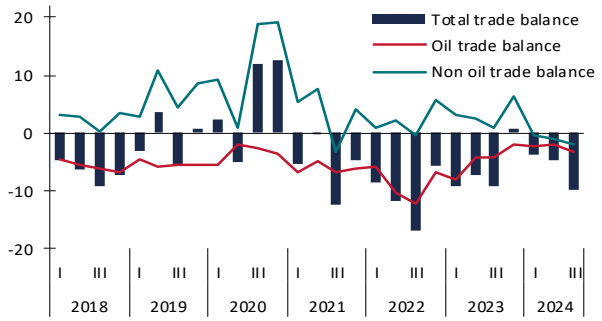
In the second and third quarters of 2024, there were surpluses of 0.6% and 0.2% of GDP in the current account, respectively (Graph 69). Within this account, the balances of the commercial oil and non-oil trade balance were in deficit (Graph 70). Meanwhile, the financial account recorded net loans abroad in the second and third quarters of 2024. In the second quarter, this was predominantly attributable to an outflow in portfolio investment, whereas in the third quarter it was due to an increase in net loans abroad in other investment.

Graph 69
Current Account
Percent of GDP



Data as of third quarter 2024.
Source: Banco de Mexico and INEGI.

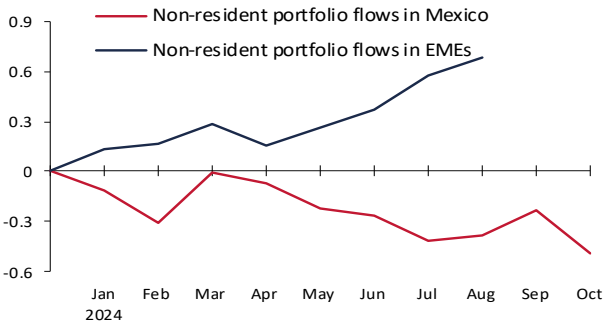
Graph 70
Trade balance
Billions of dollars



Data as of third quarter 2024.
Source: Banco de Mexico and INEGI.

Timely information from the Institute of International Finance (IIF) indicates that, during the second quarter of 2024, emerging economies experienced modest inflows of non-resident portfolio flows (Graph 71). The behavior was heterogeneous within the quarter: in April, the publication of unfavorable inflation data in the United States increased expectations of a more restrictive monetary policy, leading to capital outflows. In the subsequent months, more favorable indicators gave rise to expectations of a more accommodating monetary policy, thereby fostering inflows. In Mexico, the expectation of a more restrictive monetary policy in the United States also began to drive the outflows in April. This trend reversed in August and September, with the third quarter showing a better performance. October, however, exhibited outflows of non-residents portfolio flows in Mexico once again.

Graph 71
Non-resident portfolio flows to Mexico and EMEs [1/]
Percent of GDP



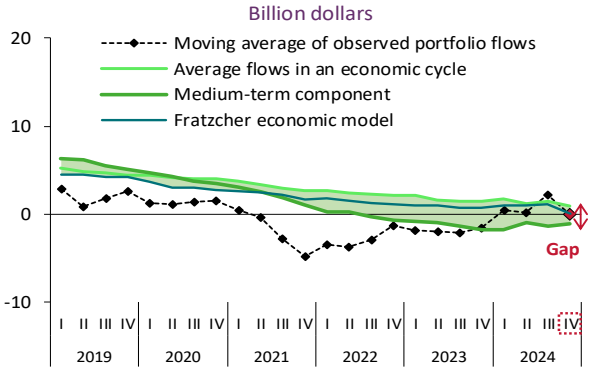
Data as of October 2024.
Source: Institute of International Finance (IIF).
1/ Acummulated flows since January 2024. The measure of portfolio flows of emerging economies was obtained by adding the flows of Brazil, Chile, Czech Republic, Hungary, India, Indonesia, Poland, South Africa, Thailand and Türkiye and dividing it by the sum of ther GDP in 2022. Those countries were 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.

Therefore, it is pertinent to analyze how much the non-residents portfolio flows in the country could recover moving forward. For this purpose, the estimate of the range of the natural value of these flows is used (see Box 3 of the *Financial Stability Report* - June 2023) and an imputation[52] is made for the fourth quarter using the only information available on flows so far, that of October.[53] Since the last version of this *Report*, a decline in the amount of accumulated flows has been observed, driven by outflows in the second quarter, July, and October. This places the amount currently farther from the upper limit of the range of its natural short- and medium-term value (Graph 72a). With respect to the range of the natural value of long-term flows, this indicates that there is still considerable room for inflows for reasons linked to the structural performance of the Mexican economy (Graph 72b).

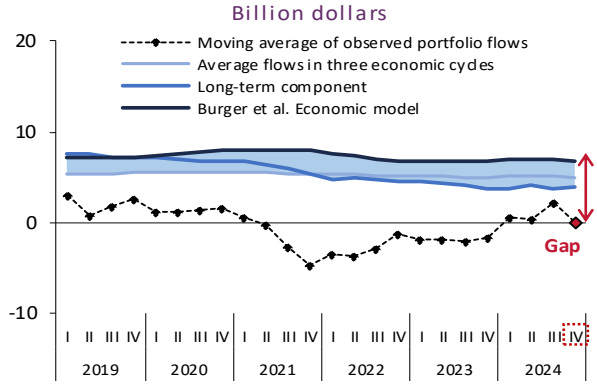
[52] Imputation involves estimating unobserved values using the available data, in order to complete the dataset and conduct the analysis. In this case, the observed flows up to October are used to project the value for the fourth quarter.

[53] This value measures the portion of the flows that is not influenced by temporary factors but is instead, affected exclusively by persistent and structural factors.

Graph 72
Range of natural flows[1/ 2/]
a) Short- and medium-term



b) Long term



Data as of fourth quarter of 2024.

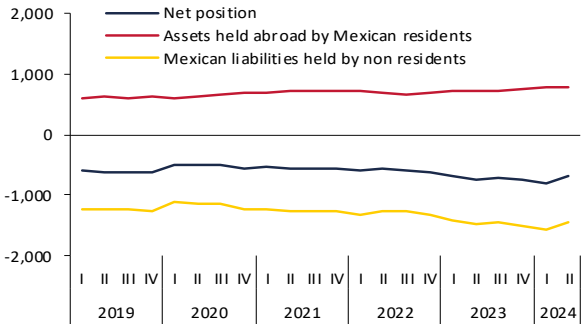
Source: Banco de Mexico, IMF, Bloomberg, IIF and UBS.

1/ The portfolio flows to Mexico for 2024 Q4 were imputed with information from the IIF.

2/ One year moving average.

Mexico's international investment debit (net) position decreased in the second quarter of 2024 compared to the same quarter of the previous year. On the assets side, investments abroad by residents in Mexico increased 4.7% and, on the liabilities side, investments from abroad decreased 1% (Graph 73).

Graph 73
International investment position [1/]
Billions of dollars



Data as of Q2 2024.

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 Federal Reserve has initiated a cycle of monetary easing cycle in the United States. This has historically been associated with to capital inflows into emerging economies, among other factors, due to the yield-seeking behavior of international investors. However, at the current juncture, the global outlook is not without risk. The escalation of geopolitical tensions could lead to an increase in global risk aversion, resulting in capital outflows from economies perceived as higher risk. Additionally, the ongoing possibility of increased trade tensions could further diminish risk appetite. In this context, it is particularly salient that Mexico continues to distinguish itself as a reliable emerging economy, characterized by a robust macrofinancial framework and a commitment to safeguarding the investments of both foreign and domestic investors.

IV.3. Institutions

Total assets of the financial system increased by 10.2% in real annual terms at the end of September, a higher rate than those recorded in previous quarters and observed since 2020. However, it is worth noting the low growth of commercial banks' assets compared to the rest of the entities. Some banks within the LSIBS, as well as others focused on investment banking reduced their assets in real terms. Some of the non-bank entities registered significant real annual growth in assets. Such was the case of siefores, investment funds and development institutions, which include development banks. Other financial institutions such as insurance and bonding companies, non-regulated sofomes and sofipos

also showed higher asset growth rates than the financial system as a whole. In particular, the sofipos sector registered a significant increase, although from a low base in relative terms. This was driven by the entry of new digital participants employing growth strategies to attract new clients. The share of other financial intermediaries in total assets either decreased or remained stable.

Commercial banks remain the most significant intermediaries in terms of total assets within the financial system. Furthermore, although some banking license applications are currently under review by the authorities and new authorizations based on fully digital business models, some authorized institutions have not yet started operations. [54]

Table 1

Mexican Financial System Structure [1/]

	Number of entities in operation[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	42.3	41.5	2.2	64.4
Siefores (afores)[5/ 6/]	118 (10)	20.2	19.8	18.4	76.6
Investment Funds (Managers)[7/]	630 (31)	12.4	12.1	21.1	63.7
Development Institutions[8/]	9	9.3	9.1	14.9	90.9
Insurance Companies	112	7.9	7.8	14.4	42.6
Broker dealers	36	3.4	3.4	5.9	59.8
Non-regulated sofomes[9/]	1,634	1.8	1.8	19.2	23.8
Regulated sofomes[10/]	24	1.0	1.0	8.8	75.5
Savings and Loan Cooperatives (socaps)	153	0.8	0.8	6.0	54.8
Popular Finance Corporations (sofipos)[11/]	36	0.5	0.5	109.1	82.5
Credit Unions	68	0.2	0.2	0.6	51.0
Bond warehouses	14	0.1	0.1	-11.3	93.5
Crowdfunding Institutions[12/]	21	0.0	0.0	245.5	87.0
Electronic Payment Fund Institutions[12/]	42	0.1	0.1	47.8	86.7
Total System	**2,177**	**100.0**	**98.0**	**10.2**	**n.a.**
Memo: Infonavit, Fovissste and Infonacot	*3*	8.3	8.2	7.0	n.a.
Fondo de Pensiones para el Bienestar[13/]	*1*	0.1	0.1	n.a.	n.a.
Fondo Mexicano del Petróleo	*1*	0.1	0.1	7.6	n.a.

Data as of September 2024. The figures for Investment Funds reflect the portfolio of securities managed by these entities.

Source: Banco de México, BMV, CNBV, CNSF, Consar, Condusef, and SHCP.

1/ This table includes direct financing provided by the listed financial institutions, which may not align precisely with the direct and indirect financing reported in the Development Banking section.

2) Refers to entities currently operating with positive assets; this may differ from the number of authorized entities.

3/ The five entities with the highest asset concentration in each sector are as follows: Commercial Banking: BBVA, Santander, Banorte, Citibanamex, Scotiabank. Pension Fund Administrators (Afores): XXI Banorte, Profuturo, Citibanamex, SURA, Coppel. Investment Fund Operators: BBVA Bancomer Gestión, Impulsora de Fondos Banamex, Sam Asset Management, Operadora de Fondos Banorte, Operadora HSBC. Development Institutions: Banobras, Nafin, Bancomext, Banjército, FIRA. Insurance and Surety Firms: Pensiones Banorte, Seguros BBVA, Grupo Nacional Provincial, Citibanamex Seguros, Pensiones BBVA. Brokerages: Banorte-Ixe, Finamex, Goldman Sachs, Invex, Actinver. Non-regulated Sofomes (Sofomes ENR): Binmtec, Crédito Real, BMW Financial Services México, Préstamos Felices en 15 Minutos, Marverde Infraestructura. Regulated Sofomes (Sofomes ER): GM Financial, Arrendadora y Factor Banorte, Cetelem, Ford Credit, Operadora de Servicios Mega. Savings and Loan Cooperatives (Socaps): Caja Popular Mexicana, Caja de Ahorro de los Telefonistas, Caja Morelia Valladolid, Acreimex, Coopdesarrollo. Financial Savings Companies (Sofipos): Nu México Financiera, Financiera Sustentable, Libertad Servicios Financieros, Klar, Consejo de Asistencia al Microemprendedor (CAME). Credit Unions: Ficien, Unión de Crédito Agricultores de Cuauhtémoc, Unión de Crédito para la Contaduría Pública, Unión Crédito Alpura, Agropecuario de la Laguna. General Warehousing Deposits: Afirme, Mercader, Banorte, Sur, Accel.

4/ Total assets for commercial banks include those of regulated Sofomes that consolidate with their parent bank. Note that three banks authorized in 2023 and 2024—Hey Banco, Openbank, and Revolut—are not yet operational.

5/ The group of pension funds managed by the 10 Afores encompasses 118 specialized retirement funds (Siefores).

6/ From January 2020, there was an increase in the number of Siefores due to the transition to a new Generational Fund-based Siefore Investment Regime following regulatory changes issued on December 13, 2019, by Consar. More information is available here: https://www.gob.mx/cms/uploads/attachment/file/517105/BP-32-2019_TDF_transicio_n_VF_2_.pdf

7/ A total of 31 investment fund operators manage 630 investment funds.

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

9/ Figures for the number of non-regulated Sofomes come from the RECO Registry (Condusef). New information is presented with preliminary figures, reflecting corrections to information reported by non-regulated Sofomes since June 2023. Only Sofomes with a positive portfolio are counted. Credit portfolios of non-regulated Sofomes granting credit solely to related entities or subsidiaries are excluded, as they are not considered credit intermediaries in the strict sense. As of December 2023 (latest available date), the Financial Entities Bureau has information on 2,158 non-regulated Sofomes with operational status, including those granting credit solely to related entities or subsidiaries. Asset figures refer to the total credit portfolio reported by these entities to Condusef.

10/ Regulated Sofomes include those with ownership ties to banks (without being subsidiaries) and those issuing debt on the BMV.

11/ In December 2022, Nu México, a Fintech specializing in credit cards, merged with a non-operational Sofipo it acquired in December 2021. Since this date, its assets are counted under the Sofipo sector, making it the largest entity in this category with a 40% market share, raising the concentration of the top five entities to 79%. Prior to this transition, no public financial data was available for this entity.

12/ As of October 2024, there are six crowdfunding institutions and 14 electronic payment fund institutions authorized but not yet operational. Asset figures consider information from 48 ITFs that published financial statements on their websites as of September 30, 2024. These institutions do not engage in credit intermediation on their balance sheets. For crowdfunding institutions, the financing directed by the platform to projects is recorded in off-balance-sheet accounts.

13/ Figures for the Pension Fund for Welfare refer to the initial capital, as stated by the SHCP's Insurance, Pensions, and Social Security Unit. More information is available here: https://www.gob.mx/shcp/prensa/comunicado-no-44-el-fondo-de-pensiones-para-el-bienestar-contara-con-un-monto-inicial-de-mas-de-44-mil-mdp.

[54] Since the last *Report,* the number of banks authorized to operate and that have not yet done so is the same: three.

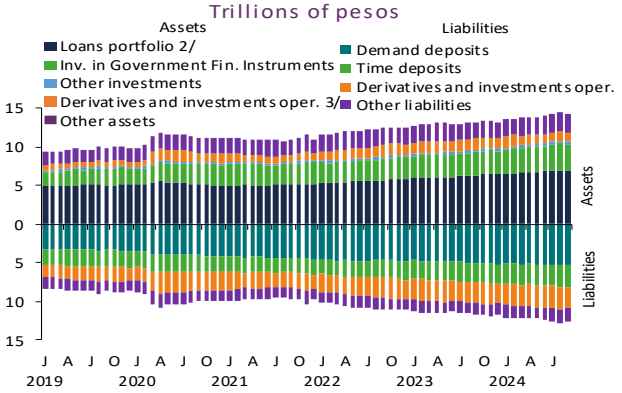
IV.3.1. Commercial Banks

Between March and September 2024, commercial banks' assets expanded, mainly due to the growth of the loan portfolio and, to a lesser extent, investments in financial instruments. On the one hand, derivative transactions recorded a reduction (Graph 74). The growth in liabilities is explained by the increase in term deposits and, to a lesser extent, in demand deposits (Graph 1).

Graph 74

Assets and liabilities from commercial banks 1/

Trillions of pesos



Data as of September 2024.

Source: CNBV.

1/ Unbound commercial banks.

2/ Net loans portfolio includes allowances for credit risks, deferred items and acquired collection rights.

3/ Includes purchase operations value considering to receive cash at maturity, when the entity act like a buyer.

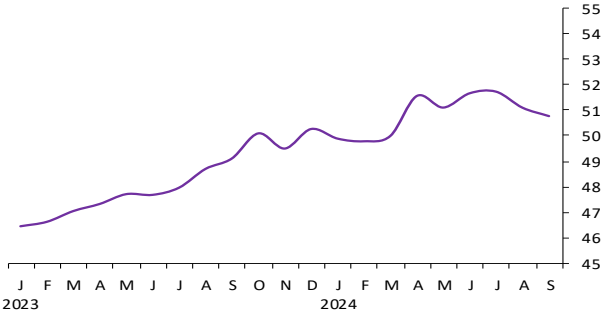
The commercial banks' net interest margin, as a proportion of stockholders' equity, decreased in August and September 2024, after having registered an increasing trend in preceding months (Graph 75).

Graph 75

Flow financial margin cumulative

12 months-to-total equity ratio 1/

Percentage



Data as of September 2024.

Source: Banco de México with data from CNBV.

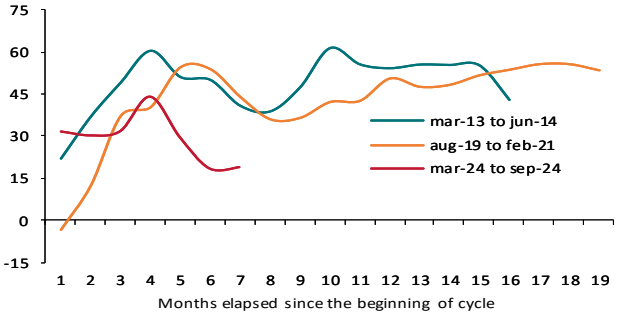
1/ Includes banks loans and linked sofomes loans.

In response to monetary policy, starting in March of this year, the interest rates paid by banks for their deposits declined, although this adjustment was not uniform among institutions. It is worth mentioning that the degree of response observed in this initial phase of the cycle was lower than that observed during the last easing cycles (Graph 76). In particular, this degree of response reflected a lower adjustment in the funding costs of the group of locally systemically important banks, both in terms of funds received from the general public and from other banking institutions. In this backdrop, it is noteworthy that, within term deposits, the yield of the Yield-Liquid Promissory Notes (PRLV) showed a smaller adjustment relative to the reduction in the target rate between March and September 2024, compared to previous easing cycles.

Graph 76

Target rate-to-average cost in local currency ratio 1/

Percentage



Data as of September 2024.

Source: Banco de México.

1/ Consider 3 target rate downwards reviews, first since March 8 of 2013 to June 6 of 2014 (-150 bp), second since August 15 of 2019 to February 12 of 2021 (-425 bp), and third since March 22 of 2024 to end of September 2024 (-75 bp). The average cost in local currency of commercial banks includes demand deposits, time deposits, credit securities and interbank loans.

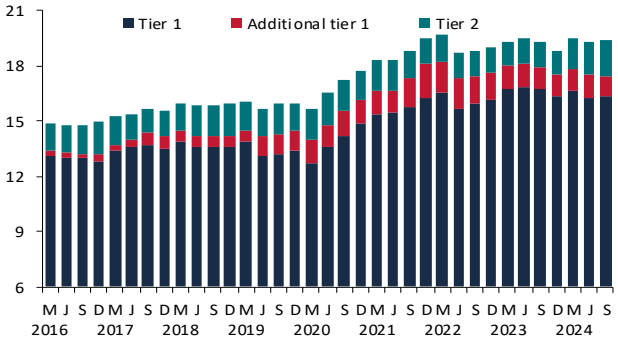
Solvency

Between March and September 2024, commercial banks presented capitalization levels that comfortably exceeded the minimum levels contemplated by regulation. However, the capitalization index (CAR) decreased during the period, from 19.49% in March to 19.39% in September. This behavior mainly reflected an expansion of risk-weighted assets, particularly those related to credit risk, which more than compensated for an increase in regulatory capital (Graph 77 and Graph 78). Furthermore, although there was an expansion of earned capital, this was partially offset by dividend payments made by some institutions.

Graph 77

Breakdown of banks' Capital Adequacy Ratio (CAR) by regulatory commercial banks capital [1/]

Percentage



Data as of September 2024.

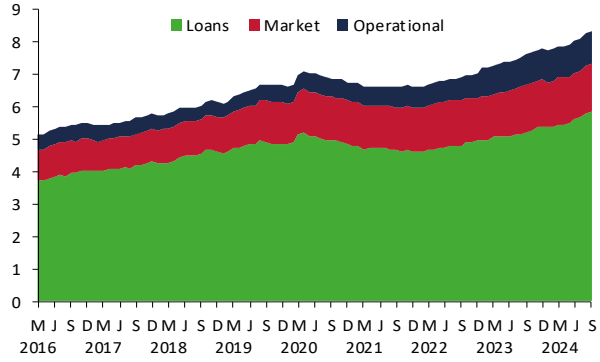
Source: Banco de México.

1/ Capital Adequacy Ratio, is calculated by dividing net capital by risk weighted assets. Net capital is the regulatory capital thtat includes the Tier 1, Additional tier 1, and the Tier 2 capital. Tier 1 includes earned capital and shareholder contributions, and has the major ability to absorb potenial losses. Additional tier 1 includes perpetual subordinated bonds and surplus reserves, and therefore has a lower ability to abosorb potential losses, while Tier 2 includes specif term subordinated bonds, and therefore has a lowest ability to absorb possible losses.

Graph 78

Risk weighted assets [1/]

Trillions of pesos



Data as of September 2024.

Source: Banco de México.

1/ Credit Risk weighted assets reflect the associated risk of the loan portfolio and other credit exposures. Market risk weighted assets are a risk measure that a banking institution holds due to market factors to which are their assets exposed; while operational risk weighted assets are a risk measure for possible losses due to inadequacies or failures in internal processes, personal and internal systems or due to external factors.

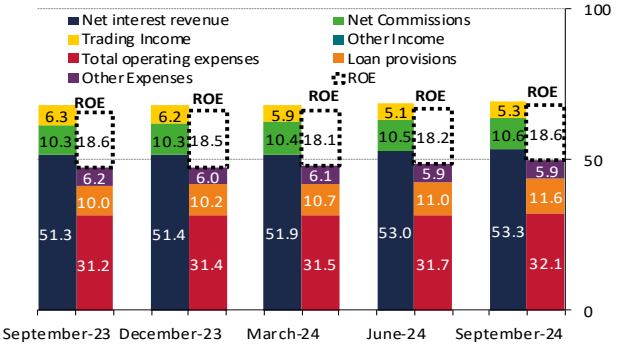
Profitability

As of September 2024, commercial banks' profitability, measured as the ratio of 12-month net income to average return on equity (*ROE*), has increased since the last *Report* and is at a similar level to a year ago (Graph 79**).** Both net interest revenue and other income increased with respect to average stockholders' equity. In addition, on the expenditure side, loan-loss provisions and administrative expenses increased slightly, but at a lower rate than revenues. The heterogeneity in profitability levels of the system's banks suggests that institutions with higher profitability will be better positioned to accumulate capital if necessary.

Graph 79

Commercial Banks Profitability Components (12-month flow)

Percent of 12-month average capital



Data as of September 2024.

Source: CNBV.

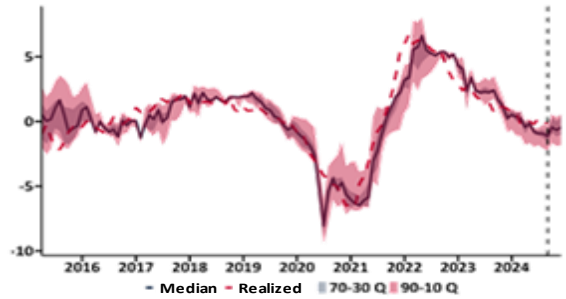
Financial Indicators at Risk

Historical information on financial indicators for the banking sector can help identify risks and build forecasts by applying the methodology described in Box 6 of the June 2022 *Financial Stability Report.* It is possible to construct a distribution that reveals which indicators present greater uncertainty in their estimates, which often translates into increased risk levels going forward.[55]

Profitability indicators reveal that both the ROE indicator (Graph 80a) and the financial margin (Graph 80b) show an increasing trend, both have returned to levels close to their historical averages, after some oscillations caused by the pandemic.

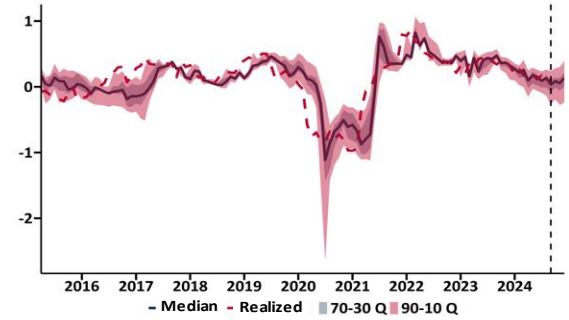
[55] For each of the indicators, forecasts are presented for a three-month horizon based on quantile regressions.

Graph 80
Three month horizon out of sample forecast
a) ROE
Percentage points



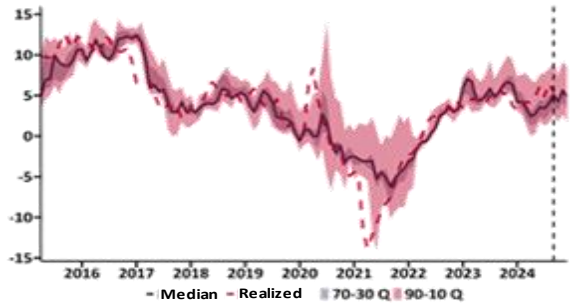
Data up to September 2024 and forecasts through December 2024.
Source: Banco de México

b) Net interest margin
Percentage points



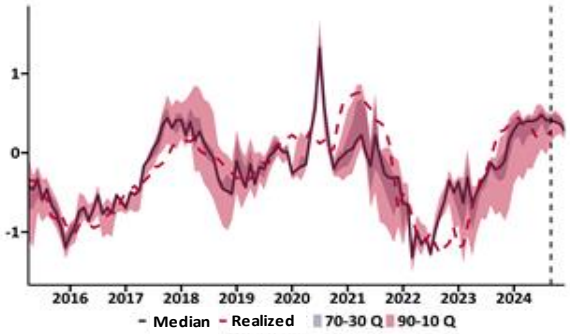
Date up to September 2024 and forecasts through December 2024.
Source: Banco de México

c) Real credit growth
Percentage points



Date up to September 2024 and forecasts through December 2024.
Source: Banco de México

d) Adjusted non-performing ratio
Percentage points



Date up to September 2024 and forecasts through December 2024.
Source: Banco de México

The portfolio growth projection (Graph 80c) shows an accelerated rise in the indicator culminating in a peak, followed by a slowdown phase, albeit with a high degree of uncertainty.

Finally, the indicators of the Adjusted non-performing loans ratio (Adjusted Loss Index) are shown. This indicator in turn shows a slowdown in growth (Graph 80d).

These indicators point to portfolio growth accompanied by a moderation in revenues and non-performing loan ratios in the coming months, unless events occur that change this expected trajectory.

Credit Risk

Banking credit risk measured by the Conditional Value at Risk (*CVaR*) at the 99.9% confidence level as a proportion of the credit portfolio, remained at low[56] and stable levels during the period of this *Report* (Graph 81a).[57,58] Although default probabilities of the portfolios have increased, default correlations have decreased, which explains the stability in the portfolio risk levels (Graph 81b).[59]

[56] *CVaR* as a proportion of the portfolio is within the lowest levels of at least the last thirteen years.

[57] Conditional Value at Risk (CVaR) allows the analysis of losses in the tail of the distribution, since it represents the expected value of the loss when it is 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 assets subject to credit risk.

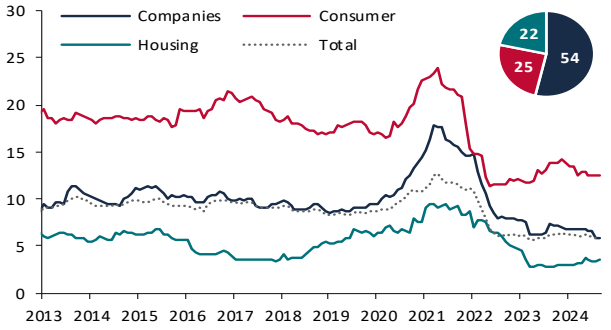
[58] Credit *VaR* is calculated using the "Capitalization and Credit Risk" (CYRCE) model. The main elements of this model are the probability of default of each loan, the structure of variances and covariances of potential defaults, and the structure and concentration level of the loans in the portfolio. An explanation of the model can be found in Banco de México (2006), Report on the Financial System May 2007, pp. 64- 67, and in Javier Márquez Diez-Canedo, *Una nueva visión del riesgo de crédito*, third edition, Limusa (2024).

[59] The probabilities and correlations of default used in the model are estimated through the observed historical default rates of loans, whose reference can be found in Banco de México (2006). "Estimation of Probabilities and Correlations of Default". Report on the Financial System May 2007, Box 10, pp 66.

Graph 81

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

Percent of portfolio



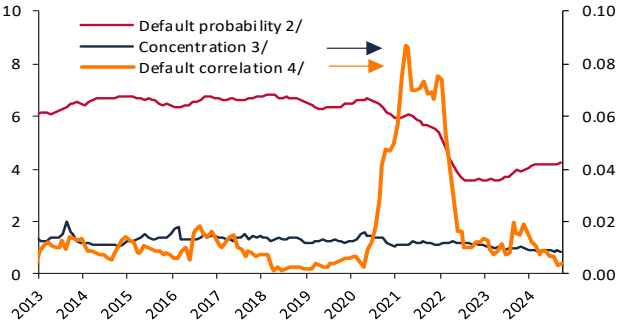
Data as of September 2024.

Source: Banco de Mexico, 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 September 2024.

Source: Bank of Mexico, 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.

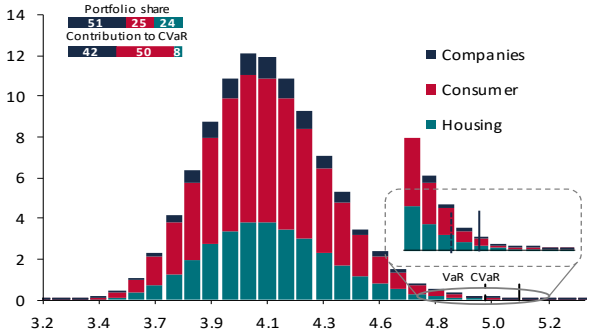
When considering all commercial banks' credit portfolio exposures and their distribution of potential credit losses,[60] it is found that, although the consumer portfolio is more atomized, it has a relatively higher probability of default than the other portfolios which makes its contribution to *CVaR* considerably higher than its share of the total portfolio balance (50% vs. 25%), a contribution that has been increasing since mid-2021 (Graph 82). Although the contribution of consumer portfolio risk has increased, the aggregate level of banking credit risk has remained constrained. Its capital levels are high and above regulatory minimums; however, it is important to maintain adequate granting criteria in order to prevent systemic risk from increasing.

Graph 82

Simulated credit loss distribution of the system

Horizontal axis: Percent of portfolio [1/]

Vertical axis: Percent



Data as of September 2024.

Source: Banco de Mexico, CNBV, and Credit Bureau.

1/ The percentage of loss for each portfolio is relative to the total loss, within each interval. The VaR and CVaR levels are

Bank Credit Risk Map

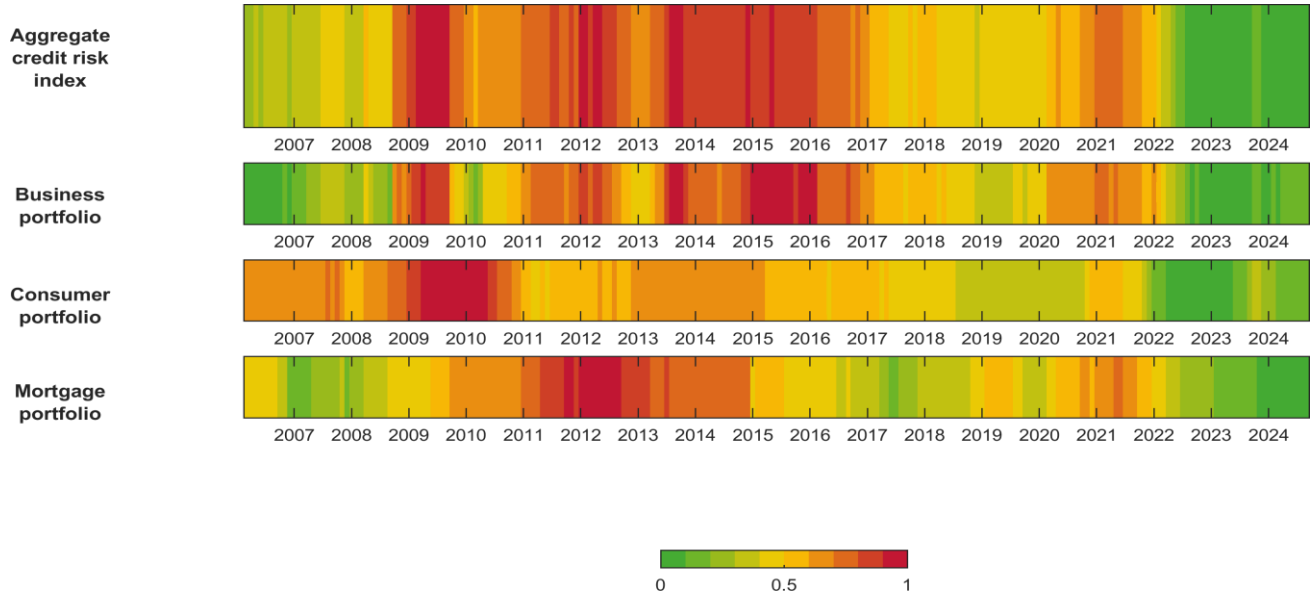
Aggregate credit risk, as represented in the heat map,[61] is at historically low levels. Despite the strong growth of the corporate portfolio, the risk associated with this sector remains under control. Throughout 2024, the consumer portfolio has shown a slight improvement, driven by lower funding costs and a reduction in expected losses under extreme scenarios. Finally, mortgage portfolio risk remains minimal, with a reduced concentration of loans issued in recent months.

[60] This distribution is generated using the loss simulation methodology for a loan portfolio. Available from Banco de México (2022). "Measuring the credit risk of a portfolio through Monte Carlo simulation." Financial Stability Report June 2022, Box 7, pp 74.

[61] For more details on the methodology used to determine the heat map, see: Banco de México (2024). "Bank credit risk map". Financial Stability Report June 2024, Box 4, pp 62-63.

Graph 83

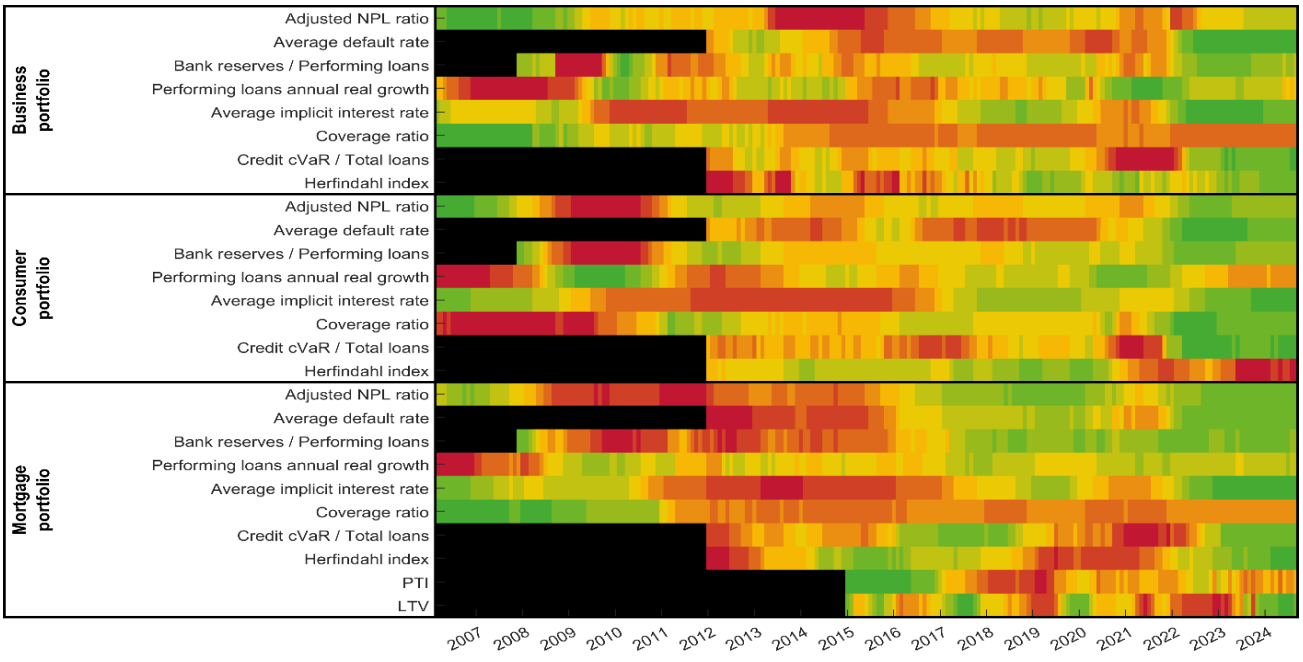
Bank credit risk map



Data as of September 2024.
Source: Banco de México, CNBV and Credit Bureau.

Graph 84

Disaggregated bank credit risk map



Data as of September 2024.
Source: Banco de México, CNBV, and Credit Bureau.

Box 2: Indicator of the Risk Profile of Commercial Portfolio Loans

I. Introduction

Credit risk is the most relevant risk incurred by banking institutions. The evaluation and monitoring of this risk in the Mexican financial system is fundamental to preserve financial stability and prevent systemic crises. For these reasons, there are several indicators for monitoring this risk, from *ex post* indicators, such as non-performing loan ratios, to indicators that measure this risk in advance, such as expected loss. High credit risk can reduce the supply of loans, slowdown economic growth and generate knock-on effects that impact different sectors, with significant consequences for the entire economy.

This box examines the credit risk profile of the commercial portfolio by estimating the probability of default at the individual level for each loan in conjunction with macroeconomic indicators[1] . A robust machine learning algorithm, *XGBoost* (*Extreme Gradient Boosting*), was used to estimate the probability of default (PI) for each loan originated during the study period. From these estimates, weighted by the exposure of the loan, the Relative Expected Loss (PER) indicator was calculated for the loan portfolio in each month of the analysis. This approach allows for the evaluation of the risk level in the commercial loan portfolio at different levels of aggregation.

This research covers four different economic phases, which allows us to identify risk trends and their evolution in different sectors, states and regions of the country over time. These findings contribute to a better understanding of credit risk exposure in Mexico and to identify trends in risk taking under different aggregation criteria.

II. Methodological description: data and model

This study uses detailed information on all loans registered in the banking system along with their associated characteristics. Among these variables are the interest rate, the total exposure to default, the years of operation of the borrower company (in the case of legal entities) or the age of the borrower (for individuals), the economic activity to which the loan is directed, the type of interest rate, the contracting currency and the activity sector to which the loan is destined.

In addition, other variables are incorporated, such as the Quarterly Indicator of Economic Activity by Federal Entity (ITAEE), annual inflation and the monthly unemployment rate by state, the exchange rate, the Consumer Price Index (CPI), the US Industrial Production Index, the Federal Funds Rate and the 3-month US Treasury Bond rate, all of them at a monthly level. The selection of variables was made based on a preliminary analysis that took into account factors such as their possible predictive capacity and their availability throughout the time period studied.

Due to imbalance in the data (with a significantly lower proportion of defaulted loans), the balancing technique known as *Synthetic Minority Over-sampling Technique* was used. For analysis, the data were divided into training, validation and test sets. Since the main objective of this study is prediction, the machine learning algorithm *XGBoost* was used, a particularly robust technique for classification tasks. [2]

The model was trained and validated by cross-validation, obtaining an outstanding performance in the validation data[3]: accuracy (0.94), sensitivity (0.96), specificity (0.91), F1 Score (0.94) and AUC-ROC

[1] These results can complement other approaches to credit risk analysis, such as Survival Analysis (SA) (Bátiz Zuk et al, 2021).

[2] *XGBoost* is highly computationally efficient and stands out for its ability to identify nonlinear patterns and complex interactions in the data, outperforming traditional econometric models such as logistic regression (Chen and Guestrin, 2016), given that, no explicit functional form is assumed between the covariates and the response variable. This algorithm builds decision trees sequentially, where each new tree is trained to correct the prediction errors of the previous trees. Initially, the first tree generates a basic prediction, while subsequent trees focus on improving performance on more challenging data points (Xia et al., 2023).

[3] Accuracy measures the proportion of correct predictions out of the total, assessing the overall performance of the model. Sensitivity measures how well positive cases are identified, while specificity measures the ability to correctly detect negatives. The F1 Score combines sensitivity and precision into a harmonic mean. Finally, the AUC-ROC measures the area under the ROC curve, assessing how well the model distinguishes between positives and negatives at different thresholds of the probability of default. Values close to 1 are ideal for all metrics.

(0.98). Using the trained model, default probabilities (PI) were calculated monthly for newly originated loans in each month of the period covered by the R04 series.

III. Relative Expected Loss

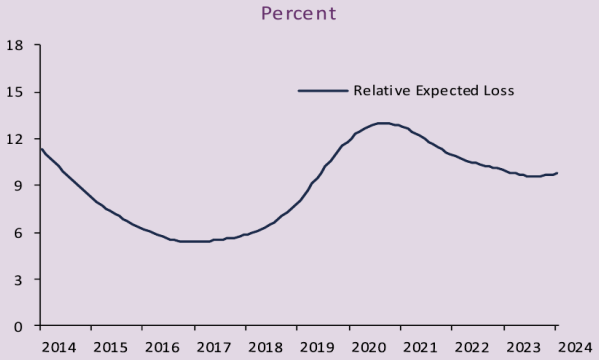
Considering that in month m, a set of n loans is issued into the banking system, each associated with an exposure given default (EDI_i), loss given default (PDI_i), and probability of default (p_i); the Expected Loss (*EL*) represents the potential loss that the system anticipates when defaults occur and is defined as $PE_m = \sum_{i=1}^{n}(p_i \times PDI_i \times EDI_i)$. On the other hand, the PER represents the fraction of the total exposure (E_m) that the system could lose in the event of default, $PER_m = \frac{PE_m}{E_m}$ where $E_m = \sum_{i=1}^{n}(PDI_i \times EDI_i)$. Higher values of *PER* indicate higher risk in the system attributed to new loans issued.

IV. Results

This section presents the results of the PER analysis for the banking system as a whole, broken down by industry and state. To facilitate the analysis and discussion, the study period was divided into three phases: Period 1 (July 2014-March 2020); Period 2, associated with the COVID-19 pandemic (April 2020-March 2023); and Period 3, defined as the post-pandemic period (June 2023-July 2024).

The Graph 1 depicts the trend of PER, the aggregate risk level index. The first phase shows a reduction in the portfolio's risk profile after the period of the global financial crisis. The indicator spiked during the pandemic period and recently, the risk profile of the portfolio has rebounded.

Graph 1
Relative Expected Loss Trend

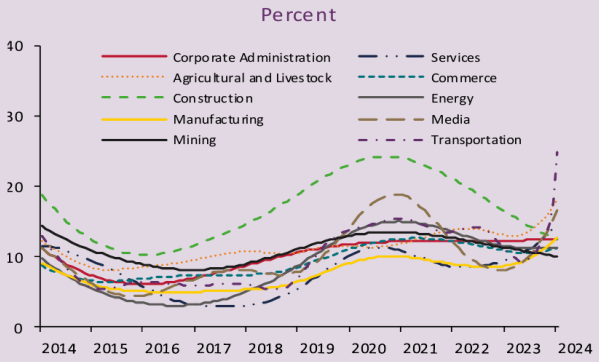


Data as July 2024

Source: Banco de México

The disaggregated analysis by industry, illustrated in Graph 2 reveals a pattern similar to that of the aggregate indicator. However, there are sectors, such as construction, that maintain a higher risk profile relative to other activities. Also, in recent times, there is a higher level of risk in credit to the agricultural-livestock and transportation sectors.

Graph 2
Expected Loss Trend by Industry



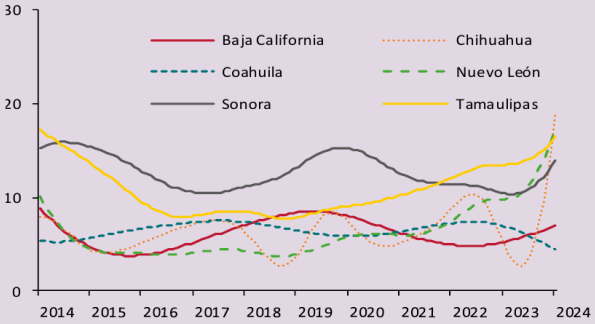
Data as July 2024

Source: Banco de México

Graphs 3-6 present the trends by state and region. The results indicate higher variance in the Northern region, in contrast to the Central region, which presents lower variability. This behavior suggests structural differences between regions in terms of credit risk exposure and resilience to adverse events. These results highlight regional differences in the intensity of the financial impact, possibly associated

with economic, productive and social factors specific to each entity.

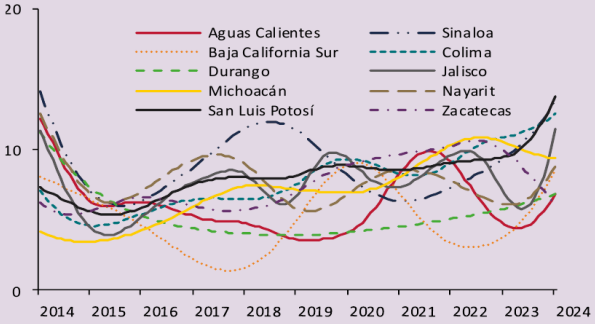
Graph 3
Expected Loss Trend by Industry
Northern Region
Percent



Data as July 2024

Source: Banco de México

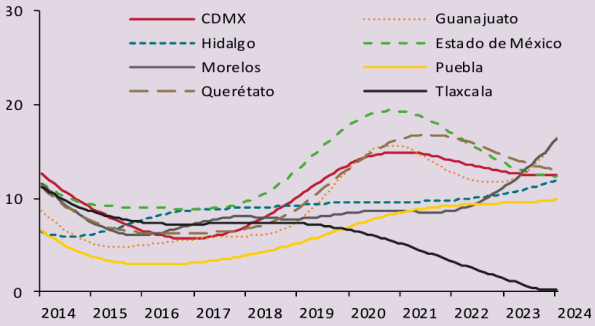
Graph 4
Expected Loss Trend by Industry
North Central Region
Percent



Data as July 2024

Source: Banco de México

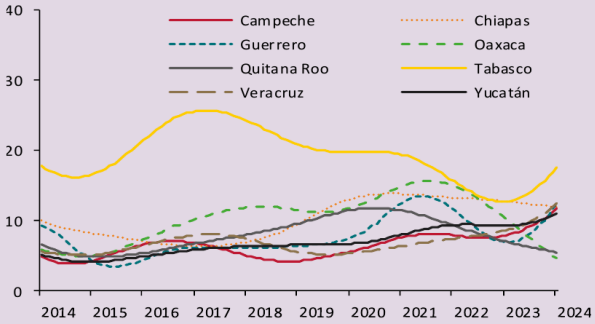
Graph 5
Expected Loss Trend by Industry
Central Region
Percent



Data as July 2024

Source: Banco de México

Graph 6
Expected Loss Trend by Industry
Southern Region
Percent

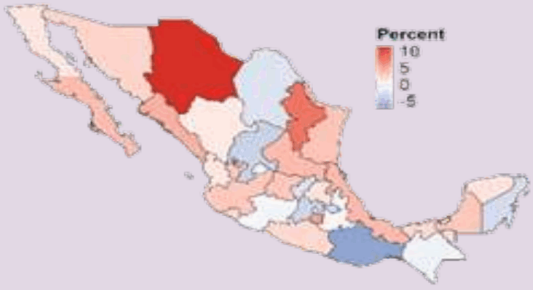


Data as July 2024

Source: Banco de México

Finally, Graph 7 shows the average PER for the last 36 months of the analyzed period and the PER as of July 2024. Chihuahua was the entity where PER increased the most, with an increase close to 10%, driven mainly by the increase in risk in the Transportation sector (see Graph 2). In contrast, Oaxaca decreased 5% compared to the average values of the previous 36 months.

Graph 7
Relative Expected Loss Difference
Last 3-years average



Data as of July 2024.
Source: Banco de México.

V. Final Considerations

The analysis of the risk profile of the commercial portfolio by means of the PER reveals patterns in its evolution throughout different phases.

The regional and sectoral analysis also shows differences in risk profile. For example, Chihuahua recorded the largest increase in PER as of 2024, especially in the transportation sector, indicating a growing risk in specific areas of the country. In contrast, Oaxaca experienced a decrease in PER, suggesting a relative recovery or better risk management in certain sectors.

These results underscore the importance of monitoring the dynamics of the credit risk profile not only at the national level, but also at the regional and sectoral levels. The variability observed in the PER index over the different periods and in the different regions highlights the usefulness of having tools that allow for a more detailed and segmented approach in identifying the risk profile.

References

Bátiz, E., Mohamed, A., Sánchez, F. (2021), Exploring the sources of loan default clustering using analytics. of survival with fragility, Banco de México Research Paper No. 2021-14.

Chen, T., and Guestrin, C. (2016). XGBoost: A scalable tree boosting system. In Preceedings of the 22nd International Conference on Knowledge discovery and data mining, 785-794.

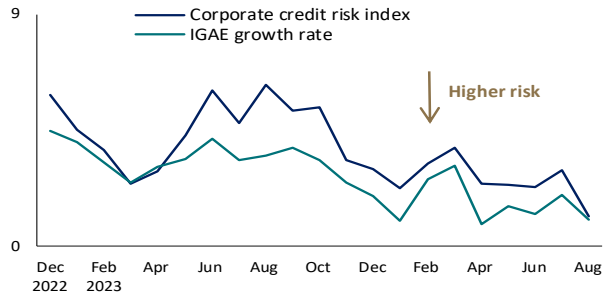
Xia, H., An, W, and Zhang, Z. J. (2023). Credit risk models for financial fraud detection: A new outlier feature analysis method of xgboost with smote. Journal of Database Management, 34, 1, 1-20.

Banks' Exposure to Changes in Inflation, Economic Activity and Formal Employment

In this section, we construct indicators that assess how the performance of economic activity, formal employment, and inflation affect the risk of corporate, payroll, mortgage, automotive, personal and for the acquisition of durable consumer goods (ABCD) credit.

For the analysis of the corporate portfolio, an indicator is used to show a higher credit risk when the economic growth rate declines, either in aggregate terms or in those sectors that have more credit participation.[62] As in the previous *Report*, the indicator continued to decrease, reflecting more credit risk for this portfolio (Graph 85). The decline was greater than that of the annual growth rate of the Global Economic Activity Index (IGAE). This was largely because the economic slowdown experienced in certain sectors, such as construction, which more than offset the higher growth rates observed in other sectors, such as professional services, that also have a greater share in credit than production.

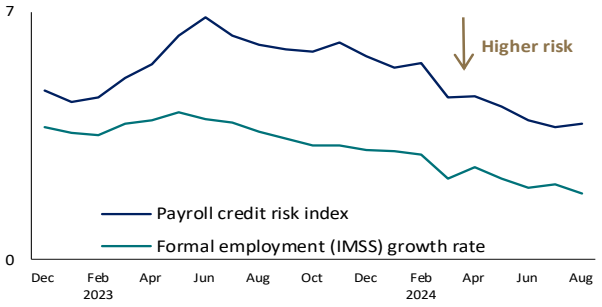
Graph 85
Corporate portfolio credit risk due to changes in economic activity
Annual variation in percent



Data as of August 2024.
Source: Banco de Mexico and INEGI.

In the payroll, mortgage and automotive portfolios, the indicator shows more credit risk when the growth rate of formal employment falls, either in aggregate terms or in the labor markets with greater participation in these portfolios.[63] Compared to the previous *Report*, the indicators decreased, reflecting a higher credit risk for the three portfolios under consideration (Graph 86).[64] The decline in the indicators surpasses the slowdown in employment growth. This is attributable to the fact that the slowdown was concentrated in higher-wage workers, who have a higher share in these portfolios than in formal employment as a whole. In addition, the sharper slowdown in this type of employment led to a greater increase in risk for mortgage loans, followed by automotive and payroll credit, in line with the participation of these workers in each of these portfolios.

Graph 86
Payroll portfolio credit risk due to changes in formal employment
Annual variation in percent



Data as of August 2024.
Source:Banco de Mexico and IMSS.

In the personal and ABCD portfolios, the indicator reflects the credit risk arising from changes in the inflation rate, measured through the National Consumer Price Index (INPC). Inflation is selected as the risk factor because in these portfolios the borrowers possess less purchasing power compared to other credit segments, thereby rendering them more vulnerable to rising prices.[65] Consequently, the indicator reflects higher risk when the annual inflation rate increases, whether general inflation or inflation within the categories in which these borrowers spend proportionally more.[66] Since the last version of this

[62] The risk indicator is constructed as the weighted average of economic growth in the different sectors. The weight received by each sector is equal to its share of corporate credit.

[63] In order to construct the indicators related to formal employment, the proportion of loans in each state is obtained, by gender and wage level, according to the information of workers affiliated to the IMSS. The threshold for high-wage formal employment is defined as the median of the historical wage distribution of borrowers.

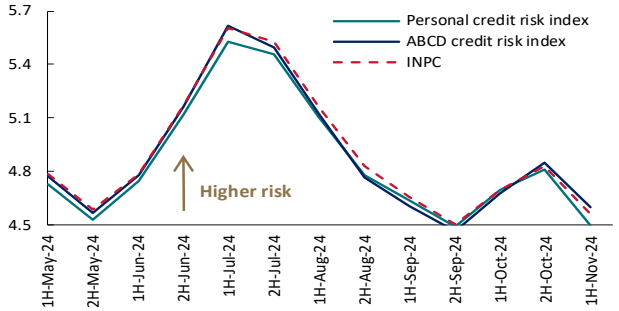
[64] The largest deterioration occurred in the mortgage portfolio, followed by the automotive and the payroll portfolios.

[65] See Box 1 Inflation and non-performing loan ratio in non-revolving consumer credit in the *Financial Stability* Report-December 2022.

[66] To construct the personal and ABCD portfolio indicators, the inflation exposure of each municipality is estimated, and then a national average is calculated, weighting each municipality by its share in each portfolio. The classification by object of expenditure of the INPC and economic activity by state is used, which provides detailed information on spending components such as food, education, leisure and housing, among others. This classification allows for a detailed analysis at the state level and type of expenditure component. This information differs from that provided by the CPI, its core and non-core subindices, and their respective disaggregates. An illustrative example is the housing

Report, the indicators have decreased, reflecting lower levels of risk (Graph 87). In the ABCD portfolio, this decrease was smaller than that of headline inflation because: (i) borrowers in this portfolio spend proportionally more on food, beverages and tobacco; and (ii) in this category the increase in inflation was greater than that of the INPC (which, in fact, decreased). In the personal portfolio, the decline in the indicator was, in the opposite direction, greater than that of headline inflation because: (i) in this portfolio, borrowers spend proportionally more on housing; and (ii) in this category, the decrease in inflation was greater than that of the INPC.

Graph 87
Credit risk in personal and ABCD portfolios due to changes in inflation
Annual variation in percent

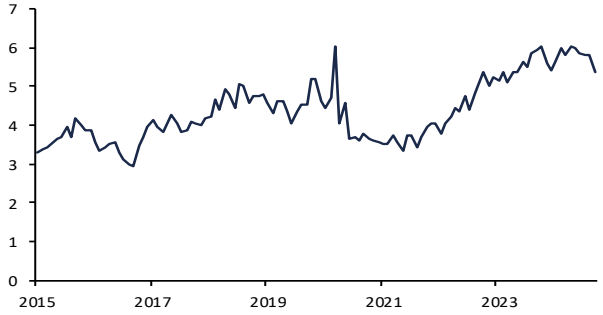


Data as of the first half of November 2024.
Source: Banco de Mexico and INEGI.

Market Risk

Banks' market risk, measured by the *CVaR* as a proportion of net capital, stood at 5.38% in September 2024, lower than the level prevailing in March 2024 (5.81%). This is due to changes in the composition of the portfolios, particularly in the positions with foreign exchange risk (Graph 88).[67]

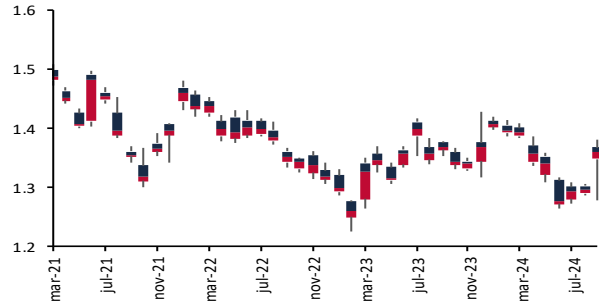
Graph 88
99.9% CVaR for commercial bank's market risk
Net capital percent



Data as of September 2024
Source: Banco de Mexico, CNBV, BMV, Bloomberg and Valmer

The sensitivity of the debt instruments portfolio to changes in interest rates, as measured by duration based on market data, decreased in the second and part of the third quarter of 2024.[68] This follows a two-year period in which they had increased marginally. This change is mainly due to the rebalancing of the institutions' portfolios towards variable rate securities. As of September 2024, duration stood at an average level of 1.35 years, which is below the level prevailing in March, which was 1.40 years (Graph 89).

Graph 89
Average monthly duration of commercial bank's position
Years



Data as of September 2024.
Source: Banco de Mexico and Valmer.

component: in the classification by object of expenditure, this component includes generics such as electricity and fuels. However, in the core and non-core classification of the INPC, the housing category (in the core subindex) excludes these items, which are classified in the non-core subindex as energy.

[67] The *CVaR* represents the 99.9% quantile of the loss distribution generated by historical simulation, which is generated with the observed 20-day changes in risk factors since 2004, applied to the positions of the date considered. Given the number of observations, the behavior of the Conditional *Value at Risk* is almost entirely explained by changes in portfolio composition, with a marginal effect of recent changes in risk factors.

[68] The increase in the system's duration in September was due to the rebalancing of debt portfolios in some institutions, which was reflected in an increase in the position of long-term debt instruments.

Box 3: Technological Advance, Social Networks and Depositor Perceptions

I. Introduction

The objective of this Box is to analyze the impact that social networks and technological advances may have on the stability of bank deposits. In particular, it analyzes the role of social networks and technology in relation to the speed of news dissemination and the ease of making bank withdrawals that could lead to a bank run, as well as their implications for financial stability. In addition, this box discusses the possible solutions to the challenges posed by these new trends, and explores the importance of a robust regulatory framework to maintain the stability of the financial system.

II. Background: Stress Events in the United States' Banking System in 2023

In March 2023, after facing significant withdrawals by depositors, three US regional banks, *Silicon Valley Bank (SVB), Signature Bank (SB) and First Republic Bank (FRB)*, were intervened and placed under disposal for resolution by the Federal Deposit Insurance Corporation *(FDIC*), representing the most severe disturbance of the US banking sector over a decade.[1]

In general terms, these events were attributed to the tightening of financial conditions and various factors related to inadequate risk management, resulting in the accumulation of significant vulnerabilities.[2]

These events were characterized by the speed and magnitude of massive withdrawals of deposits. For example, *SVB* and *SB* experienced daily average withdrawals of between 20-30% as a proportion of their total deposits prior to the run.[3] Most of these deposits were comprised of immediately demandable, uninsured deposits, from high-net-worth individuals (*FRB*), from a specific niche as they were depositors related to virtual assets (*Silvergate* and *SB*), and from accounts of large companies and *start-ups (SVB* and *SB*).

While the financial conditions and risk management of these institutions played an important role, the evidence points to the fact that social networks and the banks' digital platforms may have contributed to these events.

III. Information in the Age of Social Networks

Social networks have the potential to transform the dynamics of the financial sector by amplifying the speed and scope of information, even generating disruptions in the markets. In particular, they have revolutionized the generation and dissemination of information. News, ideas, rumors, and trends, such as the possible instability of a bank, can spread around the world through digital platforms in a highly interconnected system.

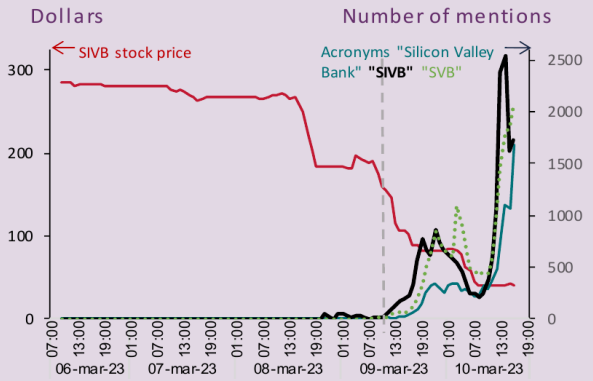
Likewise, sentiment on social networks influences the depositor confidence. Research indicates that negative sentiment regarding banks can lead to a decline in their retail deposits, which has a greater impact on less capitalized financial intermediaries.[4] Furthermore, it highlights that banks not directly affected by negative comments may be harmed if they are perceived as linked to those affected, i.e. there are contagion effects stemming from negative sentiments on social networks.

Bank runs are a phenomenon that may also be influenced by the increased use of social networks. Evidence suggests that exposure to social networks may amplify the risks associated with a bank run. For example, the failure of *SVB* was preceded by a surge in activity on the Twitter platform (now *X*) by apparent depositors who openly used words such as "withdraw" or "contagion" in their posts.[5] From the opening of the markets on March 6, 2023 at 9:00 a.m. until their closing on March 10 at 4:00 p.m. mentions of *SVB* on the X social network increased rapidly (Graph 1). Likewise, internet searches about the banks affected by the aforementioned deposit runs increased considerably at the start of these events (Graph 2).

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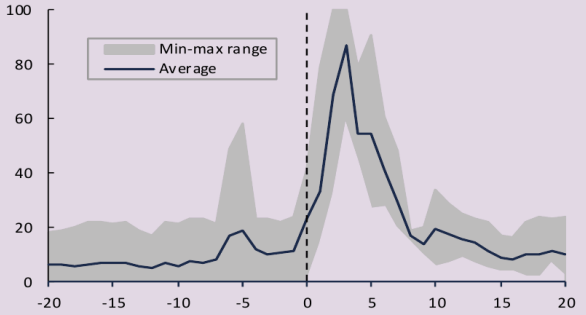
[1] See Box 6 "*Recent Developments in the US government debt ceiling*" of the Financial Stability Report - June 2023 for more detail.
[2] FSB (October 2024).
[3] FSB (October 2024).
[4] Accornero and Moscatelli (2023) show that a 1% drop in the sentiment index reduces retail deposit growth by 0.15% for banks with average capitalization, and up to 0.4% for less capitalized banks.
5 Cookson et al. (2024).

Graph 1
Silicon Valley Bank stock price and mentions on Twitter



Data as of March 2023.
Source: Cookson et al. (2023) with data from Twitter/X and FirstRate Data.
Note: The dotted line corresponds to March 9, 2023 9:00 hrs.

Graph 2
Banks with massive deposit withdrawals[1/]



Source: Google Trends; own calculations.
1/ Includes banks involved in the March 2023 events centered around the start of the bank run (SVB: 08/03/2023; Signature Bank: 10/03/2023; First Republic Bank: 10/03/2023; and Silvergate: 08/03/2023).

It is also important to note the key differences between open platforms (e.g., Facebook, Instagram, LinkedIn and X) and private groups (e.g., WhatsApp, Signal and Telegram). On the one hand, open platforms can be reviewed by everyone (including other banks or regulators) but quickly reach mass audiences, which could make damage control difficult. On the other hand, the dissemination of information in private groups is difficult to control, limiting the ability of banks and regulators to react effectively.[6] In particular, the creation of content on novel platforms typically is not subject to the accountability mechanisms or verification processes employed by traditional media, such as editorial filters, legal responsibility, and supervision by press councils and regulatory bodies,[7] which could mitigate uncertainty regarding the veracity of the information.[8]

Cookson et al. (2024) highlight the multifactorial nature of bank runs. On the one hand, X-posts might serve as an early warning indicator for banks already exhibiting vulnerabilities. On the other hand, emphasizes that the type of *SVB* and *SB* depositors likely influenced the severity of the runs, since they were mostly members of the technology community in the United States, who are more likely to utilize technological platforms for the dissemination of their perspectives. However, it is plausible that corporate depositors and high-net-worth clients possess alternative information sources, suggesting a need for caution regarding the role of social media.

Mexico is at a point of high digital interconnection and has a high capacity for immediate dissemination. Regarding the use of social networks and digital media, according to data from DataReportal, at the beginning of 2024, Mexico had 107 million Internet users and 90 million social network users,[9] along with 125 million active mobile phone subscriptions.[10]

IV. Technological Advances and the Speed of Deposit Transfer

In recent years, technological innovation has enabled banks to expand their services offering. Among these, real-time transfers are particularly relevant, enabling the mobilization of funds without time restrictions.

6 S&P Global (2024).
7 Newman et al. (2019).
8 Vosoughi et al. (2018).
9 DataReportal et al. (2024).

10 The same person may have more than one mobile subscription (for example, one for personal use and another for work), so the data is not necessarily indicative of the number of individuals with an active cellular line.

Digital wallets, which permit instantaneous payments without the use of cash or physical cards; or immediate access to savings accounts, which enables swift resource transfers, are also noteworthy.

Globally, there has been a notable increase in the adoption of mobile banking and online banking applications among retail depositors. The advent of novel technologies, facilitated by open banking,[11] banking-as-a-service (*BaaS*)[12] and artificial intelligence (AI), is poised to enhance the efficiency and speed of liquidity management and deposit transfers for large companies.

However, increasing the speed with which depositors can withdraw or transfer their money also increases the risk that, in the event of a loss of confidence on an institution, there will be a sudden and massive withdrawal of deposits. The search for yield, the ease of transferring resources, and the absence of a solid relationship with institutions may result in a heightened propensity among clients to withdraw their deposits.[13] Koont et al. (2024) estimated that banks with digital platforms have fewer stable deposits, thereby reducing their deposit franchise value by 40%.[14] In addition, demonstrated that the sensitivity to interest rate changes of banks based on digital platforms is more than twice that of traditional banks.

Digitalization may have played a significant role in facilitating the rapid outflow of funds prior to the failure of *SVB* and other regional banks in the United States. Withdrawals in regional banks exceeded, both in magnitude and speed, withdrawals during similar past crises (Table 1). However, these withdrawals were massive in terms of amounts, but not in terms of number of depositors.

Table 1

Deposit outflows in different stress episodes

Bank	Date run started	Deposit Insurance Coverage (%)	Total outflow (%)	Duration of outflow
Continental Illinois	07/05/1984	15	30	10 days (7 bus. days)
Washington Mutual	08/09/2008	74	10.1	16 days (12 bus. days)
Wachovia	15/09/2008	61	4.4	19 days (15 bus. days)
Silvergate	2022 Q4	11	52	7 days or less
Silicon Valley Bank	09/03/2023	6	25 +62*	1day + expected next day
Signature Bank	10/03/2023	10	20 +9*	1day + expected next day
First Republic	10/03/2023	32	57	7-14 days (5-10 bus. days)

Source: Rose, J. (2023).

Note: *Figures with asterisks are the expected amount of outflows that were scheduled to go out the next business day, but did not actually occur because the banks were closed.

In Mexico, increased digitalization has been observed in recent years. As of the second quarter of 2024, there were 94 million accounts linked to cell phones, representing a growth of 115% since the beginning of the pandemic (43.8 million accounts as of the first quarter of 2020).[15] These accounts constitute 60% of the total deposit and savings accounts (156.8 million), while in the first quarter of 2020 this proportion was only 35% of the total.[16]

Another innovation in recent years has been the introduction of AI into financial decision-making processes. These technologies, which operate with pre-established parameters and are fed by external information such as news or financial events, allow the automatic mobilization of resources, thereby enhancing the efficiency of depositors' decision-making.

However, it is essential to acknowledge the potential risks associated with the emergence of generative AI within the context of social networks and bank runs. This technology has the potential to facilitate the manipulation of social networks by rendering it difficult to distinguish between generated and real

[11] Open banking is defined as the sharing and leveraging of customer-permissioned data by banks with third party developers and firms to build applications and services. *BCBS* (2019).

[12] Banking-as-a-Service refers to the provision of banking products through third-party distributors, such as Fintech companies. Deloitte (2021).

[13] *EBA* (2021).

[14] The value of the deposit franchise is a function of deposit stability: how much and for how long depositors are willing to tolerate a return on deposits below the reference rate.

[15] CNBV. Financial Inclusion Database. Accounts correspond to the sum of commercial banks, Socaps and Sofipos.

[16] It is important to mention that not necessarily all accounts linked to the cell phone or with internet access use mobile banking. According to the National Survey on Availability and Use of Information Technologies in Households (Endutih), conducted by INEGI, the number of people who have a smart mobile device (*smartphone*) with internet access and who use mobile banking reached 24.8 million in 2022 (an increase of 3.5 million over 2021), and that figure was projected to reach 27.5 million users by 2023.

content, for both users and automated detection tools. For example, generative AI could be used to create high-quality fake messages and *deepfakes* that increase the spread of disinformation.[17] The risk could intensify if malicious actors use these technologies to discredit or undermine the credibility of financial institutions. Large-scale manipulations, such as false information about a bank's solvency, or advanced *astroturfing* strategies,[18] could generate uncertainty, incentivize the massive withdrawals of funds, and undermine the confidence in the financial system.

On the upside, while new technology may increase the risk of massive withdrawals, financial institutions can, in turn, develop AI tools to improve liquidity management and monitor withdrawal patterns.[19] Depositors can also take advantage of new technologies for decision-making and mobilizing resources.

However, in times of high volatility, these technologies may be inefficient to assess a longer horizon based on more fundamental economic and financial characteristics and, instead, respond mechanically to high-frequency movements in the markets. Thus, these characteristics of AI could increase the risk of massive withdrawals and generate a liquidity crisis that would otherwise not occur.[20]

V. Relevant Elements to Strengthen Perception and Confidence in a Digitalized Environment

In order to address the vulnerabilities delineated in this Box, as well as to respond promptly to liquidity shocks associated with these vulnerabilities, the following recommendations are proposed, some of which have been deliberated in various international financial organizations:

1. Innovation and Regulatory Oversight

The Financial Stability Board (FSB) proposes a regulatory framework proportional to the size and risk profile of digital banks with more stringent measures for larger entities, thereby enabling innovation without compromising financial stability by adhering to minimum security and solvency standards.[21]

2. Real-time Monitoring of Liquidity

The International Monetary Fund (IMF), the FSB and the Bank for International Settlements (*BIS*) have highlighted the importance of private financial intermediaries to adapt their liquidity oversight practices to the contemporary digital banking era. In this context, the implementation of advanced systems employing AI that facilitate real-time monitoring of deposit behavior stands out.[22]

Banco de Mexico requires the submission of daily information by institutions to calculate their liquidity indicators. In addition, institutions are obligated to immediately notify Banco de México in the case of a liquidity event or the anticipation thereof.

3. Communication Strategies and Collaboration Schemes

Effective communication by authorities can mitigate the likelihood of deposit withdrawals during crises.[23]

Financial institutions and authorities should assess and revise their crisis management frameworks, as well as manage the public perception and ensure clear and timely communication. The *FSB* also advises financial institutions to establish continuous communication protocols with financial authorities and their depositors. For example, implementing specialized social media monitoring systems and having teams that closely monitor conversations, trends, and perceptions about the financial system. In addition, they should provide depositors and

[17] Marcellino et al. (2023).
[18] *Astroturfing* seeks to create the fictitious appearance of broad social consensus on very specific issues. According to the Harvard Technology and Social Change Project, it is defined as "attempt[ing] to create the false perception of grassroots support for an issue by concealing [actor] identities and using other deceptive practices, like hiding the origins of information being disseminated or artificially inflating engagement metrics".
[19] Krogstrup et al. (2024).
[20] The *FSB* (October 2024) notes that the integration of AI into the decision-making processes of bank depositors can accelerate the transfer of funds. In addition, innovations in payments, such as the tokenization of money and assets or the increased use of digital wallets, could increase the propensity of depositors to move funds between financial institutions.
[21] See FSB (October 22, 2024).
[22] See IMF (2018), World Bank (2021), *FSB* (2019), BIS (2024), *BCBS* (2024) and Rainone (2024).
[23] Shakina et al. (2018); Sandri et al. (2023).

financial authorities with reliable information in real time, particularly in times of uncertainty.[24]

In Mexico, commercial banking institutions are obligated to devise and submit contingency plans to the CNBV, wherein they stipulate the measures to be implemented in the event of encountering solvency or liquidity challenges, along with communication strategies to address stress events.

The financial authorities, with the support of the IMF, have also conducted crisis simulations to test the communication strategies of both the authorities and the institutions.

4. Additional Tools to Quantify Risks

In addition, the *BIS* and the *FSB* emphasize the need to update stress tests, traditionally focused on macroeconomic shocks, to encompass scenarios where information dissemination, whether verified or unverified, could jeopardize financial stability. They also recommend that regulators, in collaboration with financial institutions, develop advanced technologies, such as the use of artificial intelligence, to enhance supervision and risk management. For example, Khan et al. (2024) employ advanced machine learning and deep learning models for analyzing the sentiment of investors who communicate through social networks. These tools would enable real-time monitoring and help identify and mitigate potential threats before they compromise the stability of the financial system.[25] Furthermore, the development of interoperability standards between digital banking platforms to facilitate seamless transactions and improve competition is included.[26]

In this regard, Banco de México has developed several projects based on the exploitation of information extracted from digital media and social networks, predominantly text-based, to develop indicators that facilitate the identification and tracking of pertinent events within the financial system, as well as the early identification of potential risk sources.

5. Ability to Access Central Bank Liquidity Facilities in a Timely Manner

It should be encouraged that banks be prepared to access central bank liquidity facilities in a timely manner in the event of massive deposit withdrawals.[27] This implies having a well-defined governance process for identifying liquidity needs and determining funding request. It is essential to be familiar with the relevant provisions, have signed contracts and have the necessary documentation, in addition to ensuring tested access to such facilities. Banco de México has implemented simulations to assess its own liquidity access, enabling institutions to evaluate their capacity to utilize these facilities.

6. Financial Education

The promotion of financial education within the population is paramount, particularly in distinguishing between traditional and digital banking institutions.

Banks are subject to stringent prudential regulations, and their deposits are protected by deposit insurance, whereas Non-Banking Financial Institutions (IFNB, its acronym in Spanish), which can also raise funds from the public, are also subject to proportional regulatory frameworks and have smaller deposit insurance coverage.

Conversely, regulatory authorities must constantly evaluate and modernize the regulatory framework to ensure that it is responsive to the risks associated with each type of institution and the evolution of the financial system, without impeding the integration of technological advancements, thereby facilitating the provision of more and better financial services.

VI. Conclusions and Final Comments

The digital era presents significant challenges regarding best practices to respond promptly to shocks or stress events. Technological advances and social media have accelerated the dissemination of information, which suggests the potential for these

[24] *FSB* (April 2024).
[25] *BCBS* (2024). Also, the IMF (October 2024) recommends that financial brokers disclose the use of AI, implement volatility management mechanisms and regularly map the interdependence between data, models and technological infrastructure.
[26] *FSB* (October 22, 2024).
[27] *FSB* (October 2024).

phenomena to contribute to mass deposit withdrawal events in the future.

To address these challenges, financial institutions and regulators must adapt their risk management and supervisory strategies, strengthen depositor confidence, implement advanced technologies to monitor deposit flows in real time, and develop rapid communication strategies to mitigate contagion effects.

The development of novel risk measurement tools, such as stress tests adapted to the challenges of digitalization and the rapid spread of information on social networks, is imperative.

Additionally, institutions and central banks must be prepared for expedited access to liquidity facilities, without compromising institutions' responsible management of liquidity risk.

Furthermore, central banks and regulatory authorities must promote financial education, as more educated users take better advantage of digital banking services and are less susceptible to technological risks.

It is important to emphasize that the March 2023 events in some regional US banks were not caused by technology or social media, but rather by inadequate risk management, which consequently gave rise to vulnerabilities and, ultimately, to bank runs. It is noteworthy that social media and technology may have served to intensify the velocity and magnitude of these runs. This highlights the need for a robust regulatory framework and its compliance, in order to timely manage liquidity and solvency vulnerabilities that could lead to massive deposit withdrawals.

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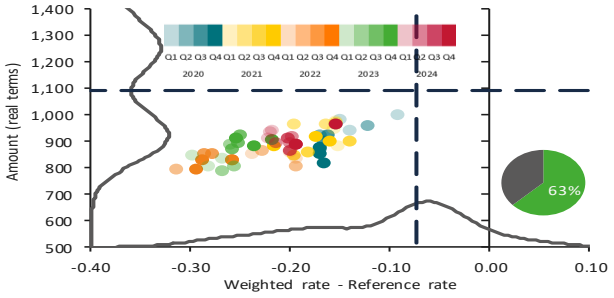
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Repurchase (repo) funding and unsecured funding

The repo market remains dynamic and continues to be an important source of funding for the banking sector. However, during the second half of 2024, for Domestic Systemically Important Banks (DSIBs) the amount, in real terms, of repo funding received from banks remains below the historical median and without significant changes since the third quarter of 2023; the spread between funding rates in the repo market and the reference rate closed in this same period (the former being lower than the latter) and was around 0.16 basis points below the target rate (Graph 90). For the rest of the institutions, the amount, in real terms, of repo funding during the second half of 2024 is at historically high levels; while the spread remained stable in this period with respect to the first semester of 2024 and is located around 0.09 basis points below the reference rate (Graph 91).

Graph 90
Repo Market [1/]
DSIBs [2/, 3/]
X axis: Basis points
Y axis: Billions of pesos

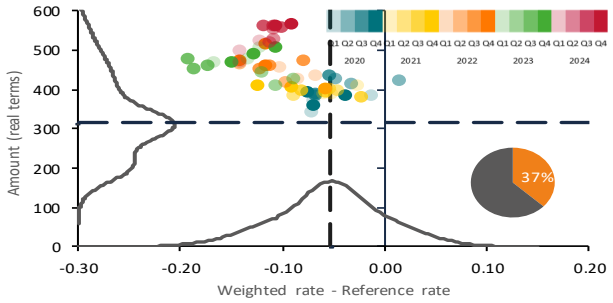


Data as of November 2024.

Source: Banco de Mexico.

1/ Data includes all authorized counterparties and all types of collaterals.
2/ Data points correspond to monthly weighted average of the daily observations for rates' spread and simple monthly average for the amount.
3/ Dotted lines correspond to medians calculated since 2008.

Graph 91
Repo Market [1/]
Non DSIBs [2/, 3/]
X axis: Basis points
Y axis: Billions of pesos



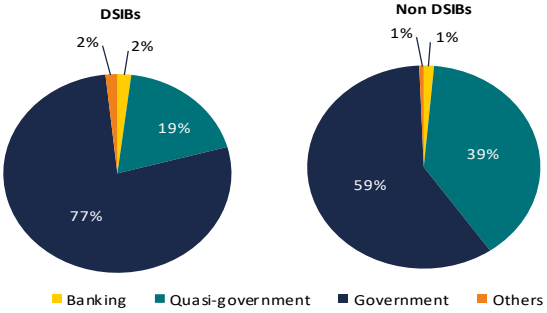
Data as of November 2024.

Source: Banco de Mexico.

1/ Data includes all authorized counterparties and all types of collaterals.
2/ Data points correspond to monthly weighted average of the daily observations for rates' spread and simple monthly average for the amount.
3/ Dotted lines correspond to medians calculated since 2008.

As for the type of securities that institutions use for collateral within the repo market, the majority are government instruments.[69] However, non-DSIBs repo quasi-government securities[70] in greater proportion than DSIBs (Graph 92).

Graph 92
Collaterals in the repo market
Percent



Data as of November 2024.
Source: Banco de Mexico.

Additionally, the average term of transactions in the repo market increased slightly this year, showing a weighted average of 2.1 days from January to November 2024; compared to 1.9 days in 2023 (Graph 93).

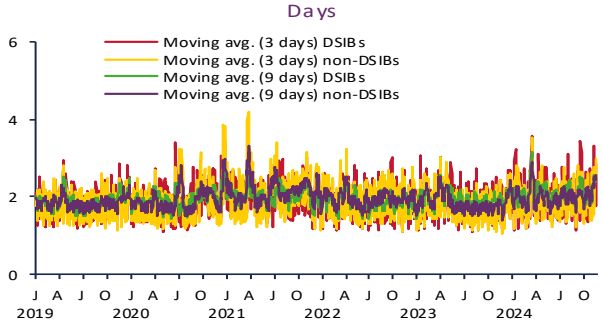
[69] Federal Government Bonds: Bondes D, Bondes F, Bondes G, udibonos, development bonds; federal government certificates; BREMS.

[70] Federal government institutions (Institute for the Protection of Bank Savings), federal public administration entities (development banks), state owned companies (Pemex and *CFE*), and state and municipal entities.

It is important to note that recent modifications to the regulation on repo transactions for credit institutions[71] could have implications on the volume and characteristics of transactions in the interbank repo market.[72]

Graph 93

Term of securities traded in the repo market 1/

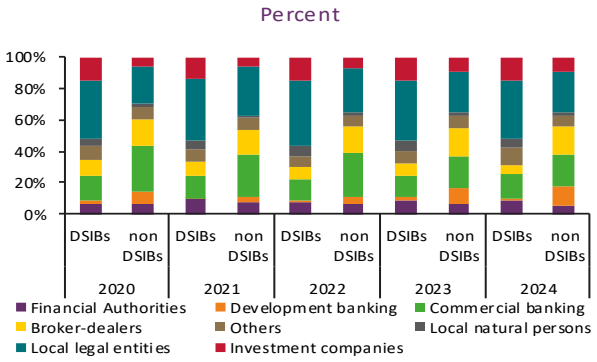


Data as of November 2024.
Source: Banco de Mexico.
1/ Weighted average by traded amount.

The main counterparties with which banks operate in the repo market, ranked by total amount, are local legal entities,[73] followed by commercial banks. The latter presented the greatest increase so far this year for both DSIBs, with an increase of 24%, and non-DSIBs, with an increase of 25% (Graph 94). With respect to interconnections between groups of institutions and counterparties within the system, repo funding from investment companies to development banks predominate, as well as from legal entities to the DSIBs (Graph 95).

Graph 94

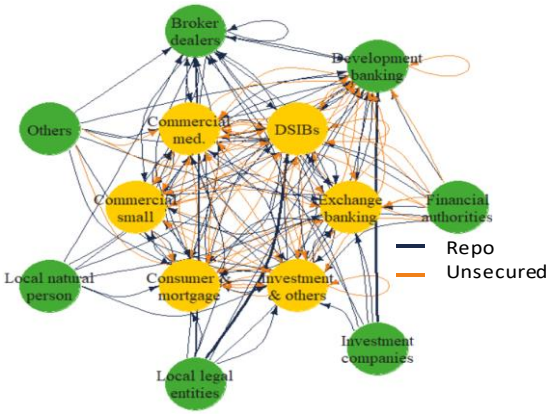
Amount traded in the repo market by counterparties 1/, 2/



Data as of November 2024.
Source: Banco de Mexico.
1/ Percetages correspond to the annual average of the total daily trades for each counterparty over the annual total, for each type of institution.
2/ Others: lessor, surety, Siefores, insurance, treasury companies.

Graph 95

Interconnections in the repo and unsecured market 1/, 2/



Data as of November 2024.
Source: Banco de Mexico.
1/ A → B: group B receives funding from group A.
2/ The thickness of the arrows corresponds to the average of the total amounts operated daily by group in 2024.

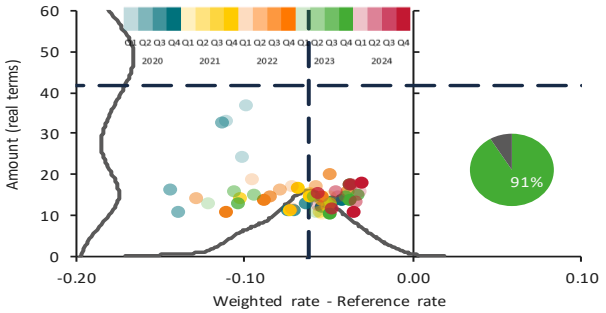
On the other hand, financing in the unsecured market remains relatively low. For non-DSIBs, the amount in real terms is at historic low levels since 2008. As for rate spreads, they are located around the median and show little variation in both cases since the last *Report* (Graph 96 and Graph 97).

[71] Banco de México Circular 7/2024: Amendments to the rules to be followed by credit institutions, investment funds, specialized retirement fund investment companies, general deposit warehouses, insurance companies, surety companies, regulated multiple purpose financial companies that maintain equity links with a credit institution and the *Financiera Nacional de Desarrollo Agropecuario, Rural, Forestal y Pesquero*, in their repurchase transactions.

[72] See Box 2: "Rules for Repurchase Agreements: modifications to incorporate international standards and practices" of the Financial Stability Report - June 2024.

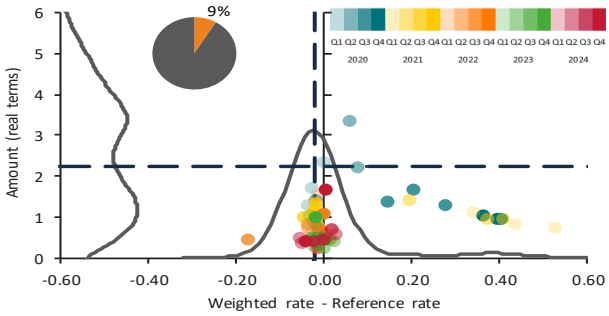
[73] Legal entities resident in Mexico (other than reserve funds, financial brokers and treasury departments), economic development funds and trusts, and brokerage service companies.

Graph 96
Unsecured market
DSIBs [1/, 2/]
X axis: Basis points
Y axis: Billions of pesos



Data as of November 2024.
Source: Banco de Mexico.
1/ Data points correspond to monthly weighted average of the daily observations for rates' spread and simple monthly average for the amount.
2/ Dotted lines correspond to medians calculated since 2008.

Graph 97
Unsecured market
Non DSIBs [1/, 2/]
X axis: Basis points
Y axis: Billions of pesos



Data as of November 2024.
Source: Banco de Mexico.
1/ Data points correspond to monthly weighted average of the daily observations for rates' spread and simple monthly average for the amount.
2/ Dotted lines correspond to medians calculated since 2008.

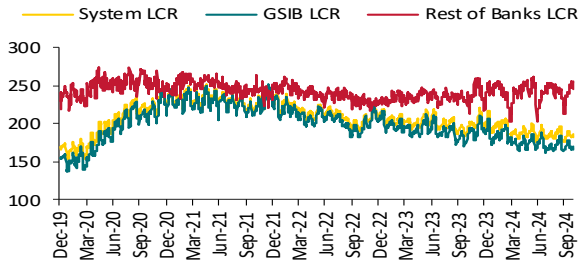
Liquidity Risk

Commercial banks maintain ample liquidity positions according to various metrics, and maintain levels above the minimum regulatory requirements.

The aggregate Liquidity Coverage Ratio (LCR) of banks, an indicator of the sufficiency of liquidity to withstand a stress event during a thirty-day horizon, was around 190 percent during the period covered by this *Report* (Graph 98); in other words, banks as a whole have sufficient liquid assets to meet almost twice the liquidity needs calculated under the stress scenario posed by the LCR.

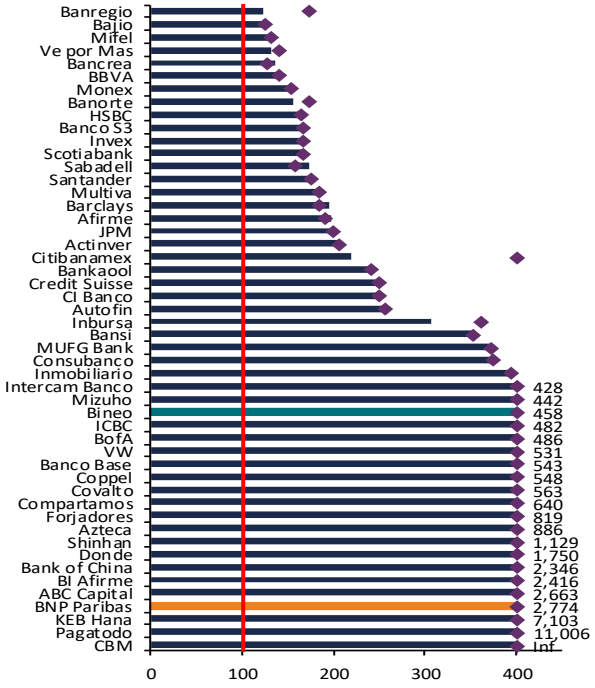
Likewise, each bank maintained a LCR higher than the regulatory minimum (Graph 99). Although liquidity levels remain high, they are gradually returning to pre-pandemic levels.

Graph 98
Daily LCR of the banking system and by groups of banks
Percentage



Data as of October 31, 2024.
Source: Banco de México.

Graph 99
LCR of commercial banking institutions [1/]
Percentage

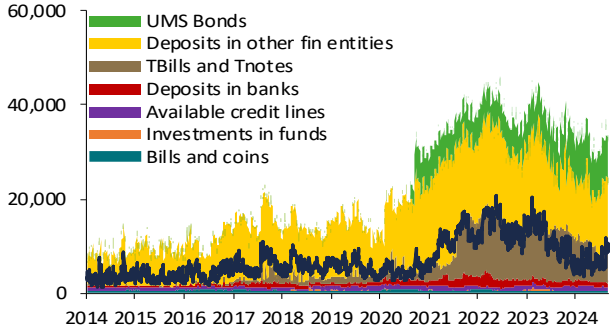


Data from July to September 2024.
Source: Banco de México and CNBV.
1/ The graph shows the quarterly average of the LCR for each bank from July to September 2024. The bar shows the consolidated LCR and the rhombus the individual LCR. In accordance with the regulation, banks marked in dark blue must meet a minimum LCR of 100%, banks marked in orange a minimum of 70%, and Banks marked in turquoise are not yet subject to a minimum requirement.

Banks also maintain a large surplus of liquid assets in foreign currency with respect to the regulatory

requirement. And, as is the case for the LCR, at the individual level, every bank in Mexico complies with the regulatory requirement in foreign currency (Graph 100).

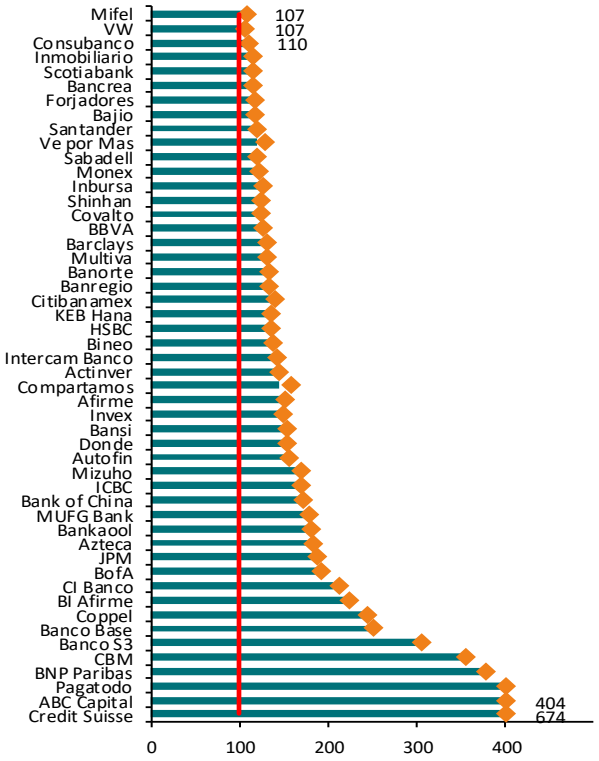
Graph 100
Liquidity requirement in foreign currency and liquid assets
Millions of USD



Data as of October 31, 2024.
Source: Banco de México.

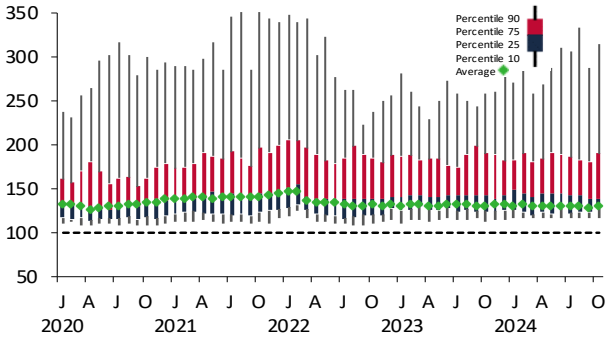
The Net Stable Funding Ratio (NSFR) suggests that banks maintain a balance sheet structure with sufficient stable funding to finance their lower-liquidity and longer-term assets. All banks maintained a NSFR above the regulatory minimum of 100% in the third quarter of 2024 (Graph 101). This indicator has remained relatively stable and above the regulatory minimum since its implementation in March 2022 (Graph 102).

Graph 101
NSFR of commercial banking institutions 1/
Percentage



Data from July to September 2024.
Source: Banco de México and CNBV.
1/ The graph shows the quarterly average of the NSFR for each bank from July to September 2024. The bar shows the consolidated NSFR and the rhombus at a stand alone level.

Graph 102
NSFR Distribution
Percentage

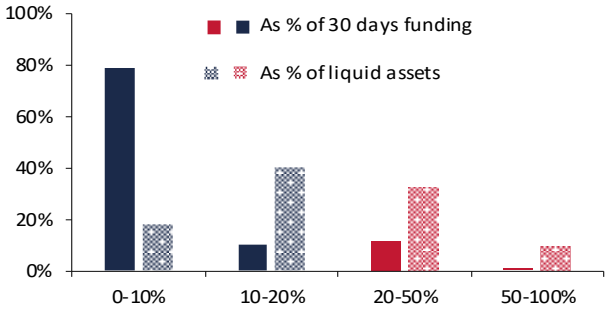


Data as of October 2024.
Source: Banco de México.

Funding concentration, another indicator of banks' liquidity risk, has remained generally stable. At the aggregate level, the level of banks' liquid assets would

be sufficient to meet large withdrawals[74] from the ten largest creditors. However, some medium and small banks have a significant concentration of their funding with large depositors, which represents a risk in the event that one or more of these depositors decide to withdraw their resources. It is essential to monitor the behavior of large creditors and avoid excessive concentration in a few sources of funding, in order to prevent a sudden deterioration in the liquidity of highly concentrated institutions. Nevertheless, the level of systemic risk associated with funding concentration is low (Graph 103).

Graph 103
Funding concentration of the 10 largest counterparts maturing within 30 days 1/, 2/
Vertical axis: proportion of total assets of the system
Horizontal axis: percentage that the 10 largest funding counterparts as a proportion of liquid assets and 30 days funding



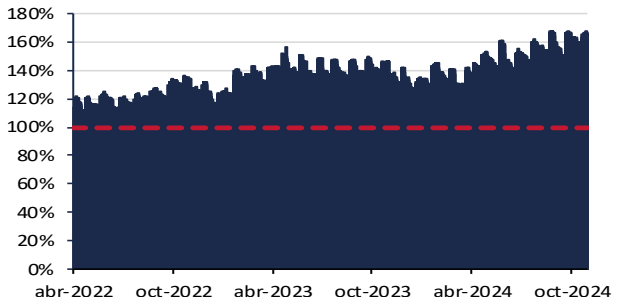
Data as of October 31, 2024.

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.

Another risk factor is the exposure to contingent liquidity needs, such as, for example, a considerable proportion of borrowers simultaneously using credit lines granted by commercial banking institutions. The total balance of credit lines granted by banks has increased since 2022, as has the undrawn portion of these lines. Although these are mostly revocable lines, cancelling or denying the exercise of these lines would imply challenges from an operational and reputational standpoint, and some banks could see their liquidity pressured if a significant proportion of these lines were to be exercised (Graph 104).

Graph 104
Undrawn credit lines granted by banks
% of liquid assets

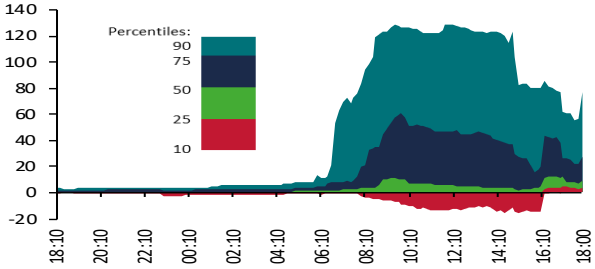


Data as of October 31, 2024.

Source: Banco de México.

Regarding intraday liquidity, although all banks hold sufficient liquid assets to cover their intraday liquidity overdrafts, some small banks often experience relatively large intraday liquidity needs with regard to their available liquid assets. However, the net cumulative intraday liquidity position[75] suggests that, in general, banks are able to cover their liquidity needs at times when they face the highest demands for payments and transfers (Graph 105).

Graph 105
Net cumulative intraday liquidity position (received payments minus sent payments) 1/
Vertical axis: Percentage of deposits in Banxico
Horizontal axis: Hours (10 minute intervals)



Data from July to September 2024.

Source: Banco de México.

1/ Net cumulative intraday liquidity position refers to intraday payments received minus payments sent, it allows identifying times of the day with liquidity deficit and its magnitude with respect to available liquidity. The total payments sent and received are normalized as a proportion of liquidity in Banco de México (DRM, unencumbered deposits in pesos and dollars). The graph presents the percentiles of distribution per hour in 10-minute intervals, considering average observations for the quarter.

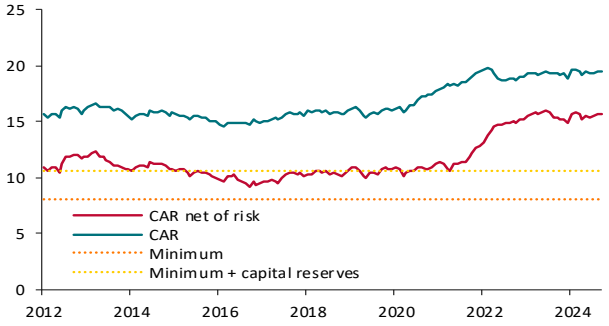
[74] Outflows equivalent to the 90th percentile of the historical outflows.
[75] Intraday liquidity risk is monitored through specific indicators for this purpose. One of these indicators is the net cumulative intraday liquidity position, which refers to payments received minus payments sent, measured throughout the day (intraday operation). This indicator makes it possible to identify the times when total payments sent exceed total payments received and their magnitude with respect to available liquidity.

CAR and LCR at risk

At the end of September, it can be seen that most banks have sufficient capital and liquid assets to face stress situations. This is concluded based on the analysis of the net-risk capitalization adequacy ratio (Net-risk CAR) and the Liquidity Coverage Ratio (LCR) at risk for commercial banking institutions.

On the one hand, the net-risk CAR, which is estimated as the resulting CAR after portfolio losses equivalent to the *CVaR* at 99.9%,[76] remained at stable levels during the second and third quarters of 2024, at a level of 15.70% and 15.64% in March and September, respectively (Graph 106). This is the result of the stable behavior of both the CAR of the system and the risk of the credit portfolio. The levels of this indicator for the financial system continue to be higher than the regulatory minimum, which shows the banks' capacity to absorb unexpected losses derived from the credit default of their portfolios.[77]

Graph 106
Net-risk CAR [1/]
Percent



Data as of September 2024.
Source: Bank of Mexico, 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.

On the other hand, according to the LCR at risk[78] analysis, the banking system has a solid liquidity position. Most of the banking institutions, which represent around 94% of the system's total assets, maintain a LCR at risk above the regulatory minimum level of 100%, even in scenarios of extreme deposit outflows (Table 1). The component with the greatest negative impact in this exercise corresponds to outflows of retail deposits.

Table 1
Bank groups by LCR at risk[1/]

Group	Criteria	Assets of the bank groups as a share of total commercial banks assets
1	LCR ≤ 65	4.2%
2	65 < LCR ≤ 100	2.0%
3	LCR > 100	93.8%

Data as of September 2024.
Source: Banco de México.
1/ Total assets data for commercial banks refer to those released by the CNBV at the end of September 2024.

When performing the analysis on an aggregate basis, the results show that the Mexican banking system has sufficient liquid resources to withstand periods of stress associated with extreme outflows of deposits from the system.

In addition, no second round effects were identified when assuming that those institutions which in this exercise result below the regulatory minimum level would stop renewing financing granted in the interbank repo market. It is observed that, on average, the non-renewed financing would represent 2.3% of the total liquid assets and inflows of the institutions receiving repo funding from the banks impacted in the first exercise. It is important to note that the collateral used in these operations corresponds to highly liquid assets, so even if the volume of repo financing granted were higher, it is estimated that the impact would be minimal as long as there were other sources of financing accepting these assets as collateral.

[76] For this exercise it is assumed that losses are absorbed directly with the banks' capital without affecting their reserves and that such portfolio has a 100% weighting for the determination of its capital requirement. This indicator can be used to assess whether a bank's capitalization levels are adequate to cope with unanticipated losses in its loan portfolio.

[77] As these estimates are based on historical conditions observed to date, this indicator is a reference and not a forecast of the potential losses that could be observed in the current situation.

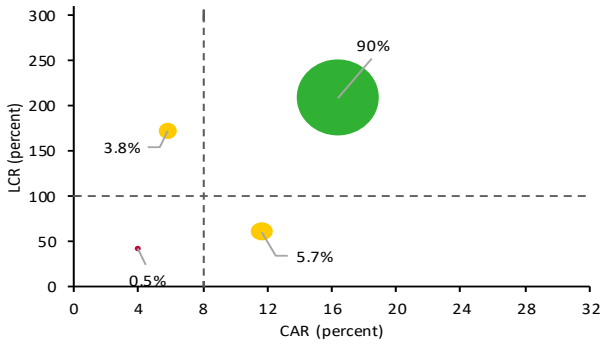
[78] The purpose of the LCR at risk exercise is to evaluate whether commercial banking institutions have sufficient liquid assets (cash and high-quality securities) to meet their net outflows over a 30-day stress period. For this purpose, outflow factors are estimated based on historical information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

Finally, a joint evaluation of the results of the LCR at risk and CAR net of risk exercises shows that, at the end of September, most institutions maintained levels above the regulatory minimum in at least one of the two requirements, under these stress scenarios, which represents around 99.5% of the system's assets (Graph 107).

Graph 107

LCR at risk and net-risk CAR of commercial banks 1/

Asset-weighted average



Figures as of September 2024.

Source: Banco de México.

1/ The lines show the regulatory thresholds for the liquidity requirement (LCR = 100 %) and the minimum capitalization requirement (CAR = 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 This section presents the results of the contagion risk analysis[79]. This exercise uses the network of exposures between financial institutions in the interbank market and analyzes the mechanisms that allow the propagation of risks and vulnerabilities to the entire financial system. Daily information is used for all exposures in the domestic financial system, as well as between financial institutions abroad. [80]

The contagion risk, as measured by both the percentage of bank and broker-dealer assets involved in the most severe contagion chains[81] (Graph 108), and the severity of losses (Graph 109), has increased since January 2023. In particular, a significant increase was observed in the second quarter of 2024, before returning to the average level recorded during 2023.

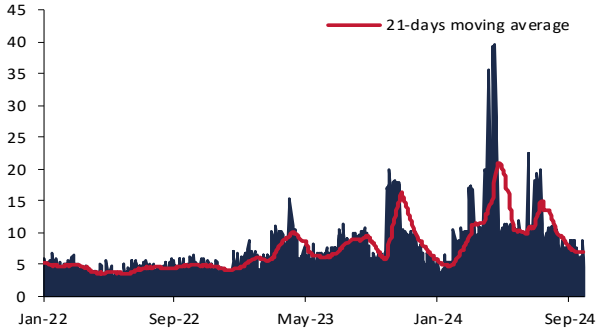
A common feature of these periods is the increased number of brokers raising their exposures relative to their capital. This phenomenon is evidenced by the rise in the number of overexposed brokers[82] (Graph 110), which renders them more vulnerable to potential contagion events, as reflected in the number of brokers affected in the contagion chains.

During this period, particularly from June 2023 onwards, a change in the structure of the network (Graph 111) was observed: This involved a decrease in both density and disassortativity[83], accompanied by an increase in reciprocity. This implies a less connected network of exposures, but with exposures more concentrated in larger brokers. This greater concentration in exposures is reflected in the counterfactual exercise in an increase in potential losses and in the number of banks affected in the contagion exercise.

Graph 108

Percentage of bank's and brokerage firm's assets involved in the most severe contagion chains

Percentage



Data as of September 30, 2024.

Source: Banco de México.

[79] Interbank contagion risk refers to the possibility that the problems faced by a bank in meeting its financial commitments may be transmitted to other banks, either directly or indirectly.

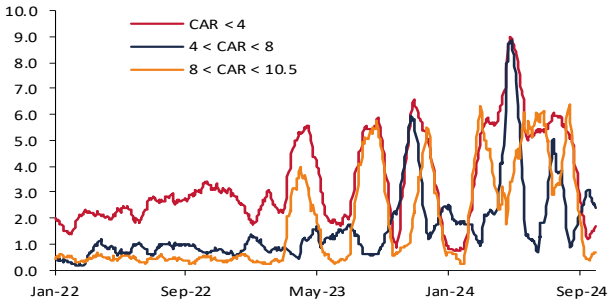
[80] It considers information on exposures in the interbank network, originated by: (i) the purchase and sale of securities; (ii) deposits and loans; (iii) market transactions, such as derivatives and repurchase agreements; and (iv) foreign currency purchase and sale transactions.

[81] To determine which is the most severe contagion chains for each date, a counterfactual exercise is carried out to evaluate the impact that the bankruptcy of each of the brokers analyzed would have on the financial system. The most severe contagion chain in a given date is the chain that present the higher losses.

[82] A broker is overexposed if the total of its inter-financial exposures exceeds the amount of capital it has available to absorb such losses, without remaining below the regulatory minimum.

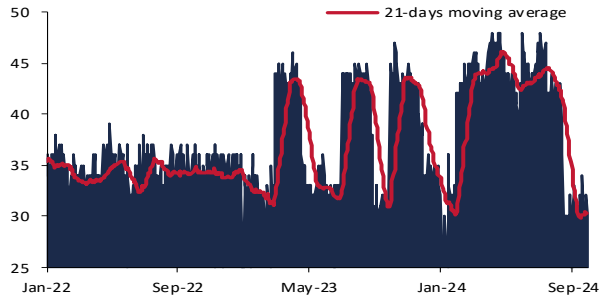
[83] *Disassortativity* is defined as a greater propensity for brokers, generally not very interconnected, to seek greater relationships with highly interconnected brokers, suspending interrelationships with others that are not very interconnected.

Graph 109
Percentage of the bank's assets lost in the most severe contagion chains by final CAR Levels [1/]
Per hundred



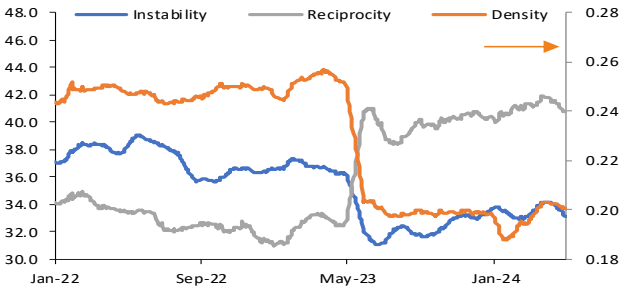
Data through September 30, 2024.
Source: Banco de México.
1/ The graphed series relates to the simple 21-days moving average of the original series.

Graph 110
Number of banks and brokerage firms overexposed
Units



Data as of September 30, 2024.
Source: Banco de México.

Graph 111
Measures of the interfinancial exposure network [1/]
Per hundred



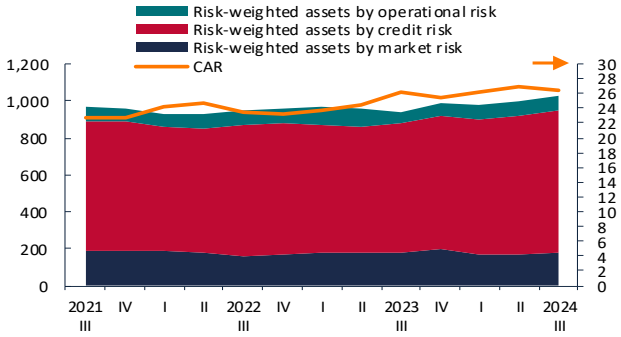
Data through September 30, 2024.
Source: Banco de México.
1/ The graphed series relates to the simple 21-days moving average of the original series.

IV.3.2. Development Banks and Other Financial Institutions

As of September 2024, development banks and other financial institutions[84] remained financially sound. The system evolves favorably in the main items of the financial statements, in which a positive net income and a growing capitalization index stand out.

As of September 2024, development banks had comfortable capital levels; the system's CAR was 26.4%, 20 basis points (bps) higher than in September 2023. Net capital increased 10.0% annually as a result of the profits obtained, while total assets subject to total risk increased 9.2% in the last year, mainly due to the increase in credit risk-weighted assets (Graph 112). It is worth mentioning that CAR has shown an upward trend in recent years driven by rising profits.

Graph 112
Development banks Capital Adequacy Rate
Left axis: billions of pesos
Right axis: percentage



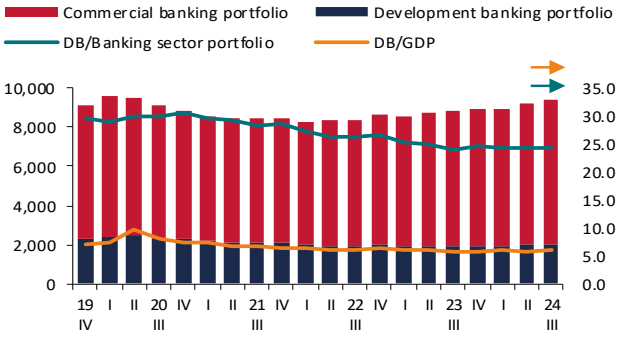
Figures as of September 2024.
Source: CNBV.

At the same date, the development banks system registered a direct and induced financing balance [85] of 2,030 billion pesos, equivalent to 24% of the total financing of the banking sector and 5.9% of the GDP; in the last year its significance in the sector increased by 31 bp, while in GDP it remained practically the same (Graph 113).

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

[85] Development banks and other financial institutions fulfill their mandate by: a) providing financing through first- and second-tier credit, "direct credit", and the provision of guarantees, "induced credit", which refers to the amount of final credit that has a percentage of guarantee coverage; b) operating special development programs, c) technical assistance and d) operating as a financial agent.

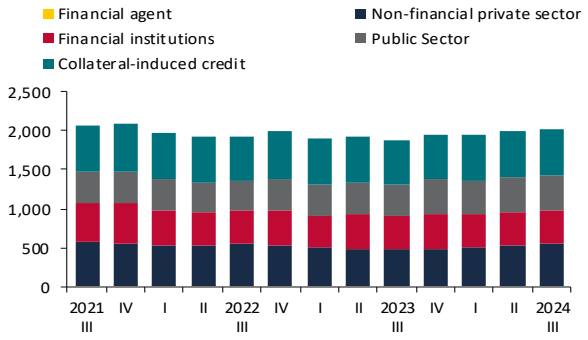
Graph 113
Development banking system significance within the banking sector
Left axis: Billions of pesos
Right axis: percentage



Figures as of september 2024.
Source: CNBV.

The financing balance of development banks registered an annual growth of 7.6% in real terms. First-tier credit grew 10.6% in real terms compared to September 2023; this is mainly explained by the 10.0% real increase in credit to the government sector and 15.9% real increase in credit to the private sector (Graph 114). As for second-tier credit and induced credit, they grew by 2.4% and 3.0% in real terms, respectively. At the same date, direct credit accounted for 70% of the financing and 30% of guarantee- induced credit (Figure 2).

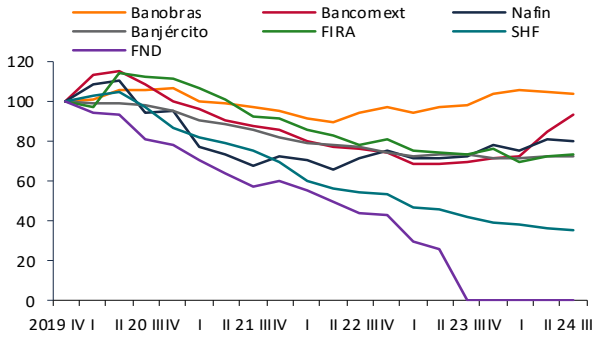
Graph 114
Evolution of loan balances and induced credit balances from development banking system
Billions of pesos



Figures as of September 2024.
Source: CNBV.

The balance of the loan portfolio showed a mixed performance among institutions, with *Bancomext*, *Nafin*, and *Banobras* presenting real annual increases of 34.0%, 9.6%, and 6.3%, respectively, mainly explained by the positive effect of the exchange rate depreciation on the foreign currency portfolio and financing to state-owned companies[86]. These increases offset the real annual decrease of 17.2%in SHF's credit portfolio and the 2.3% decrease in Banjercito's credit portfolio (Graph 115).

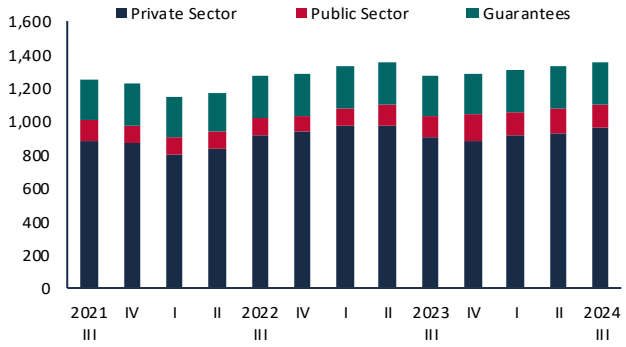
Graph 115
Evolution of loan portfolio by institution
Index (December 2019 = 100)



Data as of September 2024.
Source: CNBV and Banco de México.

The placement of credit and guarantees, defined as the amount dispersed in the last 12 months, presented a real annual growth of 7.0% as of September 2024 (Graph 116). This is explained by the 11.0% real increase in lending to the public sector, followed by 9.5% in guarantee products and 5.8% in the private sector. Of note is the 25% real annual increase in the amount granted by *Bancomext*, which is due to the placement of first-tier credit to private sector and exchange rate movements.

Graph 116
Loan and guarantee placement flows from development banking system (12M)
Billions of pesos



Data as of september 2024.
Source: CNBV and Banco de México.

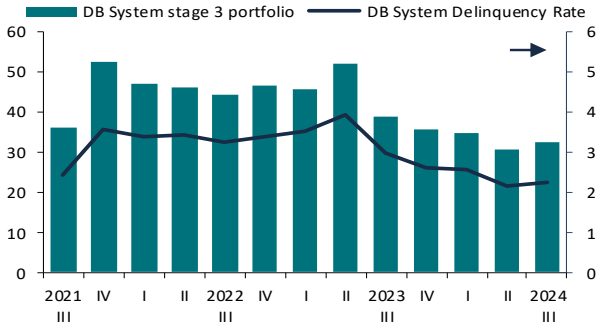
[86] Following the recent approval of the Energy Reform by the Chamber of Deputies, the Senate and the majority of local Congresses, Pemex and *CFE* have returned to being state-owned public companies.

The concentration of the development banks' loan portfolio in terms of borrowers is relatively low and has remained at similar levels the last few years.[87] Ninety-one percent of the portfolio is concentrated in the highest regulatory credit ratings (A1/A2 *CNBV* scale).

As of September 2024, the stage 3 portfolio[88] (non-performing portfolio) stood at 32,310 million pesos and registered a contraction of 17% in real terms compared to the same month of the previous year. This is mainly due to the fact that some loans were reclassified to stage 1 or were settled in their entirety. It should be noted that 62% of the stage 3 portfolio is concentrated in 10 counterparties. On the one hand, loan portfolio provisions showed a real annual decrease of 13.0%.

In September 2024, the non-performing loan ratio of the development banks system was 2.26%, 72 bps lower than in September 2023 (Graph 117). As a reference, the non-performing loan ratio of the commercial banks' commercial portfolio reached 1.46% on the same date.[89]

Graph 117
Evolution of "Stage 3" portfolio from development banking system
Left axis: billions of pesos
Right axis: percentage

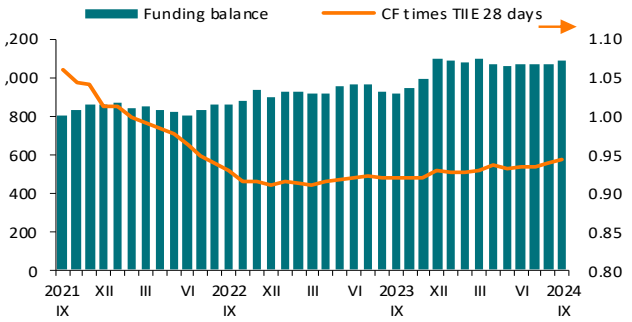


Data as of September 2024.
Source: CNBV and Banco de México.

As of the same date, credit induced by guarantees represented 2.4 times the contingent balance and induced credit registered a decrease of 3.0% in real terms over the last year. This was due to the increase in the balance recorded by *Nafin* and *Bancomext*, which was offset by the decrease recorded in Banobras.

The main sources of funding for development banks are promissory notes with yields payable at maturity (PRLV) and securities issued with a 64% and 29% share, respectively. Eighty-eight percent of funding has a maturity of less than three years, while the cost of funding remains at levels below the 28-day TIIE (TIIE, its acronym in Spanish) (Graph 118).

Graph 118
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).

In terms of market risk, Banobras, Nafin and *Bancomext* account for 74% of the development banks' investments in securities. Seventy percent of the securities have a term to maturity of less than 3 years and most of them are government instruments. Market portfolio has remained stable over the last few years.

Liquidity conditions in development banks and other financial institutions have remained stable. Internal liquidity indicators are within the established limits, resulting in a healthy risk profile. [90]

The financial margin as of September 2024 was 9.3% higher than that of the previous year and is mainly explained by higher interest income from the loan portfolio. The increase in interest income was sufficient

[87] The Herfindahl-Hirschman Index is 104 in the aggregate; the highest levels among development banks correspond to SHF with 415 and Banobras with 310. Thus, exposure to the ten borrowers with the highest balances per institution represents between 18% and 57% of their total portfolio, as well as between 1.0 and 3.3 times their core capital.

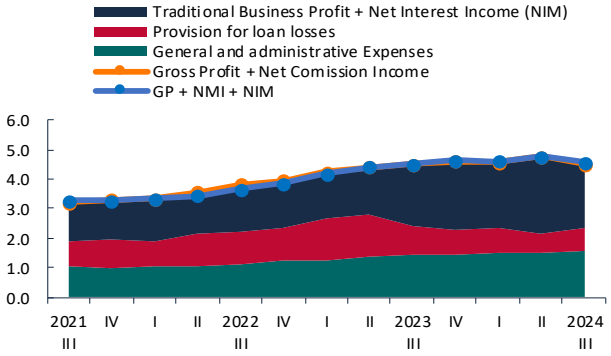
[88] With the entry into force of IFRS9 by 2022, the loan portfolio is now classified in 3 stages, according to the level of risk and impairment: in general terms, stage 1 incorporates those loans less than 30 days past due, stage 2 those between 30 and 89 days past due, and stage 3 those 90 days or more past due. For more information see: Box 5 "Adoption of IFRS9 accounting criteria", from the Financial Stability Report, June 2022.

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

[90] The Liquidity Coverage Ratio is not applicable to development banks. However, development banks repurchase it to the *CNBV*.

to offset the increase in expenses and the creation of loan-loss provisions (Graph 119).

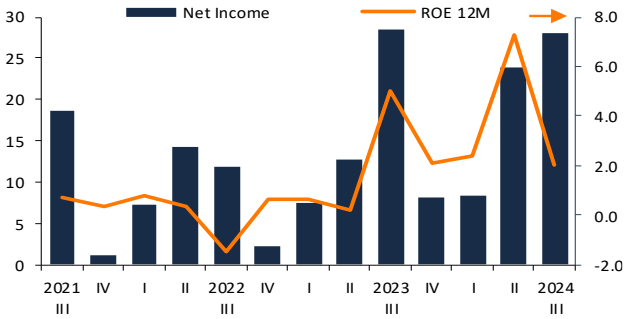
Graph 119
Performance indicators (proportional to Net Productive Assets)
Percentage



Data as of September 2024.
Source: CNBV and Banco de México.
Cumulative figures from the last 12 months.

At the same date, the development banks system as a whole reported a net income of 28,102 million pesos, 1.2% lower in real terms than the previous year. This performance was mainly due to the increase in the amount of income withdrawn by the Federal Government (*aprovechamientos* in Spanish) at the end of the third quarter of 2024.[91] The system's annualized *ROE* indicator stood at 2.0% (Graph 120).

Graph 120
Net income and ROE (12M) from development banking system
Left axis: billions of pesos
Right axis: percentage



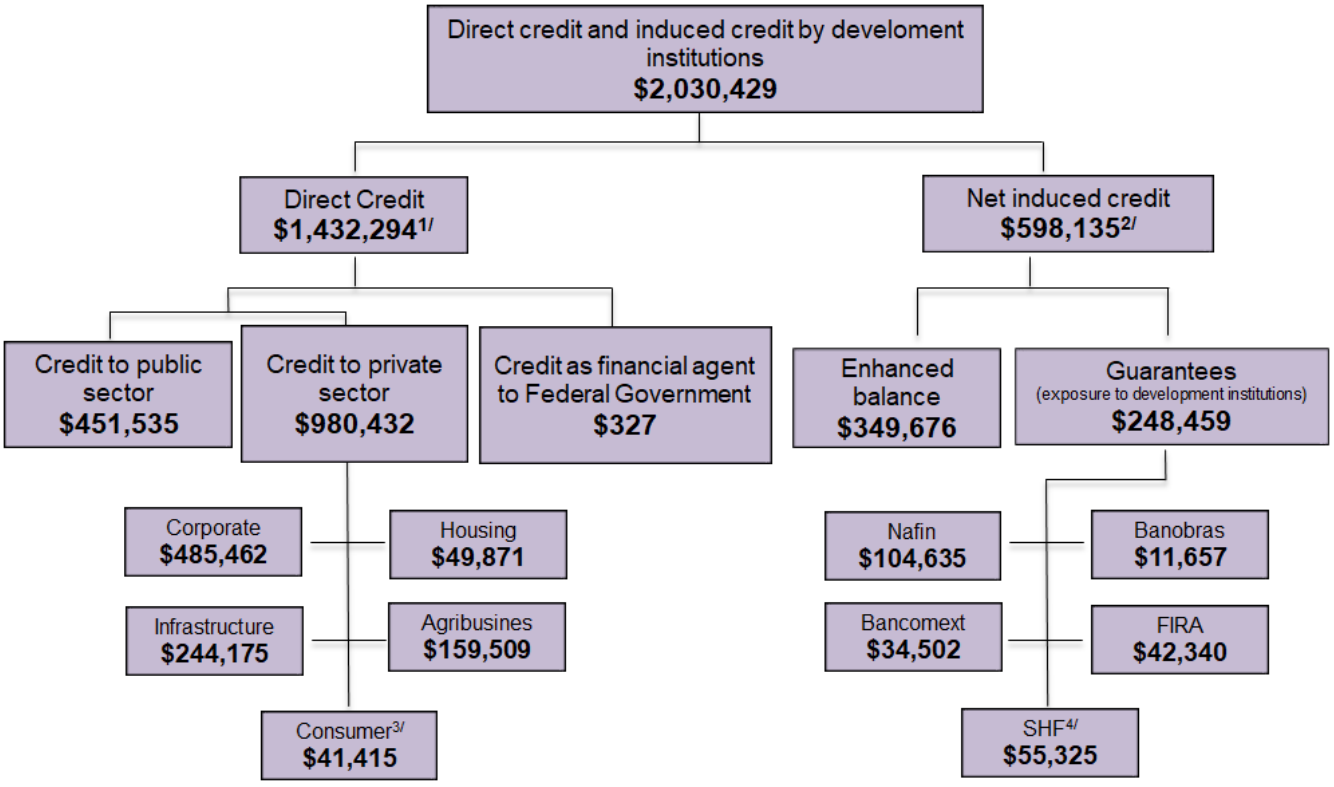
Data as of September 2024.
Source: CNBV and Banco de México.

[91] As of September 2024, the amount of resources tapped from development banks by the Federal Government (known as *aprovechamientos* in Spanish) was $10,812 MDP, $7,280 MDP higher than the amount tapped as of September 2023.

Figure 2

Direct credit and credit induced by guarantees granted by development banks and other financial institutions

Million pesos



Data as of September 2024.
Source: Banco de México.
1/ Amount of credit on the balance sheet of development institutions.
2/ Net induced credit refers to the total credit balance granted by various private financial institutions, which is partially guaranteed by development banks and FIRA, and which is not funded by development institutions.
3/ Consumer credit is comprised of credit to the armed forces serviced by Banjercito.
4/ Includes guarantees from the insurance agency Seguros de Crédito a la Vivienda (SCV) of SHF.

IV.3.2.1. *Infonavit* and *Fovissste*

Infonavit

Infonavit is the main provider of housing financing in Mexico. It grants mortgage loans to claimants through fixed and differentiated interest rates based on their income. It also manages the resources of the national housing fund for working people and is a part of the retirement savings system, since it manages the investment of the resources concentrated in the housing subaccounts of claimants.[92]

Infonavit has registered real annual growth rates in its total housing portfolio as of March 2024, after several years of contractions (1.1% on average through September).[93] On the one hand, the non-performing loan housing portfolio (stage 3) continued to contract in real annual terms (-1.4% on average).[94] In terms of the

[92] See Retirement Savings Systems Law and Infonavit Law.
[93] While Infonavit's performing housing portfolio (stage 1 and stage 2) had presented negative growth rates since November 2019, it began to show positive growth since February 2024.
[94] In January 2024, amendments to the Accounting Provisions applicable to development agencies, including Infonavit, issued by the *CNBV* came into effect, which changed the classification of the loan portfolio and established the recording of the portfolio in risk stages. Therefore, the accounting information of the loan portfolio for 2024 is not strictly equivalent to that of 2023. The adjustments made to the accounting criteria as part of the process of adopting the international standard known as IFRS9 adjust, among other aspects, the classification of the loan portfolio according to the risk perception and level of impairment of the loans, as well as the creation of reserves related to the remaining term of the obligations that present certain impairment. In particular,

number of loans originated as of the second quarter of the year, there was an acceleration associated with the implementation of policies to encourage greater demand. [95]

The non-performing loan ratio of *Infonavit*'s housing portfolio decreased at the end of September with respect to the data recorded at the time of the last Report (Graph 121)**.** This decrease is mainly explained by a significant drop in the non-performing loan portfolio balance at the end of September. *Infonavit* continues with the program to convert its portfolio denominated in minimum wage multiples (VSM) to pesos, so that the former represented at the end of September 2024 slightly less than a quarter of its total portfolio.[96] As a result, between March and September, both the performing and non-performing loan portfolio denominated in minimum wage multiples (VSM, its acronym in Spanish) declined. In early November, the freezing of the balance and monthly payments on 2 million loans granted in minimum wage multiples (VSM, its acronym in Spanish) prior to 2013 was announced, among other benefits for eligible loans. [97]

The purpose of the *Infonavit*'s Housing Fund (FANVIT, its acronym in Spanish) is to invest a portion of the savings of *Infonavit* claimants that are not yet allocated to housing-related financing. As of September 2024, the total assets managed by FANVIT represented 32% of *Infonavit*'s total assets. In addition, the nominal return on investment of workers' contributions (FANVIT) increased due to a high intermediation result from the valuation of instruments, while the investment fund's financial margin remained in line with that observed in previous quarters.[98] With these results, as of September 2024 the FANVIT reached the highest level of yield since its creation in 2014 (18.9%). [99]

The reserve coverage indicator continues to be below 100% and has remained relatively stable. On the one hand, at the consolidated level, profitability, measured through the *ROE* indicator, recorded a significant spike in September, driven by the intermediation result of the aforementioned FANVIT investments. However, 12-month EBITDA by financial margin, according to *Infonavit*'s consolidated financial statement, registered a decrease with respect to that generated as of the last *Report* and also with respect to the previous year. In both cases, lower net interest income was partially offset by lower loan-loss reserve expenses.

The most important risk for *Infonavit* continues to be the unemployment of its borrowers, since in this situation the employers cannot carry out direct payroll deductions and the credit risk of the portfolio depends on the borrowers' willingness to pay once the extension scheme is exhausted. *Infonavit* has sufficient reserves and equity to face potential losses from non-performing loan portfolios. Finally, on May 1st, 2024, the decree creating the *Fondo de Pensiones para el Bienestar* (FPB) was published in the Official Gazette of the Federation. The Institute transferred to the FPB 6,134 million pesos in accordance with the provisions of the decree of said fund.

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the classification of performing and non-performing loan portfolio is eliminated and a classification by credit risk stages (stage 1, stage 2 and stage 3) is established. In addition, for each stage, a line item of portfolio in extended status is included, whereas previously this type of portfolio was only part of the performing portfolio. In its Resources and Obligations statistics, Banco de México maps the information and, as in the case of commercial banks and other brokers that adopted the aforementioned accounting criteria in 2022, the sum of stage 1 and stage 2 portfolios is considered as outstanding, and stage 3 portfolios are considered as non-performing loan.

[95] These include the increase in maximum financing amounts, the extension of the age to repay the loan (to 70 years), the elimination of administration fees, the extension of loan terms, as well as the resumption of loans for improvements during the second half of 2023. Thus, there is a program that offers a points bonus for women, as well as a longer repayment period to reduce the gender gap in the demand for mortgage loans. In particular, in order to address housing price increases, Infonavit increased the maximum loan amounts in all of its financing schemes due to a deterioration in housing affordability.

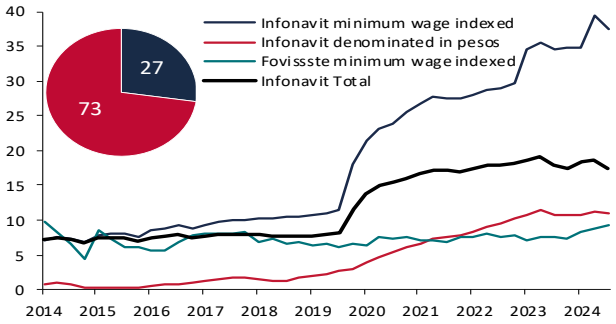
[96] These credits denominated in VSM were granted from 1997 to 2016 and until 2023 the outstanding balances of these were denominated in units of measurement and actualization (UMA), whose value is revised each time the minimum wage is modified, i.e., annually. For 2024, the Infonavit Board of Directors determined that the adjustment to loans denominated in times the minimum wage (VSM) would be equal to the lesser of the percentage increase in the minimum wage and the percentage growth of the UMA, with the UMI or Infonavit Mixed Unit being the new monetary reference that captures such minimum. Thus, for 2024, minimum wage loans were updated at a rate of 4.66% since the increase in the minimum wage was 20%. See link.

[97] See link.

[98] Trading income is explained by capital gains on fixed-income and international equity assets.

[99] FANVIT was established through the signing of the private management trust agreement F/80715, executed between Infonavit (as trustee and trustor in the first place) and Nacional Financiera (trustee), Sociedad Nacional de Crédito, Institución de Banca de Desarrollo (NAFIN). The resources are held within the trust in NAFIN, but investment decisions are defined by the Infonavit's Collegiate Bodies and directly executed/operated by personnel of the General Coordination of Investments through a "Delegated Administration" scheme established with the trustee. Performance information is available as of December 2017.

Graph 121
Non-performing Ratio of Infonavit and Fovissste's Mortgage Portfolio [1/ 2/]
Percent



Data as of September 2024.
Source: Infonavit and Fovissste.

1/ The delinquency rate or Non-performing loan ratio is defined as the ratio of non performing loans over the total portfolio. NPL breakdown by currency of origination is disclosed for analysis purposes and it is not a regulatory indicator used by CNBV.

2/ Fovissste's total portolio is minimun wage indexed.

Fovissste

Fovissste is in charge of granting housing loans to government employees. The real annual growth of the housing portfolio granted by *Fovissste* showed a slight slowdown compared to that recorded in the previous *Report*, with a lower growth rate than the average of the last five years (1.1% versus the average of 5.1% in real terms). On the one hand, the non-performing loan ratio of the housing portfolio increased since the last *Report* and is now at a five-year high (1.1% vs. the average of the last five years) (Graph 121). This increase is explained by a significant growth in the non-performing loan portfolio balance at the end of September, while the performing portfolio contracted. On the other hand, the performing portfolio contracted in the last five months, after having registered significant growth from the end of 2023 to April 2024.

Fovissste's loan portfolio is mainly denominated in minimum wage multiples (VSM, its acronym in Spanish) and in Units of Measurement and Actualization (UMA, its acronym in Spanish). Like *Infonavit*, it seeks to convert this portfolio to pesos.[100] To this end, it has a program to restructure the portfolio from Unit of Measurement and Actualization (UMA) to pesos that has been adjusted on several occasions;[101] as well as benefits for borrowers who pay off their loans early.

Although its reserve coverage ratio is greater than 100%, which suggests that its reserve level covers more than the total non-performing loan portfolio, it has declined marginally since the last *Report*. On the one hand, its profitability indicator, measured by its ratio of net income to total assets (ROA), increased significantly in September 2024 and is at its highest level in the last five years (15.5%). In addition, although *Fovissste* does not have its own equity, as it is a decentralized entity of ISSSTE, it does have sufficient reserves to face losses in its non-performing loan portfolio. The Equity Strength Indicator (IFP) as of September 2024 stood at 17.5%.[102] Finally, the Housing Fund recorded an annual increase of 1.0% in real terms. The employment stability of *Fovissste*'s claimants has been an element of strength for its financial situation.

IV.3.3. Siefores and Investment Funds

Siefores

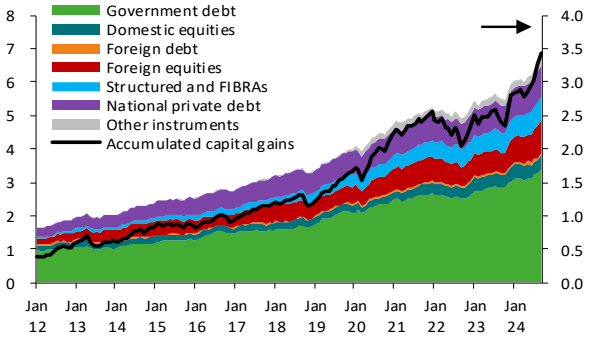
Siefores continue to be the main institutional investors in the country, with an investment portfolio comprised mainly of government securities, foreign and domestic private securities. (Graph 122). Between March and September 2024, the Siefores presented valuation gains in their investment portfolios, mainly as a result of an increase in the market value of their positions in government securities and foreign equities.

[100] Beginning in 1987 and until 2016, the outstanding balances of loans were updated annually in times the minimum wage based on the annual increase of this measure to generate indexation income, which was recognized as interest income. As of 2017, with the entry into force of the UMA, the outstanding balances are updated with the growth of the minimum wage or the UMA. The percentage increase of the Unit of Measurement and Actualization (UMA) applied for 2024 was 4.66%.

[101] The program considers two products, one for loans granted in minimum wages before 2006, whose outstanding balances in pesos have not been reduced, in which a write-off of the outstanding balance of the loan is considered, will be denominated in pesos with a nominal rate of 6%; and a second for loans denominated in minimum wages with an outstanding balance greater than the loan granted and that comply with the characteristics requested by the commercial banks, for a new loan with a fixed preferential rate. At the end of September 2024 only 0.1% of the portfolio was denominated in pesos. During the quarter, 563 restructurings were made from Unit of Measurement and Actualization (UMA) to pesos and the outstanding balances of these loans amounted to 219,848 thousand pesos.

[102] The PPI is calculated as the ratio between the resources to face unexpected losses and the positions subject to risk. For more details on its calculation, see here.

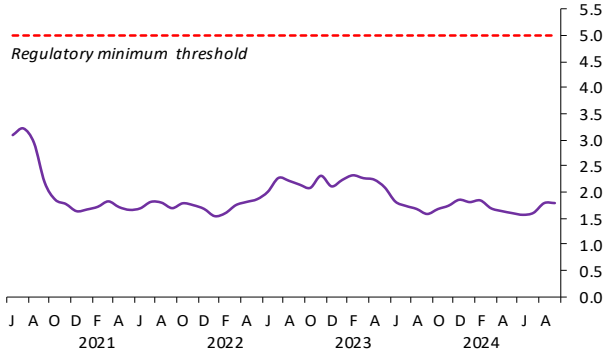
Graph 122
Siefores' portfolio and accumulated capital gains
Right axis: Accumulated flows in trillions of pesos
Left axis: Balances in trillions of pesos



Data as of September 2024.
Source: CONSAR.

In line with the increase in valuation gains recorded by the Siefores, between March 2023 and September of this year, the risk of their portfolios remained limited, as measured by the tracking error between the investment trajectory set by portfolio managers for their investments and the realized trajectory (Graph 123).

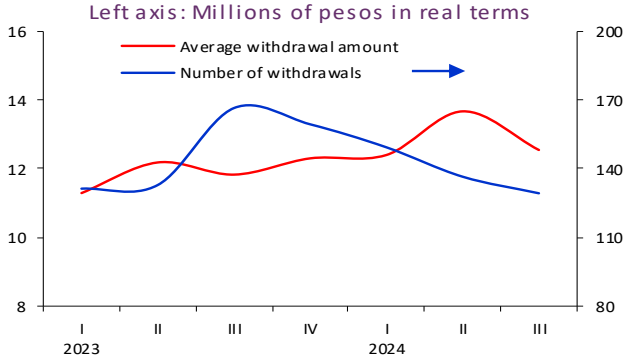
Graph 123
Tracking error [1/]
Percent



Data as of September 2024.
Source: Banco de México with data from CONSAR.
1/ In the twenty-second provision of the General Provisions that establishes the investment regime to which Siefores must be subject, the regulatory threshold for the tracking error is 5%.

On the one hand, the average amount of withdrawals due to unemployment registered a reduction in the third quarter of 2024, although it continues at relatively high levels, this represents a relatively small proportion of the resources managed by the Siefores. Against this backdrop, in the third quarter of this year there was a decrease in both the number of withdrawals due to unemployment and the average withdrawal amount in constant terms (Graph 124).

Graph 124
Average number of unemployment withdrawals and average unemployment withdrawal amount
Right axis: Thousand of number of withdrawals
Left axis: Millions of pesos in real terms



Data as of September 2024.
Source: Banco de México with data from CONSAR.

On May 1, 2024, the decree establishing the trust named *Fondo de Pensiones para el Bienestar* (FPB) was published in the Official Gazette of the Federation (DOF). This trust has the *SHCP* as trustor and Banco de México as trustee. The decree established that the main purpose of the FPB is to receive, administer, invest and deliver the resources contributed to the Mexican Social Security Institute (IMSS) and the Institute of Security and Social Services for State Workers (ISSSTE), to ensure that workers who reach the age of 65 and whose pension is equal to or less than $16,777.68 pesos per month receive, through said federal institutes, a supplement to the pension they obtain, so that it is equal to their last salary up to the aforementioned amount.[103] It is worth mentioning that although the FPB's assets are made up, among other sources, of the resources managed by the Afores of the accounts of people over 70 years of age in the case of the IMSS and 75 years of age in the case of the ISSSTE, and who have not contributed to social security for at least one year, the legal framework contemplates mechanisms to protect the imprescriptibility of the claim of these resources by workers or their beneficiaries.

Thus, in June 2024, the Afores transferred the funds in the accounts that fell under the aforementioned assumptions to be deposited in the FPB. Thus, upon determining which accounts fell under the inactivity assumption, the Afores transferred a total of approximately 24.2 billion pesos to the FPB.

[103] Amount equivalent to the average monthly salary recorded in 2023 in the IMSS, restated for estimated inflation for 2024.

On the other hand, as a result of the adoption of a five-year generational fund scheme, in August 2024 the basic Siefore 95-99 was created, corresponding to the investment fund in which the Afores invest the retirement funds of workers born between 1995 and 1999 who have been incorporated into the retirement savings system. Likewise, the remaining resources of the basic Siefore 55-59, corresponding to the investment fund for workers who were born between 1955 and 1959 and who could therefore have reached the conditions to exercise their right to a pension, were transferred to the basic pension Siefore.[104]

Likewise, in October 2024, amendments to the Siefores Investment Regime were published, which are aimed at promoting conditions to improve the replacement rate of working people by channeling investments to sectors that promote Mexico's productive and social development, job creation and the development of infrastructure and housing.[105]

In particular, investment limits in foreign currencies were increased; investment limits in Reits and structured instruments were increased, mainly in funds that manage the resources of younger working people; with the objective of improving the return profile of the savings of working people during the initial stage of their working careers.

On the other hand, On the other hand, consistent with the aforementioned amendments, the limits applicable to the Conditional Value at Risk Differential (DCVaR) were increased, maintaining both a prudent risk-return profile in accordance with the age of the worker and the objective of optimizing the returns of the generational funds.[106] Finally, the possibility for the Afores to invest in the "Simplified Issuers" contemplated in the amendments to the Securities Market Law made in 2023 was incorporated, which will allow them to have a broader set of investments in which they can channel the resources they manage, for the benefit of working people.

Investment Funds

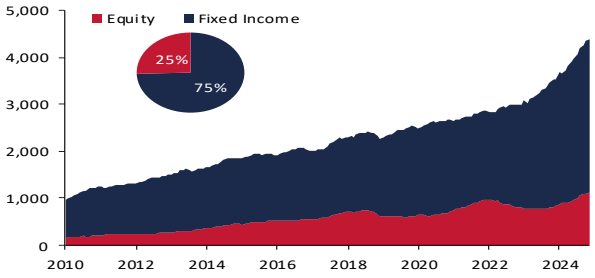
The investment funds sector continues to grow under orderly operating conditions. No significant risks are perceived and, in particular, the system's liquidity seems to be sufficient to withstand periods of high redemptions, despite a slight decrease in the sector's liquid assets. However, for some funds the composition of their investment portfolios does not align with the characteristics of their redemption practices.

As of November 2024, the investment funds system was comprised of 249 fixed income funds and 385 equity funds. As of September, investment funds ranked third in terms of asset share in the Mexican financial system, with 12.4%, only behind siefores and commercial banks. As of November 2024, the total amount of assets managed by investment funds amounted to 4.4 trillion pesos (Graph 125), which represents an increase of 9.7% compared to the end of the first semester of 2024.

Graph 125

Investment funds' net assets

Billions of pesos



Data as of November 2024.
Source: Banco de Mexico using CNBV data.

Fixed income funds increased their total assets by 8.2% so far in the second half of 2024 as a result of both inflows and positive returns observed during the period (Graph 126 and Graph 127).

[104] These adjustments are contemplated in the Thirteenth Provision of the General Provisions Establishing the Investment Regime to which Specialized Investment Companies for Retirement Funds Must Abide, and can be consulted in the following website: Amendments to the General Provisions that establish the Investment Regime to which Specialized Investment Companies of Retirement Funds must adhere, published in the DOF on August 11, 2023.

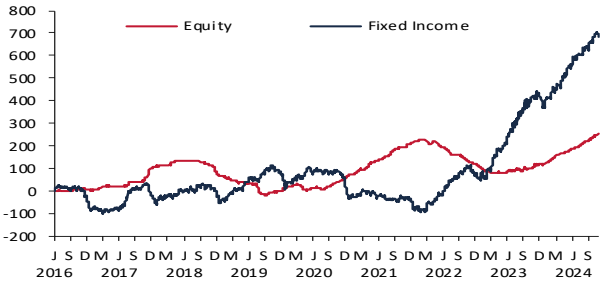
[105] Amendments and Additions to the General Provisions that establish the investment regime to which the Specialized Investment Companies of Retirement Funds must be subject, published in the DOF on October 25, 2024.

[106] Some measures of Siefores' portfolio risk are the Conditional Value at Risk (CVaR) and the Differential Conditional Value at Risk (DCVaR). The CVaR is defined as the average of the losses that, in absolute value, exceed the Value at Risk of the Siefore's portfolio. On the one hand, DCVaR is the difference between the CVaR of the entire portfolio minus the value of the CVaR when positions in derivative instruments are excluded from the portfolio.

Graph 126

Cumulative flows of investment funds

Billions of pesos

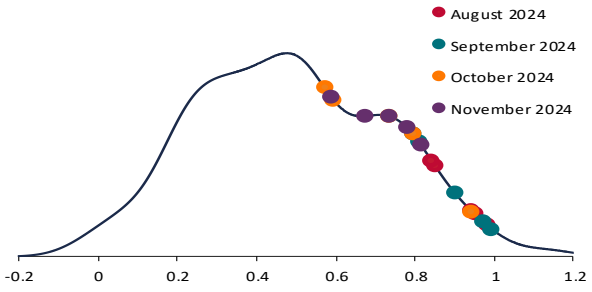


Data as of October 2024.
Source: Banco de Mexico with CNBV data.

Graph 127

Monthly returns of fixed income funds[1/2/]

Percent



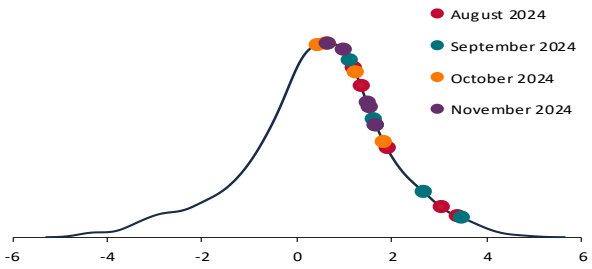
Data as of November 2024.
Source: Banco de México using CNBV and Morningstar Direct data.
1/Each point represents the average of the daily observations of the monthly returns for each week of the month.
2/ Historical distribution since 2008.

Similarly, equity funds, in general, have shown inflows and positive returns, leading to a 14.3% growth in assets under management during the same period (Graph 126 and Graph 128).

Graph 128

Monthly returns of equity funds[1/2/]

Percent



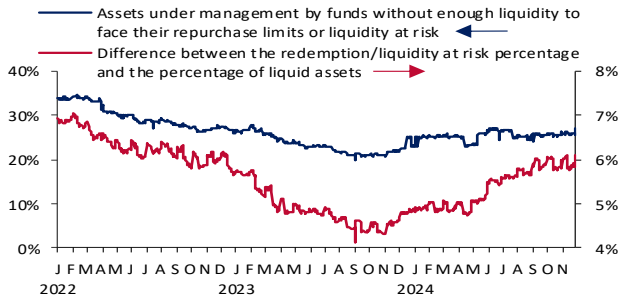
Data as of November 2024.
Source: Banco de México using CNBV and Morningstar Direct data.
1/Each point represents the average of the daily observations of the monthly returns for each week of the month.
2/ Historical distribution since 2008.

The liquidity of investment funds registered a slight decrease compared to the end of the first semester of 2024. When considering only those funds without sufficient liquidity to meet their redemption limits[107] or liquidity-at-risk,[108] these funds maintain lower liquidity than in the previous semester, although the number of funds in this situation remained stable and represents 27% of the sector's total assets as of the date of this *Report* (Graph 129). These assets belong mainly to equity funds which, as a reflection of their business model, maintain a lower share of liquid assets in their portfolios.

Graph 129

Assets of investment funds with liquidity shorfall

Percent of total net assets



Data as of November 2024.
Source: Banco de Mexico using data from CNBV.

Holdings of the fixed income funds are mainly comprised of government securities. As of November 2024, Federal Development Bonds (Bondes, its acronym in Spanish) represent 46.7% of total assets; followed by Federal Treasury Bills (*Cetes*, its acronym in Spanish),

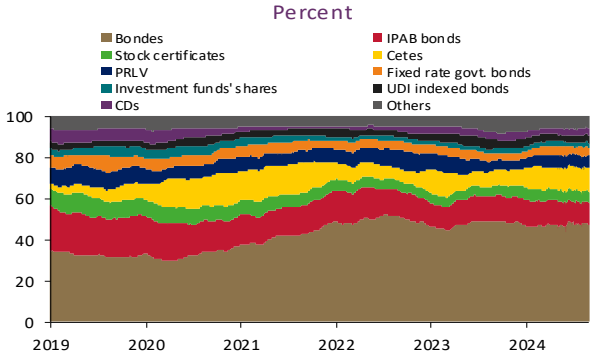
[107] Refers to the maximum percentage of total assets under management that the fund commits to repurchase in shares from investors in a single day.

[108] It is calculated as the average of the monthly outflows in the 95th percentile or higher of the flow distribution since 2008, according to historical data as a proportion of total assets at the beginning of the month.

with 11.9%. Since the end of June 2024, no major changes have been observed in the composition of the portfolio. However, the continued growth in the share of *Cetes*, which so far this year has risen from 7.5% to 11.9% of the fixed income system's assets, is notable (Graph 130).

Graph 130

Top holdings in fixed income funds' portfolios

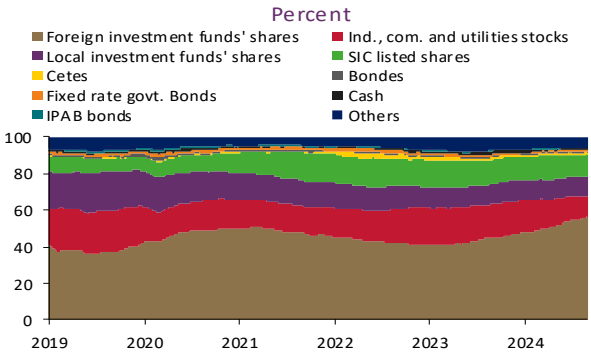


Data as of November 2024.
Source: Banco de Mexico using CNBV data.

As for equity funds, they invest mainly in other foreign investment funds (including Tracs).[109] As of November 2024, shares in foreign funds represent 55.5% of the total assets of equity funds, a proportion marginally higher than the 50.3% observed at the end of June 2024. Additionally, they invest domestically in industrial, commercial and service stocks, which constituted 12.1% of assets; and in foreign stocks, with 12.6% (Graph 131).

Graph 131

Top holdings in equity funds' portfolios



Data as of November 2024.
Source: Banco de Mexico with CNBV data.

In December 2023, the FSB[110] and IOSCO[111] published documents with recommendations[112] to address the liquidity vulnerabilities[113] of open-end investment funds.[114]

As of November 2024, fixed income investment funds that invest more than 50% of their portfolio in liquid assets represent 92% of the assets in this sector. Therefore, even if their repurchase promises are daily (which is the case for most of these funds), they satisfy the FSB recommendation. In contrast, the total assets of equity funds that invest more than 30% in illiquid assets and offer daily repurchase agreements represent 42% of the assets in this sector. It is important for such funds to evaluate the relevance of making adjustments to their holdings of liquid assets or, alternatively, to their redemption practices and promises.[115]

[109] Stock-referenced certificates (TRACS, its acronym in Spanish).

[110] Financial Stability Board: Revised Policy Recommendations to Address Structural Vulnerabilities from Liquidity Mismatch in Open-Ended Funds.

[111] International Organization of Securities Commissions: Anti-dilution Liquidity Management Tools -Guidance for Effective Implementation of the Recommendations for Liquidity Risk Management for Collective Investment Schemes.

[112] The objectives of the recommendations are to improve the effectiveness of liquidity management and to promote the adequate use of anti-dilution tools. Part of these recommendations emphasizes the consistency between the liquidity of each portfolio and its characteristics. In particular, although funds may have investment strategies with less liquid instruments, according to their business model, these strategies should be aligned with the redemption features offered to the public in their prospectus.

[113] The FSB recommends the following classification: category 1, contains funds that invest more than 50% of their assets in liquid assets, for which daily repurchase transactions can be offered; category 2, contains funds that invest more than 50% in less liquid assets, for which daily repurchase transactions can be offered, subject to demonstrating that they implement anti-dilution tools; category 3, contains funds that place more than 30% in illiquid assets; these should redeem shares less frequently, and require longer notice or execution periods for transactions. It is also recommended to take a conservative approach when funds do not clearly fall into one of the categories.

The FSB recommendations suggest grouping assets based on their liquidity as follows: liquid assets are those that are readily convertible into cash without significant market impact in both normal and stressed market conditions; less liquid assets are those whose liquidity is contingent on market conditions, but they would generally be readily convertible into cash without significant market impact in normal market conditions; illiquid assets are those for which there is little or no secondary market trading and buying and selling assets is difficult and time consuming (weeks or months), even in normal market conditions.

[114] In Mexico, Article 7 of the Investment Funds Law defines open-end funds as those that have the obligation, under the terms of the Law and their prospectuses, to repurchase the shares representing their capital stock or to repay them with Investment Subject Assets comprising their equity, unless in accordance with the provisions of such prospectuses, such repurchase is extraordinarily and temporarily suspended.

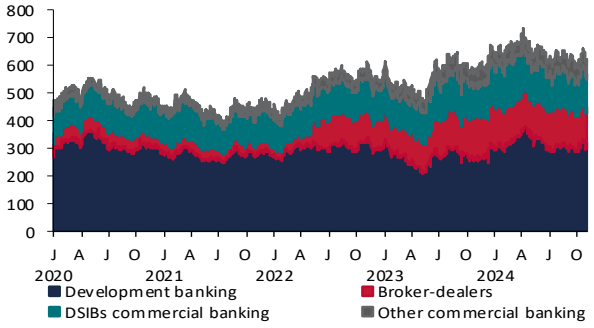
[115] Based on the definitions provided by the FSB recommendations, liquid assets correspond to: federal government bonds and certificates and

Investment funds provide liquidity to the financial system through the market of repurchase agreements (repo). In particular, with data as of November 2024, investment funds contribute 20.8% of the amount of repo funding granted to the financial system, though there is a 6.6% decrease in the amount of funding granted with respect to the end of June 2024, thus reversing the positive trend observed since May 2023. This was mainly due to a decrease in the total value of transactions with broker-dealers and development banks, the latter represent the largest proportion of funding received through repos by investment funds with 52% (Graph 132). As for receiving repo funding, investment funds have not used this source of funding, even though they have been legally allowed to do so since June 2020.

Graph 132

Amount financed by investment funds in the repo market

Billions of pesos



Data as of November 2024.

Source: Banco de Mexico.

IV.3.4. Broker-dealers

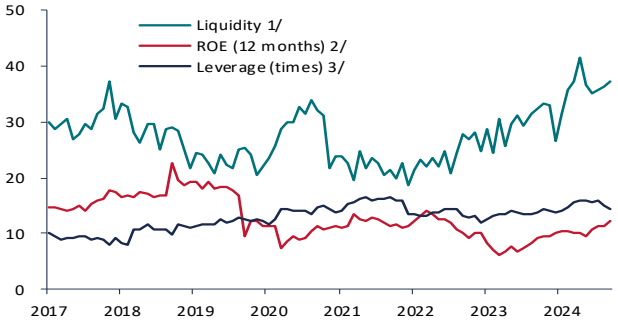
Broker-dealers are corporations engaged in securities brokerage, offering and trading securities on their own behalf or on behalf of third parties in the primary or secondary market. In addition, they provide advisory services to companies seeking financing through securities and participate in public offerings as placement agents or as representatives of security holders. They can also contribute to the liquidity of securities by acting as market makers by continuously maintaining buy and sell positions for a minimum amount of securities. The main risks in this sector are leverage associated with repurchase transactions and the market risk of their investment portfolio.

Since the last *Report*, broker-dealers' leverage decreased due to lower passive positions with repurchase agreements (Graph 133). On one hand, the liquidity indicator remained stable, while profitability increased due to a higher financial margin and service income. With respect to the sector's solvency, the CAR decreased slightly; however, it remains at high levels both for the system and for most of the individual institutions. The decrease in the CAR of the system is explained by a lower increase in net capital in relation to the increase registered in the total risk-weighted assets of the sector.

Graph 133

Leverage, Liquidity and ROE

Per cent



Data as of September 2024.

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

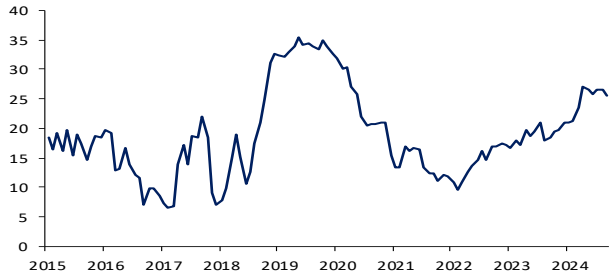
2/ ROE = Net Income 12-month flow / Total Equity 12-month

3/ Leverage = (Total liabilities - Settlement Receivables) / Total Equity.

The market risk to which broker-dealers are exposed, measured through the CVaR at 99.9% over a one-month horizon of the market portfolio as a proportion of net capital, increased compared to the value observed in March 2024. This change is due to adjustments in the composition of the positions of the institutions' portfolios, particularly in those that are sensitive to movements in interest rates (Graph 134).

cash; less liquid assets: corporate and municipal stock certificates, PRLV, SIC securities, certificates of deposit and debt fund shares; illiquid assets: all other securities, including equities, derivatives and equity fund shares.

Graph 134
99.9% CVaR for brokerage firm's market risk
Net capital percent



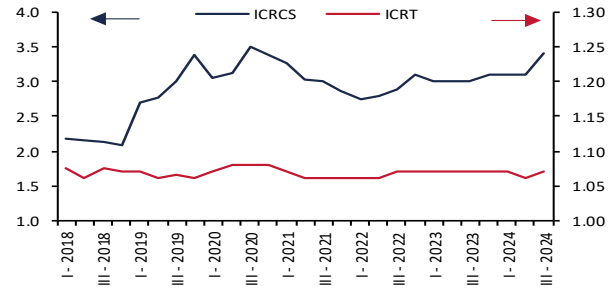
Data as of September 2024.
Source: Banco de Mexico, CNBV, BMV, Bloomberg and Valmer.

The sensitivity of the broker-dealers' debt instruments portfolio to changes in interest rates, measured through the duration of the portfolio based on market information, increased from March to September from 0.71 years to 0.84 years, after having decreased since June 2023, returning to a level similar to that prevailing in June 2023.[116]

IV.3.5. Insurance Companies and Bonding Institutions

The insurance and bonding sector in Mexico continue to show high solvency ratios. Both the Technical Reserves Coverage Index[117] (ICRT, its acronym in Spanish) and the Capital Solvency Requirement Coverage Index[118] (ICRCS, its acronym in Spanish) indicate that the sector has sufficient reserves to face its risks and maintain the sector's stability and solvency (Graph 135).

Graph 135
Coverage ratios of the insurance sector
Number of times

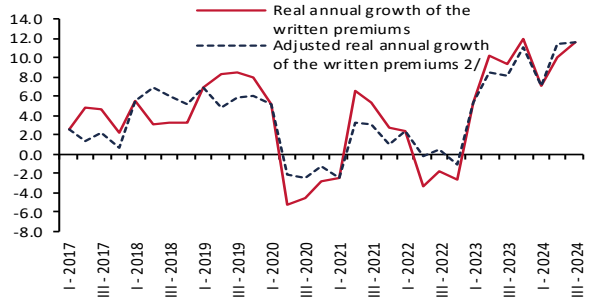


Data as of September 2024.
Source: CNSF.

The sector consists of 103 insurance and 10 bonding institutions. The sector's assets as of the third quarter of 2024 totaled 2.67 trillion pesos (7.9% of the financial system's total assets), which registered a real annual increase of 10.0%.

Premium issuance in the sector increased by 11.6%[119] during the second half of the year (Graph 136), with increases in the volume of premiums written in almost all lines, with the exception of pensions and non-automotive damages.[120] The largest contribution to this growth was made by the life line, with real annual growth of 17.0%. The auto and accident and health insurance operations also contributed to this growth, with increases in issuance of 22.7% and 8.9%, respectively.

Graph 136
Real annual growth of the written premiums of the insurance and bonding sector [1/]
Percentage



Data as of September 2024.
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.

The sector's cost of claims grew significantly, which is why it remains at historically high levels, with a real growth of 10.3% of the accumulated amount for the year to the third quarter compared to the same period of the previous year. This increase is explained by higher cost of claims in life (due to the increase in individual life claims), accident and illness (explained by the increase in both the number of claims and the cost of hospital and health services), and property and casualty (driven by the increase in the number of claims and the cost of

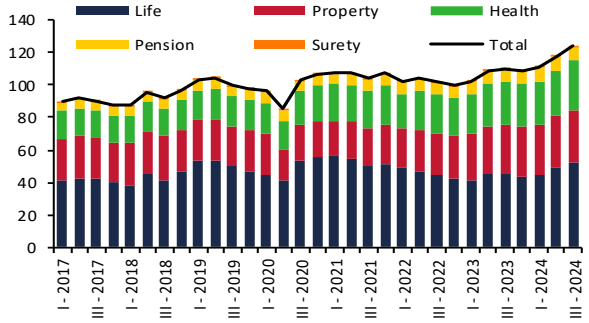
[116] In June 2023 the duration was 0.82 years.
[117] The Technical Reserves Coverage Index (ICRT) is calculated by dividing the investments backing the technical reserves by the amount of those reserves. When this ratio is greater than or equal to one, it means that the institution maintains sufficient resources to back its obligations.
[118] The ICRCS is calculated by dividing the sum of eligible own funds supporting the solvency capital requirement 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.
[119] Growth data in this section are expressed as real growth in the cumulative amount for the year through the reference quarter, compared to the same period of the previous year.
[120] Non-automobile liability includes: civil liability and professional risks, maritime and transportation, fire, catastrophic risks, agricultural and animal risks, credit, mortgage loans, financial guarantee, miscellaneous and surety.

repairs in auto insurance), with real annual growth of 9.9%, 12.1% and 10.2%, respectively, in the year-to-date amount (Graph 137).

Graph 137

Quarterly insurance claims 1/, 2/

Billions of pesos



Data as of September 2024.
Source: CNSF.

1/ Constant prices.

2/ Property includes car operation.

It is noteworthy that, within the property and casualty line, there was a significant increase in the cost of claims of catastrophic risks, particularly those related to meteorological phenomena, such as the cost of claims caused by Hurricane Beryl.[121] Although the cost of claims for these phenomena is still low, it is expected to increase due to climate change,[122] which is why it is important to follow up on the resilience of this sector to these events, as was the case with Hurricane Otis, the third most costly event in the history of the sector.[123]

Profit for the sector as a whole in September 2024 increased in real terms by 24% over the previous year, which is explained by the good performance in the investment of the sector's reserves (with a real annual growth of 41.6%) and by the growth in premium issuance, referred to above. During this period, profit reached and exceeded 2019 levels for the first time.

IV.3.6. Other Non-Bank Financial Intermediaries

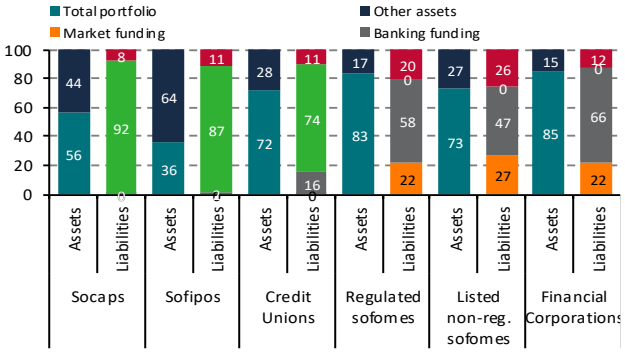
Non-bank financial institutions and companies that carry out credit intermediation or credit operations on a regular and professional basis in the country are collectively referred to as Other Non-Banking financial intermediaries (OIFNB, its acronym in Spanish) (Table 3).

In terms of asset size, this sector is small relative to the rest of the financial intermediaries; however, its participation is important in some credit segments such as consumer credit; in addition, they provide financial services to the population with little to no banking penetration. The sector is heterogeneous, with some institutions relying mainly on non-stable sources of funding, such as bank loans and stock market liabilities, which continue to face challenges, and others that depend more on traditional fundraising (Graph 138).

Graph 138

Assets and Liabilities of Other Non-Bank Financial Intermediaries (ONBFI)

Percent



Preliminary data as of September 2024.
Source: Banco de México, BMV, CNBV and Condusef.

[121] This impact is expected to be even greater at year-end, once the cost of claims caused by hurricanes John (Sep-24) and Milton (Oct-24), which had a significant impact on coastal areas of Mexico, are taken into account.

[122] This is reflected in higher economic and insured losses. See AON. Q3 Global Catastrophe Recap (Oct-24).

[123] See Mexican Insurance Institutes' Association (AMIS, its acronym in Spanish) press release of October 23, 2024.

Table 3

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	Capitaliz ation	Liquidity	Leverage	
Socaps (levels 1 to 4)		✓	✓		✓	275	0.8	6.2	✓	✓		CNBV
Sofipos (levels 1 to 4) [2/]		✓	✓	✓	✓	159	0.5	n.a.	✓	✓		CNBV
Credit unions (levels 1 to 3)		✓	✓		✓	69	0.2	0.7	✓	✓		CNBV
Regulated Sofomes	With links with a bank and consolidated with said bank	✓	✓			321	0.9	2.9	✓	✓		CNBV
	With links with a bank but not consolidated	✓	✓			125	0.4	76.6	✓	✓		CNBV
	No links with a bank and issues debt [3/]	✓	✓	✓	✓	222	0.7	-13.4				CNBV
Non-regulated Sofomes [4/]		✓	✓		✓	622	1.8	1.8				
Financial corporations [5/]		✓	✓		✓	408	1.2	-0.3				
Non Bank credit card issuers [6/]		✓	✓		✓	90	0.3	13.8				
Securitizations of financial entities [7/ 8/]		✓	✓		✓	511	1.5	2.7				CNBV
Securitizations of non-financial entities [7/ 9/]		✓	✓			241	0.7	-20.8				CNBV
Total non-banking financial intermediaries						**2,722**	**8.0**	**3.4**				
Real Estate Investment Trust (fibras) [7/]			✓			533	1.6	-1.2			✓	CNBV
Mortgage trusts (no fibras) [7/]		✓	✓		✓	6	0.02	-8.2			✓	CNBV
Development Capital Certificates (CCD) [7/]			✓			538	1.6	28.2			✓	CNBV
Energy and infrastructure trusts (fibra E) [7/]			✓			138	0.4	-6.3			✓	CNBV
Investment projects trusts (CERPIS) [7/]			✓			88	0.3	37.9			✓	CNBV
Total infrastructure financing vehicles						**1,303**	**3.8**	**10.7**				
Total of financial intermediaries, infrastructure financing vehicles and activities						**4,026**	**11.9**	**5.6**				
Other financial intermediaries or activities [10/]					✓	5,616	16.6	18.4				CNBV/CNSF
Capital investment funds [11/]						0	0.0	n.a.				
Pensions funds [12/]						7,590	22.4	19.2				Consar
Commercial banks		✓	✓	✓		14,249	42.0	2.7	✓	✓	✓	CNBV/Banxico
Memo:												
Crowdfunding Institutions [13/]						1	0.0	245.5				CNBV
Electronic Payment Fund Institutions [13/]						37	0.1	47.8				CNBV

Data as of September 2024.

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/ The total assets of the sofipo sector recorded a remarkable annual increase as of June, primarily driven by the growth of assets from new competitors with digital models following the acquisition of licenses from existing sofipos.

3/ In 2014, various legal provisions were amended to include sofomes issuing debt securities within the regulatory framework. Starting in 2015, 18 unregulated entities changed their status to regulated due to their issuance of debt and gradually began reporting information to the CNBV.

4/ The figures related to the number of non-regulated SOFOMs come from the Registry of Commissions - RECO (Condusef). New information is presented with preliminary figures resulting from corrections made to the data reported by non-regulated SOFOMs as of June 2023. For the purposes of counting, only SOFOMs with a positive portfolio are considered. Credit portfolios from non-regulated SOFOMs that grant credit exclusively to related entities or subsidiaries are excluded, as they are not considered credit intermediaries in the strict sense. As of December 2023 (the latest available date), the Bureau of Financial Entities has information on 2,158 non-regulated SOFOMs (SOFOM E.N.R.) with operational status, including those that grant credit exclusively to related entities or subsidiaries. The asset figures refer to the total credit portfolio provided by these entities as reported to Condusef.

5/ These are companies that incur debt but are not financial entities under Mexican law. For example, financial arms of automotive manufacturers and companies that conduct credit or commercial leasing activities. The figures presented here only include those that issue debt in financial markets. It should be noted that two entities changed their status, moving from regulated and unregulated sofomes, respectively, to both becoming financial companies, affecting the growth of this category due to this reclassification.

6/ Includes only the balance of credit granted directly by department stores to their customers without any financial entity intermediary.

7/ Represents the outstanding value at market prices.

8/ Includes securitizations from banks, sofomes, Infonavit, and Fovissste.

9/ Includes securitizations from the private and public sectors, such as those of states and non-financial companies.

10/ Includes fixed-income mutual funds, local debt exchange-traded funds (ETFs), warehousing companies, brokerage firms, credit insurers, fondo mexicano del petróleo and fondo de pensiones para el bienestar.

11/ Includes investment funds invested in equity instruments, local exchange-traded funds tracking stock indices.

12/ Includes Siefores (retirement savings funds).

13/ Asset figures consider information from only 48 ITFs that published their financial statements on their websites as of September 30, 2024. These institutions do not engage in credit intermediation on their balance sheets. In the case of crowdfunding institutions, the financing directed by investors through the platform to projects is recorded as off-balance-sheet accounts.

At the end of September 2024, total financing granted to the non-financial private sector by the country's OIFNB increased in real annual terms at a slightly higher rate compared to the previous *Report*. This is mainly explained by the growth of the portfolio granted by the OIFNB, both regulated and non-regulated.

The non-performing loan ratio of the portfolio granted by the NBFI remained stable, although it remains at high levels, particularly for non-regulated entities.

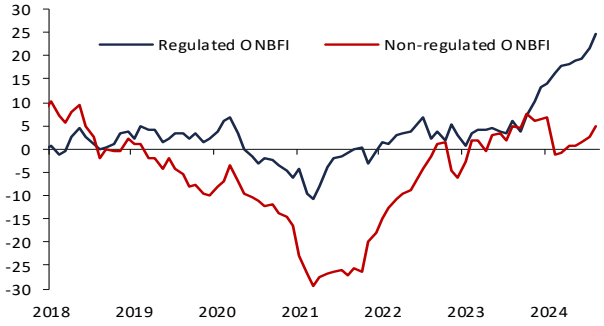
Regarding the sources of financing to the OIFNB, regulated OIFNB have experienced sustained growth in their sources of financing over the last year, particularly

in traditional customer or member deposits and bank financing. In contrast, in the case of non-regulated NBFI that depend on stock market and bank funding, there was a stagnation in the financing received during the first months of the year; however, as of May, this reactivated. This is mainly explained by greater financing granted by commercial banks at the end of September. (Graph 139).

Graph 139

Real annual growth of financing sources [1/]

Percent



Data as of September 2024.

Source: CNBV, BMV and Condusef.

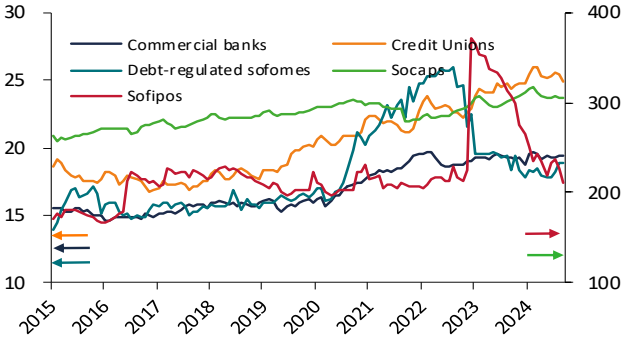
1/OIFNB financing sources include loans granted by banks, debt issued locally and overseas, as well as traditional fundraising from clients or partners for some regulated OIFNB.

Some entities in the OIFNB sector have risk indicators at levels that suggest financial vulnerabilities. The number of these entities increased slightly with respect to the previous *Report*; however, their share of total assets decreased. It is worth noting that the country's banks' exposure to these vulnerable entities is low with respect to their regulatory capital. On the one hand, the aggregate exposure of commercial banks and development banks through loans granted to the OIFNBS, as well as their own holdings of securities issued by the latter, remained relatively low. Consequently, a default by some entities in this sector would not represent a risk for the banking system. Finally, the capitalization levels of the regulated OIFNBS remain stable and high with respect to the regulatory minimum (Graph 140)

Graph 140

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

Percent



Data as of September 2024.

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 Credit Unions must maintain a minimum ICAP of above 8%.

An analysis of the aggregate asset and liability positions in foreign currency of the NBFCs, including their positions with financial derivatives, shows that the mismatch for the sector as a whole is in surplus in US dollars, so that a depreciation of the peso against the US dollar would not have a negative impact on the sector as a whole. However, there are particular cases whose funding in recent years was highly concentrated in international debt issues and still face significant financing restrictions. In fact, some of them defaulted on their financial obligations and are currently immersed in financial restructuring or settlement processes.

Total assets in the sofipos sector recorded a very notable annual increase (more than doubling) as of September, mainly explained by the growth in assets of new competitors with digital models following the acquisition of licenses from existing sofipos. [124] The new competitors have important challenges ahead: on the one hand, to obtain and maintain a stable source of resources, including traditional fundraising, and on the other, to control the level of credit risk in their portfolios, since their models include a greater number of people new to the financial system with no previous credit history. These entities compete for borrowers

[124] As of December 2022, NU Financiera México, a Fintech entity specializing in credit through a digital card, became a sofipo after acquiring an entity that was no longer operating. Fintech Klar also acquired sofipo Servicios Financieros Alternativos (Sefia) in April 2023 and Fondeadora acquired sofipo Apoyo Múltiple in September 2023. Finally, the financial company Stori merged with Savvi Financieros to become a sofipo in July 2024. As of November 2024, there are no new authorized sofipos licenses. The shares of these sofipos that acquired previously granted licenses within the sector are 56.7%, 7.17% and 0.8%, respectively.

with similar characteristics and may increase the leverage of their clients, which could hinder adequate risk management.

Although sofipos and socaps have different prudential regulation and supervision than banks, they depend on the segment of the population they serve, so allowed activities vary according to the size and level of operation authorized by the *CNBV*. Due to their origin, these popular sector entities aim to promote savings and support the rural sector, and such savings are protected by deposit insurance for up to 25 thousand UDI; it is important to remember that the rest of the OIFNB are prevented by law from taking deposits from the public.[125] However, these entities currently also serve the public outside the rural and microfinance context. The nature of digital models means that these entities can conduct lending and deposit transactions with greater speed than the traditional physical branch model, which makes them more efficient; however, they also carry the risk of abrupt deposit outflows. Due to regulatory restrictions to carry out certain types of activities in the case of digital sofipos, it is to be expected that some of them will consolidate their business models and transform into banking institutions. In fact, the process to transform a sofipo with a digital business into a bank has already been announced and begun, which will allow the entity to expand the services it offers to the public, thus favoring inclusion and competition. In addition, this will reduce the potential for regulatory arbitrage, considering the size of the entities and their footprint in the system and the population they serve, since banking regulation is more robust in several areas than that currently applicable to the sofipos sector.

The growth in the sofipos sector's assets is due to the increase in the attraction of a broad customer base attracted by the high deposit or savings rates offered by the new digital competitors, even above the bank funding rate. This strategy has put pressure on their financial margins. In addition, some sofipos have a high loan provisioning burden, which also reduces their profitability. The rest of the sofipos with traditional business models also have pressures on their profitability; however, these cases are explained by the high administrative expenses that characterize them. Some of these entities have high non-performing loan ratios in turn have capitalization levels close to the minimum required by regulation.

In general, OIFNB are vulnerable to downturns in economic activity due to the segment of the population and companies they serve, so an abrupt slowdown could lead to a significant deterioration in non-performing loan ratios, which would cause problems in their credit quality and the generation of income from financial margin. 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 brokers, they could contribute to the over-indebtedness of households and SMEs exposed to economic shocks.

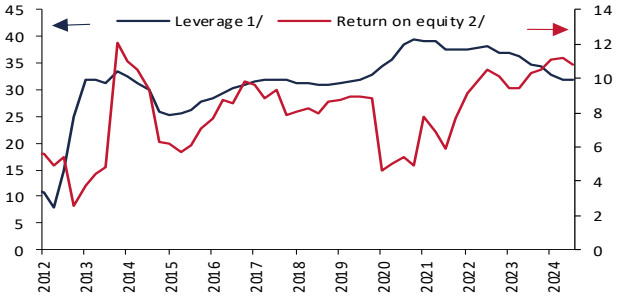
Other financing vehicles

Real Estate Investment Trusts (REITS) recorded a real year-over-year decline in revenues since the last *Report* and, in the case of some of the industrial and office sector, their occupancy rates declined slightly. Despite the above, REITS investment spending increased, driven by REITS with commercial, industrial and office properties. In general, new investments were financed with capital so that their leverage levels decreased (Graph 141).

Graph 141

Leverage and return on equity of REITs

Per cent



Data as of September 2024.
Source: BMV and BIVA.
1/ Leverage is calculated by dividing debt by assets.
2/ Return on equity (ROE) is calculated by dividing Net Income by Equity. Net Income is the sum of the last 4 quartes. Assets, debt and equity are the average of the last 4 quartes.

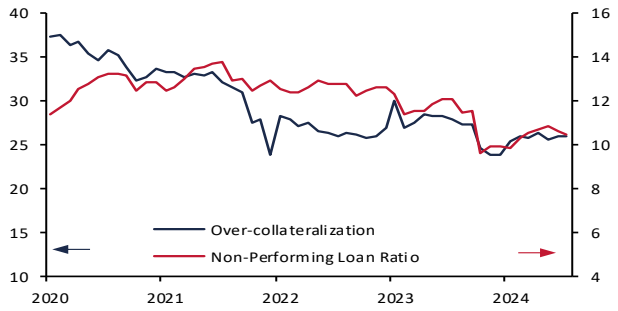
[125] Sofipos rely heavily on traditional fundraising to fund their lending activity. In order to guarantee its deposits, a sofipo must be associated with the Protection Fund, which is a trust created by the Federal Government with the development banks acting as trustee institution, without such trust being a federal public administration entity or a public trust (Articles 98 and 99 of the Savings and Popular Credit Law (Ley de Ahorro y Crédito Popular, LACP). The deposit insurance is managed by Prosofipo through the trust and the savings of the sofipos' depositors are protected for up to 25 thousand UDIs in the event that a sofipo is settled or disappears (Article 105 of the LACP). The assets of the Protection Fund will be 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 the other assets, rights and obligations acquired by the Fund (Article 101 of the LACP).

The outstanding balance of Trusts on Energy and Infrastructure Projects (Fibras E, by its acronym in Spanish) equity issuances remained stable, while their leverage risk and profitability indicators improved, although the liquidity indicator deteriorated. Most of these vehicles generate profits regardless of their creation date, which can be explained by the fact that these types of vehicles typically begin with mature and stabilized projects.

The outstanding balance of Certificates of Capital Development (CCD) and Trust on energy and infrastructure projects (*Cerpis*, its acronym in Spanish) increased, reaching an all-time high. The profitability of both vehicles improved significantly, while leverage and liquidity risk indicators worsened slightly. A portion of issuances older than seven years has incurred in losses over the past two years, whereas for newer issuances, this fraction is much smaller. Because of their nature, these vehicles often start with projects that are not yet mature or stabilized, and require time to reach a break-even point in terms of revenues and costs. Siefores are the main holders of these instruments; however, their exposure to CCDs and *Cerpis* with negative profitability represents less than 3% of the value of their portfolios.

The balance of mass or homogeneous credit securitizations (such as those of *Infonavit* and *Fovissste* mortgage portfolios) slightly decreased. Indicators of over-collateralization and non-performing loan ratios showed a slight increase (Graph 142). One-fifth of these issues, mainly from OIFNB, have weak indicators in terms of solvency, profitability and non-performing loan ratio. Banks' exposure to these structures, as well as that of other institutional investors such as siefores, is nul.

Graph 142
Over-collateralization and Non-Performing Loan Ratio in Homogeneous Securitizations 1/
Per cent



Figures at September 2024.
Source: BMV y BIVA.
1/ Over-collateralization is calculated as 1 minus the ratio of the outstanding balance of the issuance to the sum of current assets and cash, multiplied by 100.

The size of non-homogeneous securitizations (such as highway tolls) increased slightly. The leverage and liquidity levels of these structures remain stable, while their profitability increased. Less than a tenth of these issuances have weak metrics in terms of solvency, profitability and liquidity. Banks' exposure to these structures, as well as that of other institutional investors, such as siefores, is very limited.

Sector of Institutions that make use of financial technology

During the second half of 2024, new Financial Technology Institutions (ITF, its acronym in Spanish) have been added to the sector, with a total of five new license authorizations, of which two are Crowdfunding Institutions (IFC, its acronym in Spanish) and the other three are Electronic Payment Funds Institutions (IFPE, its acronym in Spanish). As of November 2024, a total of 83 ITF have been authorized under the Law to Regulate Financial Technology Institutions (LRITF, its acronym in Spanish). Of these, 27 correspond to IFC and 56 to IFPE. ITF provide innovative financial services and can help complement the existing supply to promote inclusion, efficiency and competition among participants.

The ITF sector is still small, with capital equivalent to 4.6% of the capital of commercial banks. However, due to its steady growth, its size is already comparable to that of other groups of financial intermediaries. The capital stock of ITF represents 46.9% of the contributed capital of sofipos and 137.4% of that of socaps.[126] The ITF sector continues to face challenges stemming from

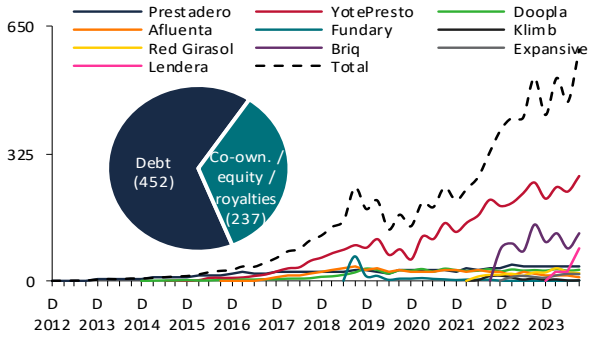
[126] For those ITF that do not report financial statements, the provided capital refers to the sum of the initial capital stock plus the financing obtained through different investment rounds. The data on capital stock for commercial banks correspond to the *CNBV*'s Statistical Bulletin of September 2024 and the data on contributed capital for sofipos and socaps to the *CNBV*'s Report on Financial Situation of September 2024.

the tightening of financial conditions, which may affect the viability of some companies dedicated to financing, although they do not pose a risk to financial stability due to their size.

Regarding debt-IFC, at the end of September 2024, according to the information published by the entities on their websites, the funding granted through these institutions continues to increase, with a nominal increase of 13.8% compared to the same quarter of the previous year, and an increase of 29.1%, compared to the second quarter of 2024 (Graph 143a). However, loan delinquencies remain high for some of these institutions, as in some cases the levels are higher than 30%. Nonetheless, the loan delinquencies weighted average (by funding), of all the debt-IFC that report information, is 7.8%.

As for IFC of co-ownership, equity or royalties, marginal changes have been observed in recent years, with an increase in the semi-annual financing granted during the first half of 2024 (Graph 143b). In this business model, unlike debt-IFC, investors acquire a share in a company or future project; or in the revenues or profits they generate.

Graph 143
Funding granted by institution
a) Debt IFC [1/]

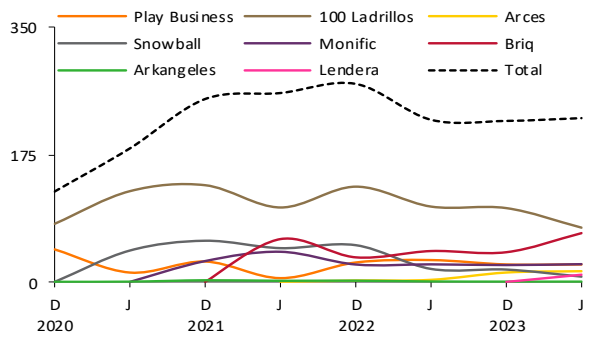


Data as of September 2024.

Source: Institutions' website.

1/ The pie chart shows the contributed capital by IFC, by type of business model (millions of pesos).

b) Equity, co-ownership or royalties IFC



Data as of June 2024.

Source: Institutions' website.

1/ The last observation remains constant for Play Business and Arkangeles, as they have not reported the corresponding information on their website.

In relation to the IFPE, they are still small compared to other financial intermediaries. For example, electronic payment funds (FPEE, its acronym in Spanish) issued by IFPE amounted to 24,635 million pesos in September 2024, compared to 22,781 million in December 2023, which represent only 0.3% of bank deposits.[127] However, despite their size as a sector, they can contribute to facilitating instant monetary transactions between consumers.

With regard to the development of the virtual asset (VA market, it is important to monitor it in order to identify potential risks to the financial system in a timely manner. Global VA activity, measured by the Chainalysis Cryptocurrency Adoption Index published in October 2024, increased in the last quarter of 2023 and the first quarter of 2024 and, despite a slight decline at the end of the second quarter, remained at levels well above those observed in 2022 and 2023.[128] This index takes into account the sum of the transactional volume of VA received by centralized services and decentralized finance protocols (DeFi) in 151 countries.

Although Mexico slightly increased its relative position in the global ranking of the aforementioned 2024 report, moving from 16th place in 2023 to 14th place, this is mainly due to methodological changes and a decrease in the adoption of some countries that were at the top of the ranking.[129] In other words, this increase

[127] The figure for issued electronic payment funds is a concept of the liabilities of the IFPEs taken from their published balance sheets, corresponding to the amount deposited by customers. To date, only 38 of the 56 IFPEs report their financial statements, so these data only reflect the most recent data reported by these institutions.

[128] Chainalysis (2024). "*The 2024 Geography of Crypto Report",* October 2024.

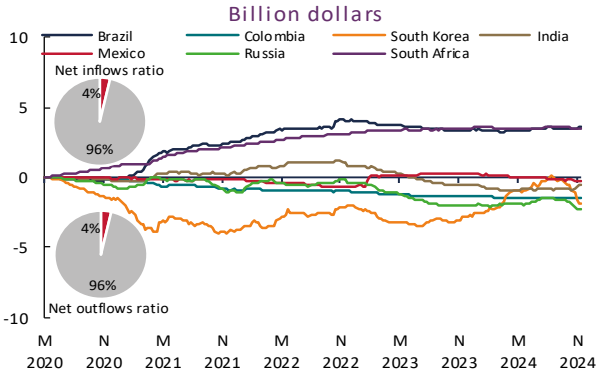
[129] The Global Cryptocurrency Adoption Index registered some methodological changes in 2024, such as: the elimination of the peer-to-peer (P2P) VA exchange trade volume sub-index, where Mexico lagged behind in 30th place; and the way in which DeFi activity is measured. Regarding Mexico's improvement in the ranking, from 16th place in 2023 to 14th place in 2024, it is important to note that Thailand and China dropped from 10th to 16th and from 11th to 20th place, during this period.

in the global index does not reflect a specific increase in adoption in Mexico, given the nature of the variables that make up the index and the policy of safe distance between VA users and financial institutions in our country.

In Mexico, interest in this type of assets continues to be low. In fact, according to available data on net cumulative flows of VA to each country,[130] Mexico has relatively low cumulative flows compared to other emerging countries, which could indicate a low level of adoption. This can also be seen in the proportion of Mexico's gross inflows and outflows compared to other emerging countries (Graph 144). On the other hand, when using Google search interest as a proxy indicator for the level of VA adoption in our country, a relatively low interest is observed in comparison with other relevant financial terms (Graph 145).

Graph 144

Accumulated net flows of virtual assets to the main EMEs 1/



Data as of December 1, 2024.

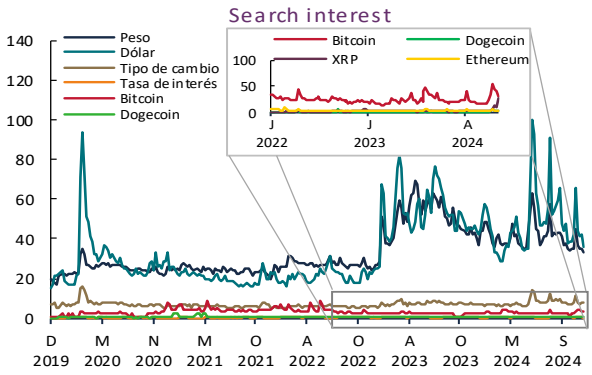
Source: Chainalysis Market Intel.

1/ The series represent an estimate of the cumulative net value (inflows minus outflows) of virtual assets (VA) transferred on the blockchain to each country, based on the location of visitors to the website of the VA services identified by Chainalysis and the flows recorded on the chain between these services.

2/ The pie charts represent the ratio of gross inflows and outflows attributable to Mexico relative to the total inflows and outflows of the remaining EMEs.

Graph 145

Google searches for main virtual assets in Mexico 1/



Data as of December 1, 2024.

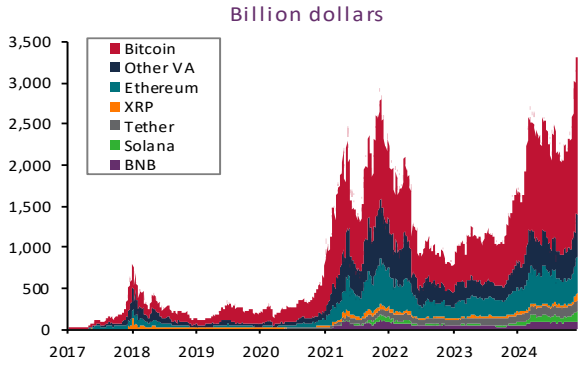
Source: Google Trends.

1/ "Google Trends" normalizes search interest to facilitate comparisons between terms. Search results are also normalized relative to the time and region of the query. Some virtual assets were omitted from the graph as their search interest was close to zero (< 6).

Global VA market capitalization has been on an upward trend since September 2024 and has already surpassed the all-time high of 2.92 trillion US dollars observed in November 2021. This optimism seems to be related to investors' expectations about the trajectory of central banks' monetary policy and the possibility of facing a less restrictive climate towards VA in some jurisdictions (Graph 146).

Graph 146

Total market capitalization of virtual assets 1/



Data as of November 2024.

Sources: CoinGecko, Coin Dance.

1/ The "Other VA" category represents the market capitalization of the remaining VA, according to the total estimated by Coin Dance.

However, the increase in the price of VA does not respond to economic fundamentals and, due to being highly speculative, could be reversed by statements that attenuate expectations regarding the financial cycle or

[130] Chainalysis Market Intel.

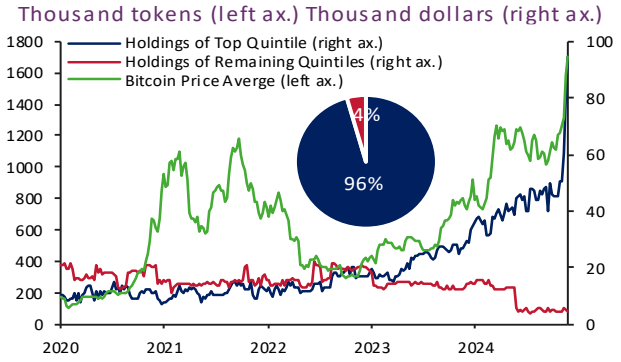
policy towards these assets. Therefore, it is important to reiterate the risks associated with the financial system's participation in, or exposure, to these assets, which, in addition to being speculative, present other disadvantages, such as high price volatility, high transactional costs, difficulties in scalability and quasi-anonymity.[131] Thus, the sustained growth of the VA market, together with an increase in the participation of institutional investors in this market, could imply some risks for financial stability, such as indirect exposures of the traditional financial system to highly volatile assets, operational and cybersecurity risks, weakening of payment systems, impacts on capital flows, among others.

In the past, instances of price manipulation by investors classified as "whales" have been analyzed,[132] particularly in the context of the accumulation of tokens[133] prior to an increase in the price of the asset.[134] At the end of September, it was observed that the holdings of the top quintile of bitcoin investors had an upward trend, preceding an increase in the price of bitcoin. This type of behavior could indicate the existence of coordinated actions similar to those observed for other virtual assets.

Likewise, the market is also vulnerable to external actors; for example, in June of this year, when the German government seized and settled a volume of 2.89 billion dollars in bitcoin,[135] the price dropped considerably, reflecting how operational interventions can significantly impact virtual assets markets. Finally, it is noteworthy that the top 20% of entities concentrate 94% of total assets. These patterns highlight the risk that exists in these markets, where a high concentration of VA holdings and their potential impact on the market is identified in light of the movements made by these large investors (Graph 147).

Graph 147

Bitcoin holdings by quintile and proportion of total holdings 1/



Data as of November 25, 2024.
Source: Chainalysis Market Intel, CoinGecko.
1/ The figures in the pie chart represent the ratio of each group's holdings relative to the total holdings in the last observation of the series.

Banco de México will continue to promote a safe distance between VA and the traditional financial system, and 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 to promote, if necessary, measures to safeguard it.

IV.4. Environmental Risks and Sustainability-related Risks.

The economic and financial impacts derived from environmental risks, especially those related to climate change and the transition to a more sustainable economy, can have significant negative implications for financial institutions. Thus, they may represent a risk for the stability of the system as a whole. In order to mitigate them, Banco de México actively encourages participants in the financial system to internalize environmental risks; to this end, it carries out the analyses presented in this section of the *Report*.

[131] For more detail on the risks implied by VA, see: Box 6. Virtual assets and their implications for financial stability and the household economy, in Financial Stability Report - December 2021; and Box 7. Recent episodes of volatility in virtual asset markets, in the Financial Stability Report - December 2022.

[132] Chainalysis classifies as a "whale" an entity that has held more than one thousand bitcoins within its lifetime, other than a service or fast-spent entity.

[133] Tokens are units of value issued by a private entity on a blockchain. A token can digitally represent any asset or utility, e.g., bitcoin.

[134] Chernoff, A., & Jagtiani, J. (2024). *Beneath the Crypto Currents: The Hidden Effect of Crypto "Whales"*. Federal Reserve Bank of Philadelphia, Working Paper No. 24-14, August 2024.

[135] Bloomberg Law (2024). *Germany secures €2.64 billion from selling seized Bitcoin hoard*. Bloomberg Law, July. Available at: https://news.bloomberglaw.com/crypto/germany-secures-2-64-billion-from-selling-seized-bitcoin-hoard.

Box 4: Mexican Financial System Sustainability Dashboard

I. Introduction

The analysis of the progress and sustainability dynamics[1] of the financial system requires periodic measurement of key indicators. In this regard, sustainability indicator dashboards aim to integrate in one place the measures or metrics that facilitate the analysis and monitoring of the evolution, change and trend of the financial system as a result of the transition to a lower-emissions economy. At the same time, its construction makes it possible to identify data gaps.[2] Against this backdrop, various international organizations have developed indicator dashboards to disseminate the environmental progress of economies and financial systems.

Given the lack of a dashboard in Mexico that comprehensively gathers the necessary indicators for a complete vision of the economic and financial impact of the current transition towards sustainability, and considering that a tool of this type can complement those currently used for the analysis of environmental risks in this *Report*, Banco de México proposes a dashboard composed of thirteen indicators grouped into four categories. This box presents the methodology and composition of the Mexican financial system sustainability dashboard (TSSFM, by its Spanish acronym), which represents a first approach to monitoring the phenomenon.

II. Methodology

The first step in defining the TSSFM was a review of indicator dashboards on the progress of economies and financial systems published by international organizations such as the International Monetary Fund (IMF)[3] and the Network for Greening the Financial System (*NGFS*),[4] as well as dashboards published by some central banks, such as the European Central Bank (ECB)[5] or the Bundesbank.[6]

Based on the analysis of these dashboards, categories and indicators were identified that could clearly show progress and highlight relevant phenomena for the Mexican economy and financial system. First, four categories were identified that are found in most of the international dashboards analyzed: i) economic activity; ii) climate change; iii) physical and transition risks; and iv) sustainable financing.

The **economic activity** category groups indicators that account for the impact of economic activity on the environment and climate, which in turn have effects on economic growth and financial stability. The **climate change** category contains indicators that are key to monitoring climate change and its impacts on populations.

The third category of **physical and transition risks** includes several indicators on: chronic phenomena such as droughts and heat waves; acute phenomena such as hurricanes and floods, which are related to climate change and biodiversity loss; and transition risks, which are those arising from efforts to move towards a low-carbon economy. Finally, the **sustainable finance** category examines the financial system's support for the transformation to a low-carbon economy through outreach and capital mobilization.

Once the categories were established, the indicators that would make up each one were defined. Given that the panorama of international indicators is broad, criteria were determined to select the indicators that best reflect the progress of the Mexican financial system. The final selection of indicators was based on the following criteria:

- **Relevance:** the indicators are essential to show progress towards greater sustainability of the financial system.
- **Materiality:** the indicators have a substantial impact on the performance of the financial sector.

[1] In this box, sustainability includes climate change and nature, so the term "environmental" is also used as a synonym.
[2] According to the *NGFS* (2021), the data gap refers to indicators that are essential for monitoring the financial system's progress toward sustainability, but for which no source of information has yet been identified. In cases where data are not available, consideration should be given to developing data collection systems to address the gaps.
[3] https://climatedata.imf.org/
[4] https://www.ngfs.net/en/dashboard-scaling-green-finance
[5] https://www.ecb.europa.eu/stats/all-key-statistics/horizontal-indicators/sustainability-indicators/html/index.en.html
[6] https://www.bundesbank.de/en/statistics/sustainability/green-finance-dashboard--862732

- **Measurement:** the indicators are quantifiable, reliable and consistent over time; they allow for meaningful comparisons and trend analysis and guarantee transparency in the data sources and methodologies used for their calculation.
- **Data availability:** indicators are based on data that are available and accessible for Mexico.

A first selection of indicators was made based on the established criteria for which it was verified that they had a clearly defined unit of measurement, as well as a regular and systematic measurement frequency for national data. The indicators that met all the criteria were grouped into the corresponding category. Finally, the indicators defined for the Mexican financial system were socialized with experts in each category in order to obtain feedback that made it possible to refine the composition of the dashboard.

III. Sustainability Indicators Dashboard

For the Mexican financial system, a dashboard was developed featuring thirteen indicators classified into four categories (Table 1). The selected indicators enable monitoring of financial risks related to climate change and nature degradation. The dashboard considers the information available from various sources at the time of its development (2023).

Table 1
Dashboard of indicators on the sustainability of the Mexican financial system

Indicator	Description	Period	Source
Category 1: Economic activity			
Greenhouse gas (GHG) emissions and carbon dioxide (CO2)	- Total GHG emissions (mtCO2e)[7] by gas type: Carbon Dioxide, Nitrous Oxide, Methane and Fluorinated Gases. - Total CO2 emissions (mtCO2) by sector. - CO2 emissions intensities (tCO2 / million USD of output).	1970-2022 annual 1995-2018 annual	IMF
Energy transition	- Energy generation by type of source (Gigawatt-hours). - Renewable energy consumption (% of total final energy consumption).	2000-2021 annual 2000-2020 annual	IMF World Bank
Environmentally Adjusted Net Domestic Product	- Environmentally Adjusted Net Domestic Product or Ecological Net Domestic Product (ENP) compared to GDP (millions of pesos at current prices).	2003-2022 annual	INEGI
Depletion and degradation costs	- Total depletion and degradation costs (millions of pesos at current prices). - Total depletion and degradation costs (as a percentage of GDP).	2003-2022 annual	INEGI
Category 2: Climate change			
Annual temperature	- Annual variation of the mean temperature with respect to the reference period 1951-1980.	1961-2022 annual	IMF
Climate-related disasters	- Frequency of weather-related natural disasters by type of disaster.	1980-2023 annual	IMF
Forests and Carbon	- Forest area (hectare and percentage). - Carbon stock in forests (million tons).	1992-2020 annual	IMF
Deforestation	- Annual area deforested in hectares by type of transition from forest land to: i) pasture land ii) agricultural land iii) human settlements iv) wetlands and v) other land.	1992-2022 annual	Satellite Forest Monitoring System (SAMOF).
Category 3: Physical and transition risks			
Physical risk index	- Global climate risk index. - Breakdown of the global climate risk index by type of dimensions: i) climate driven-hazard and exposure, ii) vulnerability and, iii) lack of coping capacity.	2013-2022 annual	IMF
Exposure of portfolios to transition risks	- Percentage of portfolio in companies of natural persons, in sectors exposed to transition risks, by type of exposure. - Percentage of SME portfolio in sectors exposed to transition risks, by type of exposure.	December 2021 - June 2024 Semiannual	Financial Stability Report, Banco de México.

[7] Metric tons of CO2 equivalent. CO2 equivalent is a standardized measure that compares the global warming potential of a greenhouse gas to that of CO2.

Indicator	Description	Period	Source
Exposure of portfolios to physical risks	- Percentage of portfolio in sectors and municipalities vulnerable to cyclones and floods. - Percentage of portfolio in sectors and municipalities vulnerable to heat waves and droughts.	December 2021 - June 2024 Semiannual	Financial Stability Report, Banco de México.
Category 4: Sustainable financial			
Labeled bonds	-Amount of issuance (MXP) and number of bond issues labeled by type of bond. -Amount of issuance and number of bond issues labeled by type of issuer.	2015-2023 annual	CMFS
Information disclosure frameworks	Number of signatories to the disclosure frameworks for climate-related information, ESG factors, and sustainability initiatives in the financial sector.	2016-onwards, annual	TCFD, PRI, Mexican Banks' Association

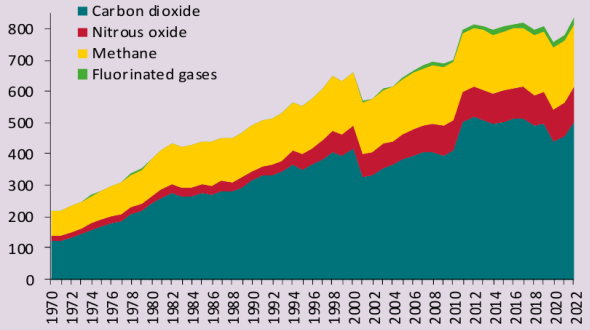
Source: Banco de México with information from the IMF, ECB, Bundesbank, NGFS, World Bank, INEGI, SAMOF, CMFS, TCFD, PRI, ABM).
1/ The period refers to the data series available in the reference source at the time of updating the data in November 2024.

For each category of the TSSFM, a representative indicator is presented. In the economic activity indicators, the growing trend of Mexico's greenhouse gas (GHG) emissions stands out (Graph 1) which went from 217.9 MtCO2e in 1970 to 836 MtCO2e in 2022, that is, a growth of 283%.

The climate change category shows that the frequency of natural disasters has increased in every decade since 1980 (Graph 2). In terms of physical and transition risks, Mexico has a climate risk rating of 4.9, considering hazard and exposure, vulnerability, and coping capacity (Graph 3), where the increase in the vulnerability component stands out.[8]

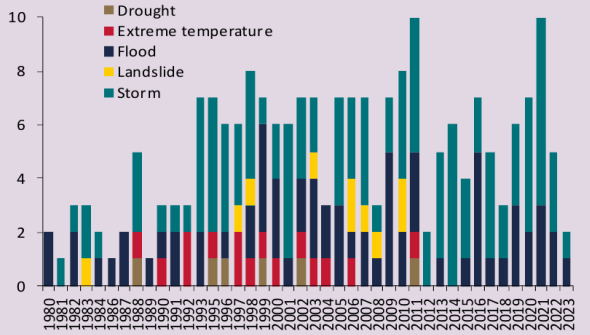
In the category of sustainable financial indicators, there was an increase in the number of signatories to the Principles for Responsible Investment from 2016 to 2020 and less dynamic growth in the following years (Graph 4).

Graph 1
Greenhouse gas (GHG) emissions in Mexico by type of gas
MtCO2e



Data as of november 2024.
Source: Internacional Monetary Fund.

Graph 2
Climate-related disasters frequency in México by type of disaster
Number of disasters



Data as of november 2024.
Source: Internacional Monetary Fund.

Banco de México uses some of these indicators to analyze environmental and social risks that could have implications for the stability of the financial system, for example, it reviews the exposure of commercial banks' portfolios to transition and physical risks. It also analyzes the financing available through the labelled bond market.

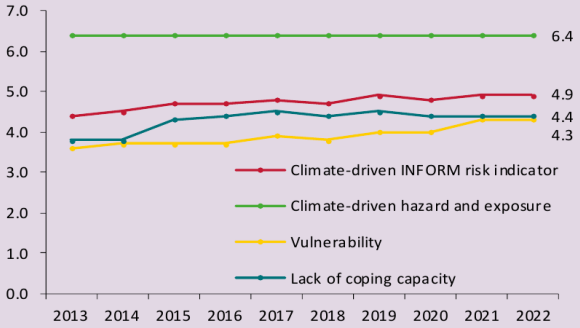
Having complementary indicators such as those for energy transition and climate change makes it easier to link the risks detected with factors that can mitigate or amplify them, as well as to review market

[8] The INFORM Climate Risk Index is a global risk assessment adjusted by the IMF for climate risks. The index is composed of three dimensions: climate hazard and exposure, vulnerability, and lack of response capacity.

- Climate-driven hazard and exposure reflects the probability of physical exposure associated with specific climate hazards.
- Vulnerability represents the economic, political and social characteristics of the country that can be destabilized in the event of a threat.
- Lack of coping capacity refers to a country's ability to cope with disasters in terms of formal and organized activities and effort by the country's government, as well as the existing infrastructure that contributes to disaster risk reduction.

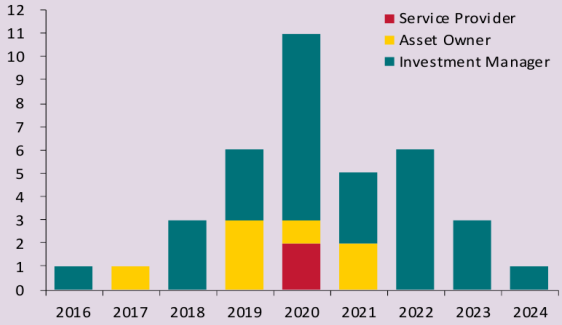
trends and their consistency with the transition to a lower-emission economy.

Graph 3
Global INFORM climate risk index for Mexico
Index



Data as of november 2024.
Source: Internacional Monetary Fund.
1/ Index scale from 0 to 10: the higher the index, the higher the

Graph 4
Signatories of Principles for Responsible Investment in Mexico
Number of signatories



Data as of november 2024.
Source: Principles for Responsible Investment (PRI).

IV. Final Considerations

Dashboards are tools that support and facilitate the analysis of the trajectories and trends that economies and financial systems are following towards greater sustainability. The creation of the TSSFM helps monitor progress in sustainable finance from various perspectives.

It is important to consider that this selection of indicators represents an initial step in the study of the phenomenon and must remain a work in progress to reflect advances in the field and improvements in addressing data gaps. In order to provide continuity to the TSSFM, it will be updated periodically and, if the available information allows,[9] the integration of more indicators that meet the defined criteria will be evaluated.

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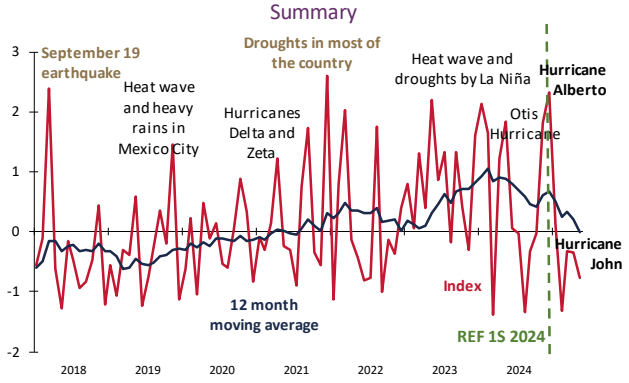
NGFS (2021): *"Note on the dashboard on scaling up green finance and data gaps"*, March 2021. https://www.ngfs.net/en/dashboard-scaling-green-finance

[9] For example, as financial and non-financial institutions make progress in disclosing information on their sustainability-related risks.

Indexes of public interest for issues related to environmental risks and natural disasters

Since the last *Report*, the average value of the index for extreme events and natural disasters from June to November 2024 was higher than in the previous six months. This increased index value reflects a greater interest of society in such events, evidenced by a rise in online searches for related terms.[136] During this period, the most prevalent search terms were "hurricane", "torrential rain" and "flood", reflecting that: i) in June, Hurricane Alberto caused significant damage, primarily in the northeast of the country; and ii) between July and September, there were torrential rains, some of which were associated with other hurricanes, such as Hurricane John, which also caused substantial damage, particularly along the Pacific Coast (Graph 148).

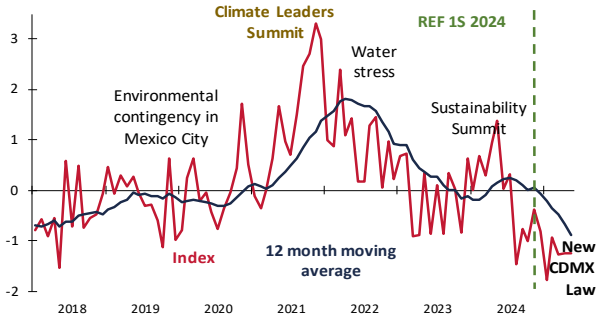
Graph 148
Interest index on isssues related to extreme hydro-meteorological events and natural disasters
Summary



Data as of November 2024.
Source: Banco de Mexico and Google Trends.

Conversely, from June to November 2024, the index for events related to transition risks averaged lower than in the previous six months. The most prevalent search terms during this period were "environmental justice", "energy policy" and "carbon price" driven by: i) the commemoration of World Environment Day in June, focused on the decarbonizing the economy and promoting energy policies to preserve, protect and revitalize the planet's ecosystems; and ii) the enactment of the new Environmental Law of Mexico City (CDMX) in July, a legislation designed to safeguard conservation land, water resources and ecosystems (Graph 149).

Graph 149
Interest index on issues related to transition risks
Summary



Data as of November 2024.
Source: Banco de Mexico and Google Trends.

It is imperative to acknowledge that an increase in the indexes signifies a growing interest of Mexican society in topics related to transition risks, extreme weather and natural disasters in general. This interest may be driven by events with positive, negative or neutral impacts on the environment. Therefore, it should not be automatically assumed that a higher index value implies greater environmental risks or a higher cost of transition toward a more sustainable economy.

[136] See the *Financial Stability Report- June 2022*, which explains that the construction of the indices is based on the work of Zhang, L. (2021) where a similar analysis is carried out for Hong Kong. Initially, the search terms are selected, both for the index of environmental risks and natural disasters and for the index of transition risks. Subsequently, a seasonal adjustment is implemented for each index, ensuring that they reflect the interest of Mexican society beyond what would be attributable to seasonal factors. The construction of these indexes is derived from public searches on the web for terms associated with each type of event.

Box 5: Nature-related Risks

I. Introduction

Nature-related risks can impact entire economic sectors and, consequently, affect financial stability. This box will explain why nature degradation[1] is a financial risk and its strong interconnection with climate risks. It will also present the conceptual framework developed by the Network for Greening the Financial System (*NGFS*) to facilitate the identification and analysis of these risks, particularly those that are more likely to be relevant from a microprudential, macroprudential or macroeconomic perspective.

This box also highlights the current international commitment to conserve nature, which involves mobilizing financial flows to halt and reverse its degradation.

II. Nature and its Importance

All economic activities depend to a greater or lesser extent on a range of benefits provided by nature (also known as "ecosystem services"), which provide society with tangible goods (e.g., timber or food); the regulation of natural processes (such as carbon sequestration, air quality and climate regulation, pest control and pollination); supporting services (e.g., nutrient cycling and soil formation); and cultural services (such as recreation and tourism).

Nature's capacity to provide ecosystem services depends directly on biodiversity. Biodiversity refers to the variety of living organisms, including diversity within species, between species and of ecosystems. Scientific evidence shows that this diversity is fundamental for ecosystems to be resilient, adaptive and productive. Biodiversity should therefore be considered an essential characteristic of healthy ecosystems.

Worldwide, more than half of the GDP (55 %), i.e. about 58 trillion US dollars, is moderately or heavily dependent on nature and its services (*WWF*, 2024).

III. Degradation of Nature

Human demands have led to an unprecedented degradation of nature and its biodiversity that threatens the continued provision of ecosystem services. According to the Living Planet Report (*WWF*, 2024), in the last 50 years (1970-2020) the average size of wildlife populations has been reduced by 73%.[2] In addition, the report identifies the degradation of ecosystems, such as: the deforestation of the Amazon (estimated between 14 and 17%) and the expected losses in the coming years of the world's coral reefs (between 70% and 90%).

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (*IPBES*), identifies five factors that have directly driven the degradation of nature at the global level (in descending order): land and sea use change, direct exploitation of organisms, climate change, pollution, and the presence of invasive species.

IV. Nature-related Risks

Damage to nature can impact the economy at different levels: micro, sectoral/regional and macro, including effects on price stability. These economic risks, in turn, can translate into financial risks that negatively affect both financial institutions and financial systems as a whole.

In 2022 the *NGFS* issued a statement[3] in which it considered the impacts and dependencies of nature, including biodiversity and ecosystems, to be a source of material risk from a macroeconomic and financial stability perspective and therefore it is critical that central banks and supervisors assess these risks adequately to fulfill their mandates.

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[1] Nature degradation includes biodiversity loss and climate change. Biodiversity loss refers to an average loss of biological diversity over time or space. This occurs when species become extinct, habitats are degraded or become uninhabitable, and the genetic diversity of populations is reduced. NGFS (2022).

[2] Freshwater populations have suffered the heaviest declines, with a drop of 85%, followed by terrestrial (69%) and marine populations (56%). Within regions, the fastest declines have been observed in Latin America and the Caribbean (95%), followed by Africa (76%) and Asia and the Pacific (60%).

[3] NGFS (2022): "Statement on Nature-Related Financial Risk".

On the one hand, various financial authorities[4] are at different stages regarding the inclusion of biodiversity loss and other nature-related risks in their financial risk assessments.

V. Conceptual Framework

To facilitate the analysis of nature-related risks, the *NGFS* proposed a conceptual framework to guide the action of central banks and supervisors with respect to these risks.[5] In this framework, the *NGFS* distinguishes physical risks from transition risks:

Physical Risks

These are risks related to activities that have a strong direct or indirect dependence on ecosystem services, and therefore could be altered due to biodiversity loss. These risks can be acute (e.g., the sudden interruption of an ecosystem service such as water supply) and chronic (e.g., the use of pesticides leading to a gradual decline in pollinators). Both types of risks result in damage to real assets, disruption of production processes, reduced productivity and other similar effects.

Transition Risks

These are financial risks that arise from actions to protect, restore or reduce negative impacts on nature. These risks may increase as the global policy agenda on biodiversity loss advances, for example, as countries take steps to implement the Kunming-Montreal Global Biodiversity Framework (Kunming-Montreal Framework), which is described in section VII of this box.

To analyze the **economic impact** of physical and transition risks related to nature, the *NGFS* suggests considering three aspects: (i) whether the impacts are direct or indirect (through the value chain), (ii) whether their effects are micro, sectoral/regional or macro, and (iii) substitutability, i.e. the adaptability of economic actors, in two dimensions: geographic and technological.

Thus, the effects of nature degradation and related policies on the economy (**economic risks**) can be transmitted to financial institutions and have an impact on the financial system (**financial risks**). Nature-related financial risks materialize through typical transmission channels, resulting in impairment of assets and collaterals, lower corporate profitability and the impairment of insurability.

It is noteworthy that **nature-related risks are also endogenous**, which means that economic agents, by generating negative impacts on the environment, can also increase the risks they then need to manage. Financial institutions can have a positive impact on nature through their activities, for example, by financing those that contribute to the conservation and restoration of nature and thereby decreasing physical risks.

VI. Linkage to Climate-related Financial Risks.

Climate and nature-related financial risks could be intensified by the interlinkages and reinforcing mechanisms between them, i.e. by the interdependence between climate change and biodiversity loss.[6] For example, the destruction of ecosystems can intensify climate change by removing carbon sinks and altering temperature regulation systems, leading to an increased likelihood of extreme weather events or sea level rise.

Given these close interdependencies, there are advantages to an integrated approach to risk assessment that considers both climate and natural financial risks, while maintaining flexibility in the assessment of such risks.

VII. Mobilization of Financial Flows

Based on the recognition of the degradation of nature described above, the Kunming-Montreal Framework was adopted in 2022 during COP15,[7] . This framework aims to address biodiversity loss, restore ecosystems and protect the rights of

[4] Financial authorities of *FSB* member jurisdictions. Financial Stability Board (2024): "Stocktake on Nature-related Risks Supervisory and regulatory approaches and perspectives on financial risk".

[5] NGFS (2024): "Nature-related Financial Risks: A Conceptual Framework to guide Action by Central Banks and Supervisors".

[6] The *NGFS* highlights four potential linkages: 1) climate change as a driver of nature degradation; 2) nature degradation as a driver of climate change, 3) climate change mitigation policies as a potential driver of nature degradation, and 4) nature restoration as a tool for climate change mitigation and adaptation.

[7] The United Nations Conference on Biodiversity (Fifteenth meeting of the Conference of the Parties (COP15) to the Convention on Biological Diversity).

indigenous peoples.[8] The framework also states that it will seek to gradually align relevant public and private activities, as well as financial and fiscal flows, with its goals and targets. In addition, the framework's strategic plan includes concrete actions to halt and reverse the loss of nature by 2030. Relevant targets include:

- Conserve and effectively manage at least 30% of land, waters and seas.
- Bring the loss of areas of high biodiversity importance close to zero (land degradation neutrality).
- Ensure that transnational companies and financial institutions transparently and regularly monitor, assess and disclose their risks and impacts on biodiversity, along with their operations, supply and value chains and portfolios.

To meet the Kunming-Montreal Framework target, financial flows for nature-based solutions must nearly triple from their 2022 level (US$200 billion) to reach US$542 billion per year by 2030 and quadruple to US$737 billion by 2050. [9]

UNEP's State of Nature Finance 2023 report identifies that, of the 200 billion US dollars allocated in 2022 for nature-based solutions, 82% was contributed by governments, while the rest corresponded to private financing. The report also highlights that the financial flow invested globally each year in activities that have a direct negative impact on nature was estimated at 7 trillion US dollars by 2023.

In addition to the Kunming-Montreal Framework, there is increasing policy and industry attention on the role of the financial system in helping to slow, halt and ultimately reverse biodiversity loss. Among the recent interest is the integration of nature and biodiversity into the G20 Sustainable Finance Roadmap.[10] Similarly, in July 2024, at the request of G20 finance ministers and central bank governors, the *Financial Stability Board* (*FSB*) published a stocktaking of regulatory and supervisory initiatives associated with identifying and assessing nature-related financial risks.[11]

Against this backdrop, it is important for central banks and financial supervisors to closely monitor these developments and assess their potential implications for financial institutions and the financial system.

In order to promote the sound development of the financial system, Banco de México, like other central banks, is in the process of training and raising awareness of the impacts of biodiversity loss and other nature-related risks to financial stability. On the other hand, financial institutions also show varying degrees of progress. [12]

VIII. Final Considerations

It is essential that financial authorities and the private sector have greater expertise in understanding and, where necessary, managing nature-related risks, so there is a need for capacity building initiatives that facilitate a shared understanding of these financial risks.

To effectively address the degradation of nature, a comprehensive strategy is required from society as a whole that goes beyond the financial sector.

Recent interest and international commitments in this area highlight the importance of central banks monitoring the potential mobilization of financial flows and their possible implications for the stability of the financial system. Banco de México has also begun to incorporate these risks in the tools it develops for its analysis, as can be seen in some of the indicators included in the Mexican financial system's sustainability dashboard, for example: forest area and deforestation (See Box 4).

[8] https://www.cbd.int/doc/c/2c37/244c/133052cdb1ff4d5556ffac94/cop-15-l-25-es.pdf

[9] *United Nations Environment Programme* (2023). *State of Finance for Nature: The Big Nature Turnaround - Repurposing $7 trillion to combat nature loss. Summary for Decision-makers.*

[10] https://g20sfwg.org/roadmap/

[11] *Financial Stability Board (2024) Stocktake on Nature-related Risks Supervisory and regulatory approaches and perspectives on financial risk.*

[12] For example, Grupo *Financiero Banorte's* commitment to adopt the recommendations of the *Taskforce on Nature-related Financial Disclosures* (TNFD) for the disclosure of information related to nature. https://tnfd.global/engage/tnfd-adopters-list/

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Transition Risk

The transition to a sustainable economy presents significant challenges for the global financial system. Companies must adapt their production in response to new regulations and to the growing consumer preference for products and services that are less polluting. For example, new regulations may be implemented based on the commitments made by several countries in international forums, such as the Conferences of the Parties (COP), to reduce their greenhouse gas emissions.

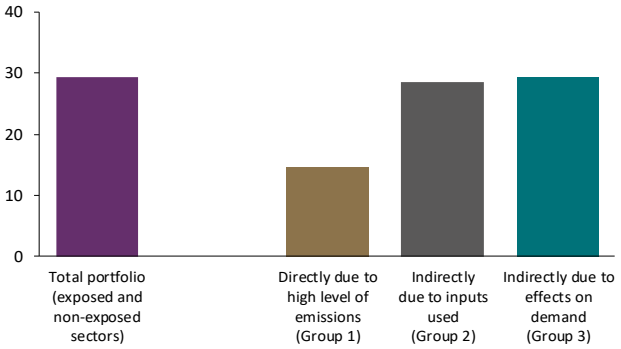
The risks to the financial system stem from the possibility that this transition process may unfold in a disorderly manner. Specifically, there could be a series of effects, such as a depreciation of polluting assets or an increase in the costs for companies reliant on obsolete technologies. This could affect their capacity to fulfill credit obligations and increase non-performing loan ratios. Therefore, financial intermediaries extending loans to such companies must prioritize the incorporation of transition risks into their lending and premiums.

This section examines the exposure of commercial banks' corporate credit to the transition risks associated with a shift towards a more sustainable economy. To this end, three groups of economic sectors are constructed based on the nature of their exposure:[137] the first group includes sectors that directly generate carbon emissions in their production processes (Group 1); the second group comprises sectors that, although not directly generating emissions, use inputs that produce high emissions (Group 2); and the third group encompasses sectors whose demand heavily depends on polluting industries (Group 3).[138]

In addition, this classification is complemented by an evaluation of the intrinsic characteristics of the companies belonging to each group. This assessment facilitates the identification of the vulnerabilities that could amplify or mitigate the effects if transition risks materialize.

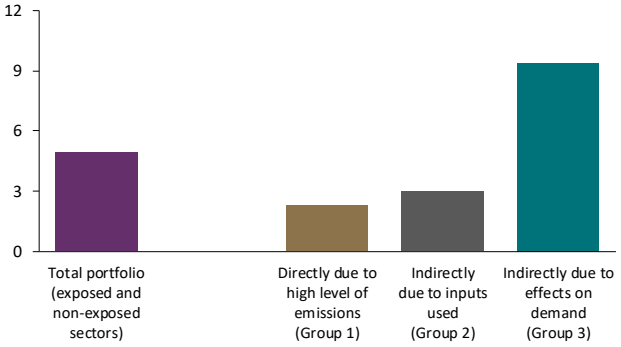
Exposure to transition risks remains primarily associated with credit to Group 3, which includes sectors whose demand depends more heavily on polluting industries. In addition, this group has a higher share of small and medium-sized companies (SMEs), which tend to have less capacity to develop adaptation and risk management strategies. Therefore, SMEs could be more affected if transition risks materialize. Likewise, there is also a higher participation of new companies in Group 3, which have a comparatively shorter credit history and then may face greater difficulties refinancing and avoiding default if they are affected. The larger share of SMEs and new companies could amplify the effects in the event of a disorderly transition (Graph 150a and Graph 150b).

Graph 150
Portfolio in sectors exposed to transition risks, by type of exposure
a) Portfolio percentage to SMEs
Percentage



Data as of June 2024.
Source: Banco de Mexico, CNBV and INEGI.

Portfolio in sectors exposed to transition risks, by type of exposure
b) Portfolio percentage to new enterprises
Percentage



Data as of June 2024.
Source: Banco de Mexico, CNBV and INEGI.

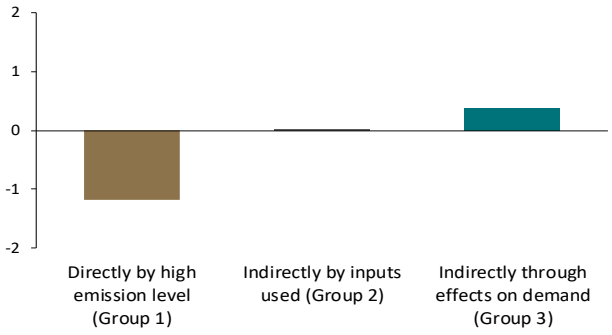
In comparison with the previous *Report*, there has been a decline in banks' direct exposure to transition risks,

[137] For more details on sector classification, see the December 2020 Financial Stability Report.

[138] The definition of Group 2 is related to Scopes 2 and 3 of the Greenhouse gas (GHG) Protocol, as these scopes consider that companies can generate emissions even when they are physically located in the plant that produces the inputs and not in the company that consumes them. In other words, they may emit indirectly through the use of inputs. The definition of Group 1 is directly related to the definition of Scope 1.

while their indirect exposure has shown an increase. This rise in indirect exposure can be attributed to an augmented portfolio exposed to demand shocks (Group 3) and, in contrast to the previous *Report*, a slight increase in the portfolio exposed to input supply shocks. Among the sectors exposed to demand shocks (Group 3), the growth of the portfolio in the storage services sector, corporate services and some professional and technical services, including accounting, auditing and IT, stands out. These sectors provide supplies to polluting industries and exhibited strong dynamism of economic activity (Graph 151).

Graph 151
Portfolio balance changes in sectors exposed to transition risks
Percentage

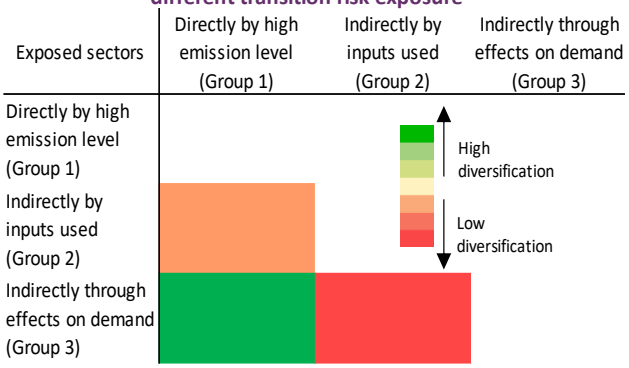


Data as of June 2024.

Source: Banco de Mexico, CNBV and INEGI.

Banks with larger portfolios in sectors exposed to demand changes (Group 3) exhibited mixed behaviors with respect to portfolio diversification. On one hand, they increased their indirect exposure due to a larger portfolio in Group 2 sectors, but, on the other hand, they diminished their direct exposure by reducing their portfolios in Group 1 sectors (Graph 152). Therefore, these banks are the ones that would be most adversely affected if a disorderly transition were to jointly impact the companies that supply polluting industries and those receiving supplies from these industries.

Graph 152
Portfolio diversification among sectors with different transition risk exposure[1/]



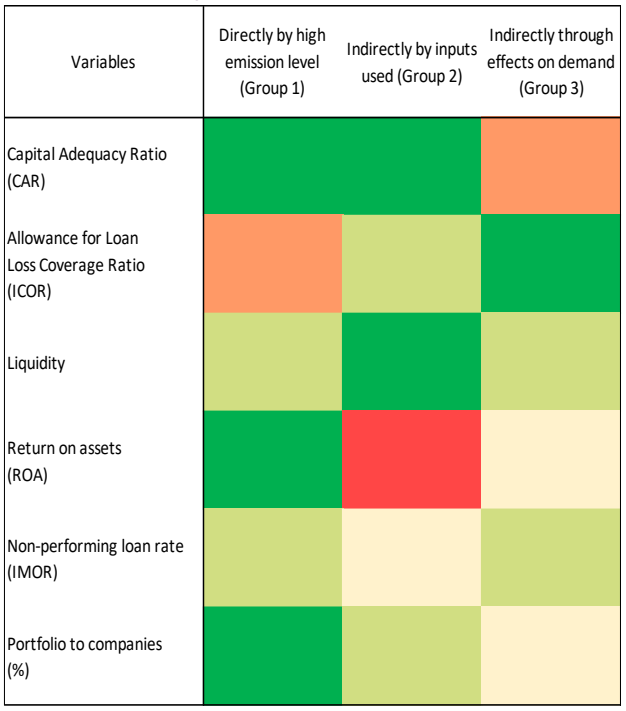
Data as of June 2024.

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.

In addition, the banks most exposed to demand shocks (Group 3) now exhibit fewer characteristics that could potentially mitigate negative consequences. Specifically, these banks currently possess lower capitalization, lower liquidity levels and reduced profitability (ROA). In contrast, the most directly exposed financial intermediaries, because they lend to companies with high emission levels (Group 1), are associated with more mitigating factors (Graph 153). For example, these banks now demonstrate higher profitability.

Graph 153
Risk amplifiers and mitigants, depending on the bank's exposure to transition risks 1/



Data as of June 2024.
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 credit portfolio

This section undertakes an analysis of the exposure of corporate credit to four hydrometeorological phenomena: tropical cyclones, floods, heat waves and droughts. These events can cause damage that increases companies' operating costs and reduce their revenues, which would eventually increase non-performing loan ratios.[139] Moreover, these four phenomena are expected to increase in both frequency and intensity in the future.

In order to conduct the analysis, the credit granted to the sectors and regions exposed to each of the hydrometeorological phenomena is identified. First, the credit granted by commercial banks in municipalities facing a specific type of phenomenon must be calculated. Then, within these municipalities, only the credit allocated to sectors vulnerable to that specific type of event is considered. The analysis covers both the states of Mexico and the financial institutions within its commercial banking system.[140]

Among the four events, floods persist as the primary phenomenon with regard to corporate credit exposure, followed by heatwaves (Graph 154 and Graph 155). However, the portfolio exposed to floods continues the downward trend it had been showing, while exposure to the rest of the phenomena exhibits an increase, particularly evident in the case of heatwaves.[141]

Furthermore, the states with the most credit exposure to floods are also those that now have the most credit exposure to tropical cyclones.[142] As a result, the credit in these states could be more affected if both phenomena were to occur in a short timeframe (Graph 156). However, the number of factors that could mitigate the negative impacts of floods has increased. Notably, in the municipalities with more exposed credit, the percentage of homes with resilient roofs and access to potable water increased, which could reduce the economic effects and, therefore, the likelihood of defaults over time (Graph 157).

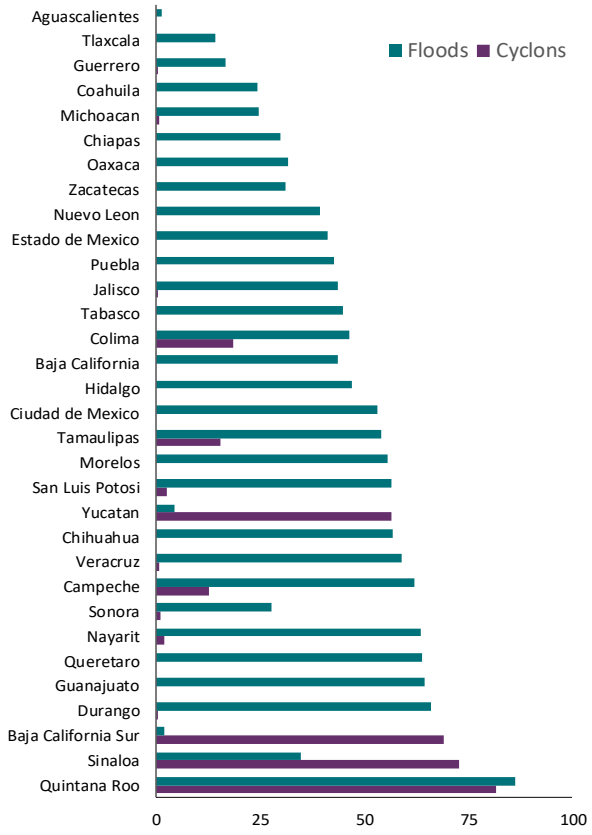
[139] See Box 7 of the previous version of this *Report*, in which it is stated that droughts can generate water shortages and this, in turn, can have an economic impact, leading to an increase in non-performing loan ratios.

[140] The study "*Thermal stress and financial distress: Extreme temperatures and firms' loan defaults in Mexico*" by Aguilar-Gomez et al. (2024) confirms the negative effect of an unusual number of extreme temperature days on corporate credit defaults in Mexico.

[141] The impact of heatwaves on the country's financial system has been documented, for example, in Box 8 "*Effect of Extreme Heat on Non-Performing Loan Ratios of Agricultural Companies*" of the Financial Stability Report - December 2020 which highlights that heatwaves increase the non-performing loan ratio of agricultural SMEs.

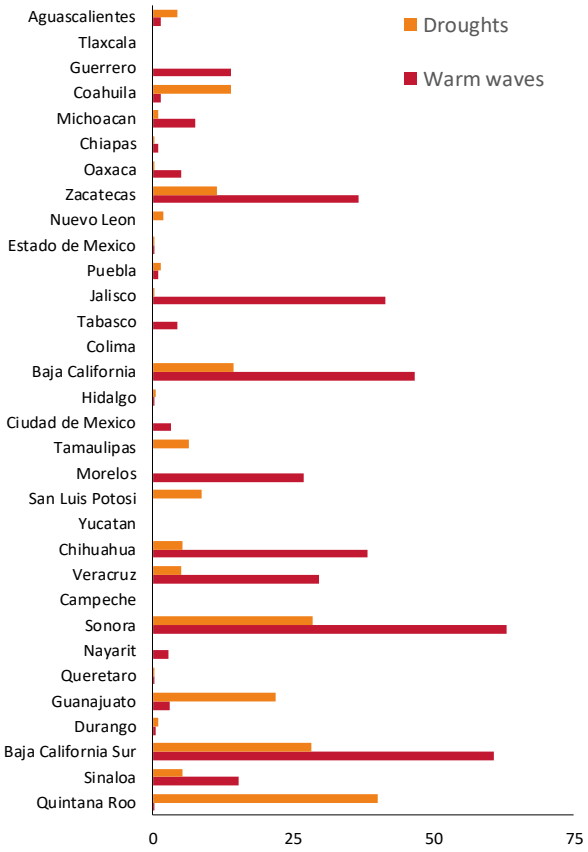
[142] See Box 5 "*Increased occurrence of tropical cyclones and credit exposure in Mexico*" of the Financial Stability Report - June 2023, which analyzes the implications of the increase in the frequency and intensity of cyclones on the exposure of the credit portfolio at the national level.

Graph 154
Portfolio in sectors and municipalities vulnerable to cyclons and floods
Percentage



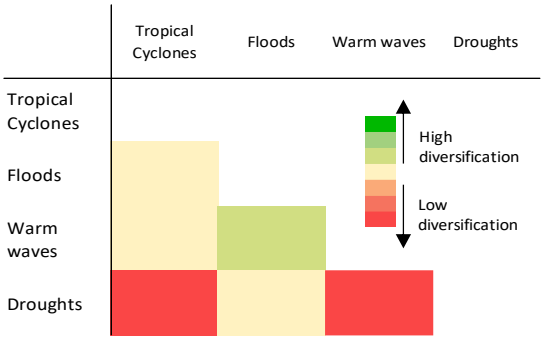
Data as of June 2024.
Source: Banco de Mexico, CENAPRED, CNBV and INEGI.

Graph 155
Portfolio in sectors and municipalities vulnerable to heat waves and droughts
Percentage



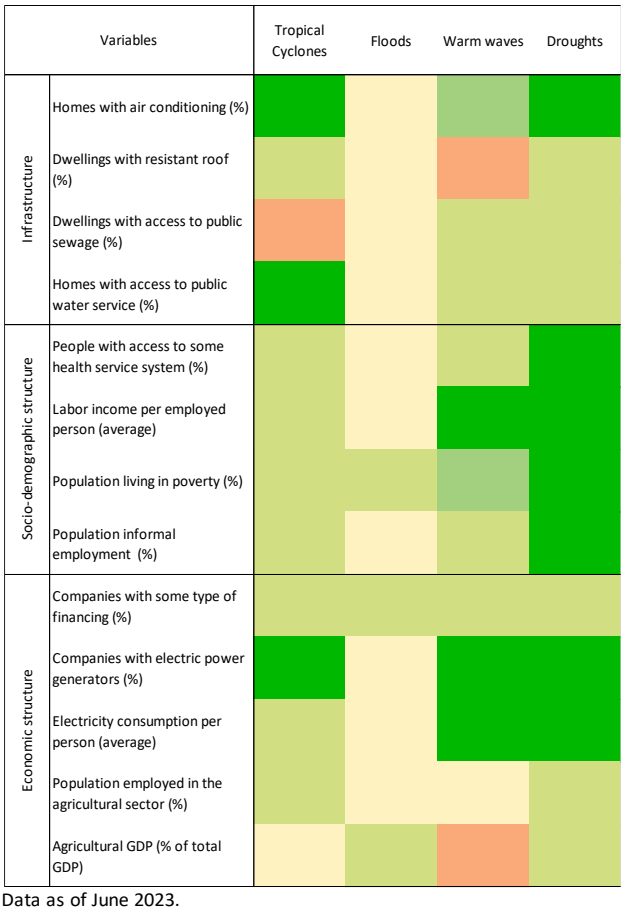
Data as of June 2024.
Source: Banco de México, CENAPRED, CNBV and INEGI.

Graph 156
Portfolio diversification among sectors and municipalities exposed to different hydro-meterological events (for different states) 1/



Data as of June 2024.
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.

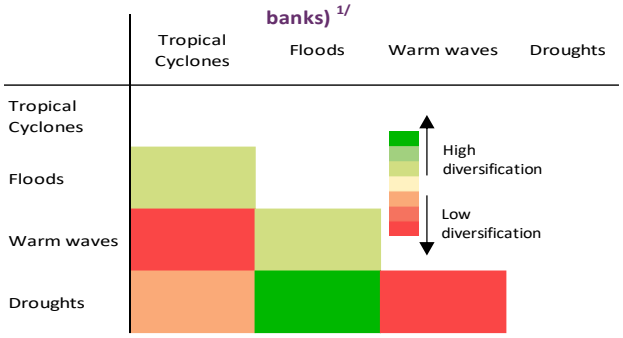
Graph 157
Amplifying and mitigating factors of physical risks (for different states) 1/



Data as of June 2023.
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.

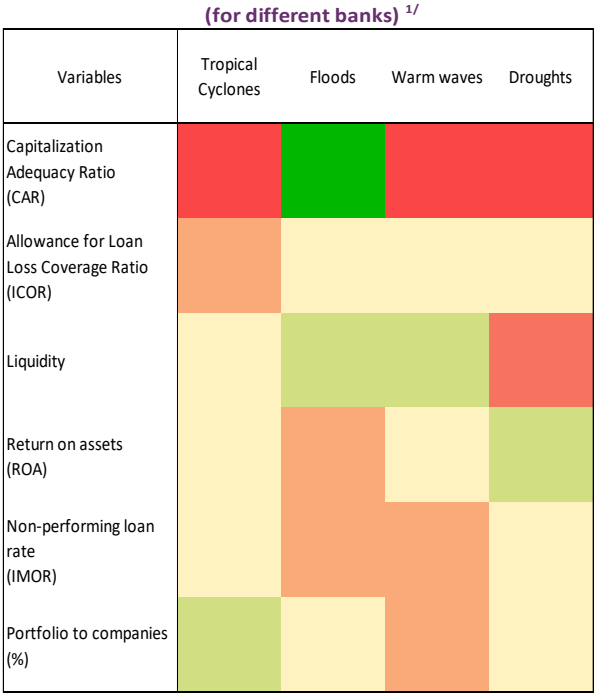
A deterioration in diversification is also observed when comparing banks in terms of the possible occurrence of floods and cyclones within a short period. Nevertheless, in general terms, the banks' portfolios remain more diversified than those of the regions (Graph 158). Moreover, banks with more portfolio exposure to floods and cyclones now have more characteristics that could mitigate the impacts. In particular, banks with greater exposure to cyclones now have higher liquidity, greater profitability and lower non-performing loan ratios, while those more exposed to floods now exhibit higher profitability (Graph 159).

Graph 158
Portfolio diversification among sectors and municipalities exposed to different hydrometeorological events (for different banks) 1/



Data as of June 2024.
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 159
Factors amplifying and mitigating physical risks (for different banks) 1/



Data as of June 2024.
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.

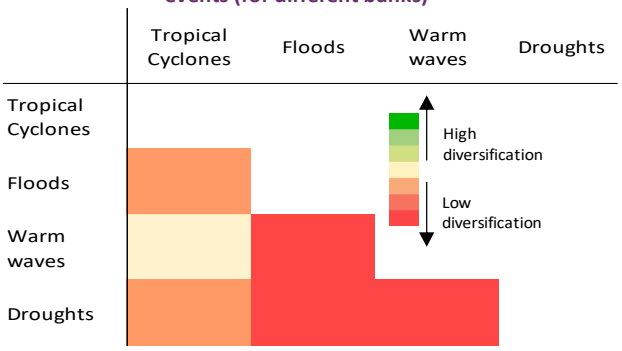
Physical risks: Mortgage and consumer credit portfolios

In this section, the physical risk analysis is extended to mortgage loans and a portion of the consumer credit portfolio: payroll, automotive, personal and revolving. The same four hydrometeorological phenomena are

evaluated as in the previous section, employing a similar process to identify the exposed credit, based on the municipality and sector where the credit is granted.[143]

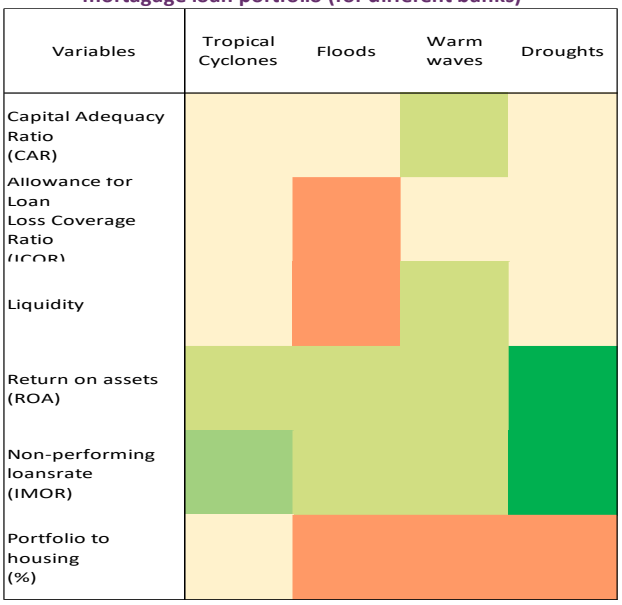
The phenomenon to which mortgage loans are most exposed is floods. Furthermore, as with the corporate sector, exposure to floods in mortgage loans continues its downward trend, but exposure to other phenomena has increased. However, in the case of mortgages, the most exposed banks are less diversified in the face of the occurrence of several events in a short period (Graph 160). With respect to floods, the most exposed banks to this phenomenon are now more diversified against the possible occurrence of cyclones, but less diversified against heatwaves. These banks also currently possess more characteristics that could amplify the impact of floods, particularly higher non-performing loan ratios and lower profitability (Graph 161).

Graph 160
Mortgage loan portfolio diversification among sectors and municipalities vulnerable to different hydro-meteorological events (for different banks) 1/



Data as of June 2024.
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.

Graph 161
Amplifying and mitigating factors of physical risks in the mortagage loan portfolio (for different banks) 1/



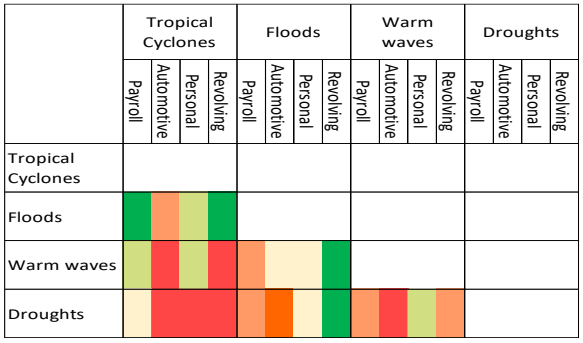
Data as of June 2024.
Source: Banco de Mexico, CENAPRED, CNBV and INEGI.
1/ Shades of green show mitigating effects while shades of red show amplifying factors. The color is determined by the correlation coefficient between each factor and the shares of credit portfolios for each sector and municipality exposed to the different hydro-meteorological events.

For payroll, automotive, personal and revolving loans, floods are the phenomenon to which commercial banks are most exposed, as well as for corporate and mortgage loans. However, in contrast to what is observed in mortgage loans, consumer loans are held by banks with the largest portfolios that are exposed to floods are the most diversified against the occurrence of multiple events, so they could be less affected if both events occur in a short period (Graph 162). In addition, as with corporate loans, and in contrast to mortgage loans, consumer loans now display a greater number of characteristics that could mitigate the impact of floods. These financial intermediaries now have more liquidity and lower non-performing loan ratios (Graph 163).

[143] The same four hydro-meteorological events are considered as with the corporate portfolio, and a similar process is followed to identify the exposed credit: credit in regions and sectors exposed to the same type of hydrometeorological event is identified; however, the proportion of the portfolio in at-risk sectors is approximated by following two steps: first, the proportion of the portfolio in high and low wages is identified for each municipality. The second step involves the integration of this information with employment data from the last census; in particular, for each wage level, the portfolio of at-risk sectors is estimated as the proportion of formal employment in those sectors.

Graph 162

Consumer loan portfolio diversification among sectors and municipalities vulnerable to different hydro-meteorological events (for different banks) 1/



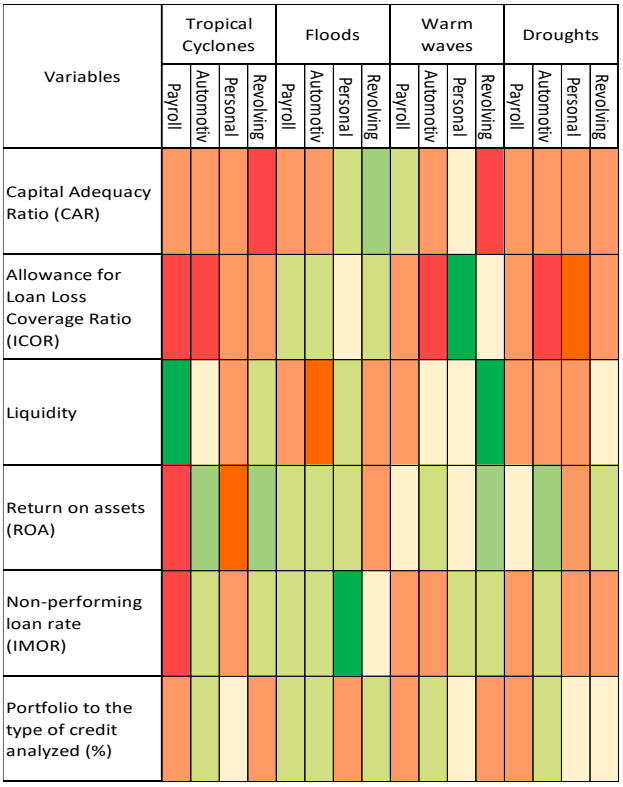
Data as of June 2024.

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 163

Amplifying and mitigating factors of physical risks in the consumer credit portfolio (for different banks) 1/



Data as of June 2024.

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 6: Sustainable Finance Committee's Pilot Climate Scenario Analysis and Integrated Assessment Models

I. Introduction

Climate change and the associated policies for its mitigation and adaptation can imply considerable losses for financial institutions and, therefore, affect financial stability, which is why central banks should be interested in knowing and assessing the associated risks. Traditional financial asset valuation models do not necessarily incorporate the risks and opportunities related to climate change, so it is necessary to incorporate new analytical tools, such as climate scenario analysis through integrated assessment models (IAM).

Within the framework of the Sustainable Finance Committee (CFS, its acronym in Spanish), Banco de México, together with international and national experts, has collaborated in the development of a *Pilot climate scenario analysis for the Mexican financial system* (Pilot) which will use IAM models calibrated for Mexico, according to the narrative of four climate scenarios adapted to international standards. Ten financial institutions are participating in the Pilot, including Afores, commercial banks, development banks, and other financial institutions.

This box presents the climate scenario analysis used by the CFS in the development of the Pilot as a tool to support the management of climate change risks and opportunities and thus motivate financial institutions to build technical capacity in its use.

II. Climate Change Scenarios in the CFS Pilot.

The Network for Greening the Financial System (*NGFS*),[1] of which Banco de México is a founding member, has proposed several climate scenarios to assess the impact of climate-related risks. For the Pilot, the CFS proposed to use three scenarios that follow the narratives proposed by the *NGFS*,[2] and a fourth scenario that explores the risk of Mexico not participating in the global efforts to transition to a decarbonized economy. The scenario narratives are presented below:

1. **Current Policies**: under this scenario, no mitigation measures are adopted, which reduces transition risks, but significantly increases physical risks. In addition, no cap on carbon emissions prices is considered for Mexico.
2. **Below 2°C**: in this scenario, starting in 2020, limits are imposed on countries' carbon emissions, limiting global warming to below 2°C in 2100. Mexico achieves net zero emissions in 2060.
3. **Delayed Transition**: the adoption of policies aims at limiting global warming to below 2°C from 2030 instead of 2020 is explored. In the case of Mexico, the goal is to achieve net zero emissions by 2050.
4. **Asymmetric (non-NGFS):** this scenario assumes that the rest of the world will transition towards net zero emissions by 2050, with a limit global warming below 1.5°C by 2100. However, Mexico does not align with this target and continues with current policies.

The goal for the 2 °C scenario is to compare the impact of the transition with current policies, while the goal for the delayed transition scenario is to explore the impact of inaction in the near term. The goal for the asymmetric scenario is to assess the case i where a country does not cooperate in the transition effort.[3]

III. Integrated Assessment Models in the CFS Pilot

IAM are the most widely used tools for climate scenario analysis. The Intergovernmental Panel on Climate Change (*IPCC*) defines them as representations of complex physical and social systems, focusing on the interaction between the economy, society, and the environment. They are largely based on socio-economic assumptions; a different technological representation; and partial or general equilibrium assumptions; and allow

[1] Box 9 "The Network of Central Banks and Supervisors for Greening the Financial System and scenarios defined by such network" of the Financial Stability Report, June 2024 provides a detailed conceptual explanation of the *NGFS* scenarios. This box focuses on the scenarios used in the Pilot.

[2] In order for the scenarios to reflect Mexican reality, the population, GDP and carbon market trajectories in the original *NGFS* scenarios were adjusted. *NGFS* phase IV trajectories are used.

[3] Under the asymmetric (*non-NGFS*) scenario, better performance relative to other non-clean energy scenarios is expected in the Pilot results.

differentiation between perfect forecasting and dynamic-recursive methodology.[4]

Two IAM will be used for the Pilot: the *Global Change Analysis Model* (*GCAM*) to assess the transition risk and CLIMRISK to assess the chronic physical risk. [5]

The features of both models are shown below:

***GCAM*:** (Calvin et al., 2019) is a global IAM that has been developed for more than 30 years at the *Pacific Northwest National Laboratory* in the US. It represents five different interacting and interconnected systems: climate, socioeconomic and climate policies, energy, land and water.[6] Starting from key assumptions such as population, economic growth, characteristics of technologies and climate policies, the *GCAM* model explores the impacts on energy use, land use, water use, emissions and global temperature rise, among others.

GCAM follows a market equilibrium approach by adjusting prices in the economy so that supply matches demand. Demand depends largely on population and economic growth, and supply depends on resource availability and additional costs. The objective for the solution is to minimize costs in the period; information from future periods is not taken into account for the solution for current periods. Physical effects of climate change (e.g., water availability, asset damage, or reduced productivity) are not modeled endogenously. It runs from 1990 to 2100 with five-year time steps. The world economy is represented by 32 world regions. [7]

GCAM[8] is part of the NGFS model suite and has Mexico as a disaggregated country, which allows for comparability with other countries in the model.

Model parameters were reviewed and adjusted when the NGFS scenarios for Mexico were modified.

CLIMRISK: (Estrada et al., 2021) specializes in estimating the physical risks and their economic damages caused by climate change and was developed in collaboration between the Center for Atmospheric Sciences of the National Autonomous University of Mexico and the Institute for Environmental Studies of the Vrije Universiteit Amsterdam. This model has unique features that allow for a more accurate and detailed characterization of the consequences of climate change and the benefits of climate policies. In CLIMRISK,[9] socio-economic and climate scenarios, vulnerabilities, impacts and risks are resolved in a geospatially explicit way, with a resolution of about 50 km x 50 km which is much more detailed than in other spatially explicit IAM[10] . The model combines probabilistic scenarios of global climate change with local warming in urban areas produced by the urban heat island to generate estimates of the economic impacts of climate change and uni- and multivariate risk measures. These risk measures take into account both economic impacts and changes in temperature and precipitation that are important to ecosystems.

It is important to note that, in the work on the coupling between the *GCAM* and CLIMRISK models, care was taken to maintain the congruence of the narrative of the CFS scenarios. To this end, it was ensured that both models received the same socio-economic inputs adjusted for Mexico. In addition, CLIMRISK receives as input the greenhouse gas emission outputs from *GCAM* for each CFS scenario.

[4] For more details, see: IPCC_AR6_WGIII_Annex-III.pdf
[5] The *Network for Greening the Financial System* (2020) classifies physical risks by distinguishing between acute physical risks resulting from extreme events, such as hurricanes, and chronic physical risks resulting from progressive changes in climate and weather patterns, such as rising temperatures.
[6] In the case of Mexico, the climate, socioeconomic and climate policy and energy sectors are disaggregated at the federal level, while the water sector is disaggregated into 14 basins.
[7] *GCAM* is open source and available at: https://github.com/JGCRI/gcam-core/releases.
[8] Several organizations have used *GCAM* to developm and analyze of their climate policy scenarios, e.g. *IPCC*, the Netherlands Environmental Assessment Agency. For further reference, see GCAM_summary.
[9] CLIMRISK has been used in national and international projects on the economics of climate change, such as in Mexico's Sixth National Communication to the United Nations Framework Convention on Climate Change. See https://cambioclimatico.gob.mx/sexta-comunicacion/economia_cc.php and in the European COACCH project. See https://www.coacch.eu/
[10] Financial institutions participating in the Pilot will also be provided with information at the local level.

IV. Final Considerations

In order to better achieve the objectives of central banks, it is important to have a comprehensive and in-depth understanding of the implications and risks associated with environmental degradation and anthropogenic climate change, given the impacts of these phenomena have on the economy and, therefore, on the financial system. These two phenomena´ economic and financial implications range from macroeconomic aspects to legal liabilities and the stability of the financial system.

Financial markets participants have extensive experience valuing financial assets, but they are highly dependent on the existence of historical data and specific metrics that can be included in existing models. Therefore, the calibration of the integrated assessment models conducted by Banco de México and used in the CFS Pilot is a valuable tool for financial institutions and promotes capacity building for climate-related risk analysis.

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Estrada F., Botzen W.J.W., 2021. *"Economic impacts and risks of climate change under failure and success of the Paris Agreement,"* Ann. N.Y. Acad. Sci.

IPCC (2022) *Annex III: Scenarios and modelling methods* [Guivarch, C., E. Kriegler, J. Portugal-Pereira, V. Bosetti, J. Edmonds, M. Fischedick, P. Havlík, P. Jaramillo, V. Krey, F. Lecocq, A. Lucena, M. Meinshausen, S. Mirasgedis, B. O'Neill, G. P. Peters, J. Rogelj, S. Rose, Y. Saheb, G. Strbac, A. Hammer Strømman, D. P. van Vuuren, N. Zhou (eds)]. In IPCC, 2022:

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Model Documentation - GCAM - IAMC-Documentation (iamcdocumentation.eu)

Network for Greening the Financial System (2019). *"A Call for Action - Climate Change as a Source of Financial Risk."*

Network for Greening the Financial System (2020) *"Guide for Supervisors Integrating climate-related and environmental risks into prudential supervision".*

Sustainable Finance Committee (CFS, its acronym in Spanish)

The Sustainable Finance Committee (CFS), within the Financial System Stability Council (CESF, its acronym in Spanish), continued to meet in the second half of 2024. The working groups established by the Committee continued to develop assessments, proposals, recommendations, and trainings on the sustainable taxonomy and the integration of environmental and social risks in the decision-making process of authorities and institutions through scenario analysis, mobilization of sustainable financing, and disclosures of environmental, social and governance factors by issuers and financial institutions.

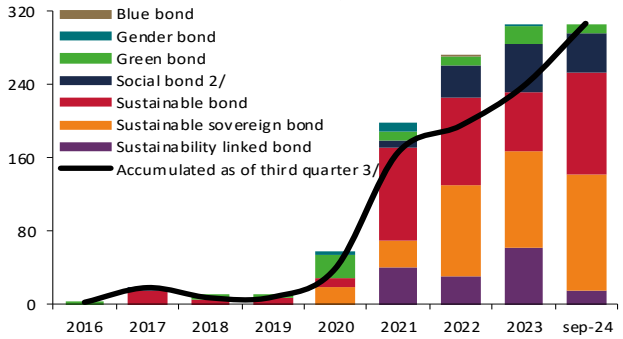
During this period, the climate scenario analysis pilot began with the participation of ten financial institutions, including pension funds, commercial banks and development banks. For further details on the technical characteristics of the pilot, please refer to Box 6 of this Report.

It also continued working on the creation of a digital repository for learning and collaboration in sustainable finance.

Sustainable Financial Assets

The market for thematic bonds continues to show dynamism, allowing companies and other issuers to access financing sources that allow them to channel resources into projects that consider sustainability criteria. In particular, between January and September 2024, the placement of thematic bonds by domestic private and public issuers was higher than in the same period of 2023. In this way, it continued its growing trend since 2020 (Graph 164).

Graph 164
Issuance balance of sustainable, green, social and gender bonds 1/
Billions of pesos



Data as of September 2024.
Source: Consejo Mexicano de Finanzas Sostenibles and Indeval.
1/ At face value.
2/ Includes COVID-19 social bond.
3/ Accumulated issued amount as of third quarter per year not considering bond type.

IV.5. Financial Market Infrastructure

Central securities depository institutions and securities settlement systems

The Securities Deposit, Administration and Settlement System (DALI), managed by Institución para el Depósito de Valores, S. A. de C. V. (Indeval) is the financial market infrastructure, responsible for the deposit and settlement of securities of all transactions, including purchases and sales, repurchase agreements and securities lending that are settled in the Mexican financial market.

At the end of October 2024, the accumulated availability level of the DALI services was 99.94%. The accumulated availability of peripheral services in the same period was 100%, such services correspond to:

- Repo and Valuation Management Services (SAVAR), which administers collateral for repurchase transactions with maturities exceeding three days in Mexico;
- Specialized Securities Lending Facility (Valpre E), which administers securities lending in Mexico related to the SHCP's market makers program, and;
- Securities lending facility for DALI participants (Valpre FV), which allows the arrangement of loans between financial institutions in Mexico.

As of the end of October 2024, the average daily settlement amount on the DALI was 4.9 trillion pesos and

the maximum amount settled was 5.5 trillion pesos on June 13.

Central Counterparties (CCP)

A central counterparty is a financial market infrastructure that interposes itself between parties entering into financial transactions, becoming a buyer to every seller and a seller to every buyer.

The trusts Asigna Compensación y Liquidación (Asigna) and Contraparte Central de Valores, S.A. de C.V. (CCV) are the central counterparties established in Mexico to clear and settle securities and derivatives transactions, respectively. Asigna and *ccv* have procedures and methodologies for requesting financial resources from their participants in order to cover the credit risk and liquidity exposures that these infrastructures assume as a result of their role as reciprocal debtor and creditor of the financial transactions that they clear and settle. The Initial Margin Fund and the Default Fund are made up of these resources. The Initial Margin Fund is collateral provided by the participants of the central counterparties (also known as Clearing Members) and the clients of such members to cover their market and liquidity risk exposures, in the event that the credit risk of a Clearing Member materializes. In turn, the Default Fund is collateral contributed by only Clearing Members that can be mutualized to address a default, particularly in stressed market conditions.

During the second half of 2024, Asigna and *ccv* have covered their risk exposures consistent with the resources required as guarantees for the Initial Margin Fund and the Default Fund. In the case of Asigna, its Default Waterfall[144] is 51,444 million pesos, which is mainly composed of an Initial Margin Fund of 44,714 million pesos,[145] with 76.80% cash resources, as well as a Default Fund of 5,390 million pesos, composed entirely of cash resources.[146]

On the *ccv* side, its Default Waterfall is 6,179 million pesos and is mainly composed of an Initial Margin Fund of 3,954 million pesos, with 97.06% cash resources, as well as a Default Fund of 1,536 million pesos, composed entirely of cash resources.[147]

At the end of October 2024, the Asigna and *ccv* systems had a cumulative availability level of 100%.

IV.6. Other Risks to the Financial System

IV.6.1. Operating Continuity Risks

Banco de México must maintain a high level of availability of the systems it manages and operates due to the systemic importance of Financial Markets Infrastructures and payment systems. At the end of the third quarter of 2024, the average availability rate of the two instances of the SPEI was 99.992%, which represents an unavailability of 40 minutes on average, mainly because of the time required to perform maintenance to the infrastructure that supports the operation of the system.

On the other hand, during this period we conducted several exercises of the business continuity mechanisms implemented jointly with the participants, in order 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.

IV.6.2. Cybersecurity Risk

Cybersecurity risks remain among the most relevant for the global financial system, given the increase in frequency and sophistication of cyber-attacks, which have doubled in frequency since the COVID-19 pandemic.[148] The impact of the materialization of these risks is not limited to a single entity, as a successful cyberattack against a systemically important financial institution could affect the country's financial services.[149] Consequently, financial institutions and authorities monitor cybersecurity risks and threats, both in Mexico and globally, and adapt their security measures to the changing and emerging information technology environment.

In this vein, the financial sector worldwide is following the evolution and relevance of cybersecurity risks associated with the growing use of Artificial Intelligence (AI) and the digitalization of finance. During the period analyzed in this *Report*, an increase in development and distribution in social networks of apocryphal multimedia content with the aim of usurping identities and carrying out more advanced digital frauds to the detriment of users of financial systems has been identified. This type of fraud attempts is increasingly frequent and impersonate the image and falsify the voice of personalities of institutions of the national and

[144] The Default Waterfall is a set of financial resources that the central counterparties (ccp) make up, mainly from the requirements they make to their participants, to cover credit risk and liquidity exposures.

[145] 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.

[146] Data as of October 31, 2024.

[147] Data as of October 31, 2024.

[148] Global Financial Stability Report (imf.org) (p. 77).

[149] Promoting Global Financial Stability: 2023 FSB Annual Report (p. 13)

global financial sector, such as officials of the European Central Bank[150] and the Central Bank of Luxembourg. [151]

Against this backdrop, Banco de México continues to monitor the evolution and adoption of this technology in the financial system, and is incorporating risks derived from AI into its institutional risk management.

On the other hand, there has been an increase in computer attacks on commercial companies that offer products and services such as remittances, credit purchases, among others, in order to steal financial information from their customers, which can be used to commit fraud. As of the date of this *Report*, no direct effects on Mexican financial institutions or their customers have been identified as a result of this type of attack.

In addition to the above, given the escalation of geopolitical conflicts, specific monitoring of risks related to the cybersecurity of financial systems is maintained, as events could occur that affect critical infrastructure through cybersecurity attacks, which could directly or indirectly impact financial institutions.[152] The monitoring that has been established for the last two years by the Banco de México and the Mexican financial authorities of the cyber-attacks originated by the conflicts between Russia and Ukraine, as well as those originated in the Middle East, merit maintaining the alert level for the Mexican financial sector at "Yellow",[153] mainly because, despite the increase in cyber-attacks, so far the global financial sector has not been their main target, and financial institutions in Mexico have not identified cyber-attacks that could be attributable to these events. Nevertheless, Banco de México continues to monitor any possible cyber threats derived from these events and encourages financial institutions in Mexico to continue strengthening their protection and response schemes.

During the period analyzed in this *Report*, no cyber incidents were recorded in Mexican financial sector institutions. Thus, in order to increase their cybersecurity maturity, the Security Sensitive Incidents Response Group (GRI) promotes the exchange of intelligence information related to threats, vulnerabilities, incidents and cybersecurity risks.

During this period, the financial authorities,[154] through the GRI, issued twelve bulletins with technical cybersecurity intelligence information to their regulated parties, with which financial institutions can proactively reinforce their protection strategies and prevent attacks that have been observed in another institution, thus contributing to strengthen the cybersecurity of the financial sector as a whole.

In September 2024, a cyber-resilience drill was carried out with the participation of Banco de México, the National Banking and Securities Commission (CNBV) and five financial institutions, in order to further develop the capabilities of financial institutions to deal with cyber incidents. The exercise evaluated the participants' capabilities to detect, analyze, contain, contain, eradicate and remediate a cyberattack. As a result, the participating financial institutions demonstrated that they have documented processes for dealing with cyber incidents, as well as coordinated participation and decision-making based on procedures. On the other hand, the opportunities for improvement identified will help the financial institutions participating in the exercise to strengthen their cyber-resilience processes. This Central Institute will continue to promote this type of exercise to strengthen the Mexican financial sector's response capabilities to various cyber incidents.

Likewise, in October 2024, the First Banxico Forum was held with the heads of information security of financial institutions, with the aim of strengthening collaboration and the exchange of cybersecurity threat intelligence information among these institutions. As the most relevant aspects, the entities shared best practices and lessons learned in dealing with cybersecurity incidents, and strengthened the exchange of threat intelligence among them.

To measure cybersecurity levels of the Mexican financial system, Banco de México monitors various cybersecurity risk indexes. In particular, the Cybersecurity Index of Mexican Financial Institutions[155] is at a level of 85%, improving from the 83% obtained

[150] Fraud - misuse of ECB name and logo (europa.eu)

[151] Banque centrale du Luxembourg - Warnings (bcl.lu)

[152] Significant Cyber Incidents: Strategic Technologies Program: CSIS

[153] At the "Yellow" alert level, digital surveillance is maintained, focused on monitoring cyber threats and relevant events associated with military conflicts by the actors directly involved or their sympathizers. It comprehensively considers technological and operational actions to monitor the SWIFT system and other platforms used for international transactions.

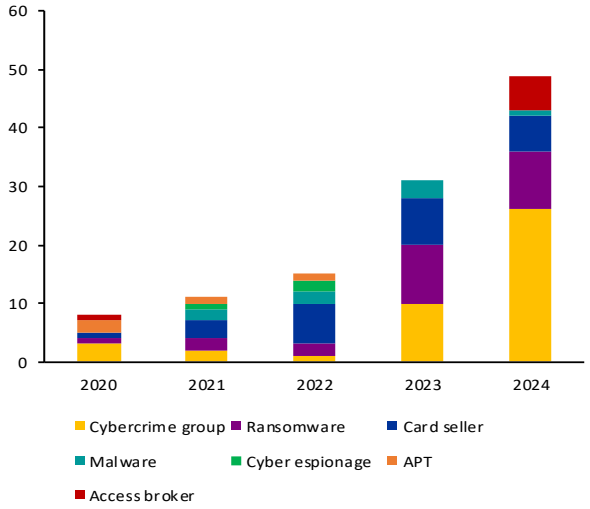
[154] *SHCP*, Banco de México, *CNBV*, Condusef, National Commission for the Pension System (Consar, its acronym in Spanish), National Commission for the Banking and Deposit Insurance and Resolution Agency (*IPAB*, its acronym in Spanish).

[155] It is built with information from 85 financial institutions in the areas of Governance, Intelligence, Resilience, Technical Capacity, and Awareness and Training; based on international standards and best practices.

during 2023. Strengths were detected in cybersecurity governance issues, which indicates that financial institutions have specialized personnel in this area, who dedicate full time to these activities and have designed processes to institutionally manage cybersecurity and cyber resilience. On the other hand, areas of opportunity were identified to strengthen the capacities of most financial institutions in the collection, analysis and exchange of cyber intelligence information. In addition, the Cyberattack Risk Index in Mexico[156] showed that during 2024 (Graph 165) that the most recurrent cyber threats were:[157] cybercriminal groups, ransomware, the sale or leakage of access credentials to institutions (access broker) and card seller. [158]

As in 2023, the activity of cybercriminal groups represented the most significant threat during the year. Ransomware was the second most important threat during the period and card seller the third. The growth of the access broker type threat stands out, which is in third place, on a par with the card seller type (with the same number of occurrences). The growth of the index in 2024 is mainly due to two factors: 1) on the one hand, the activity of "cybercriminal groups" increased over the previous year by 236%, highlighting that related to the sale of alleged personal information of customers of some financial institutions, which was obtained through social engineering attacks targeting the customers themselves, or by stealing databases from their suppliers; and 2) on the other hand, the activity of "access brokers" increased over the previous year by 600%, highlighting the sale of data that allegedly allows access to technological infrastructure of some financial institutions or their suppliers. In the vast majority of cases, the client information or access data were old and outdated, and have already been taken care of by the institutions, so they did not represent a real risk.

Graph 165
Mexican Cybersecurity Attack Risk Index
News items



Data as of December 2024.
Source: Banco de México.

The indexes presented allow generating an approximate diagnosis of the state of cybersecurity in the Mexican financial system, with which Banco de México identifies the main cybersecurity risks of the period, as well as their evolution over time, and encourages financial institutions to maintain robust cybersecurity strategies to mitigate them. These actions include improving cyber intelligence capabilities, strengthening the continuous awareness of personnel including senior management, and conducting simulation exercises that include cyber-attack scenarios, in which financial institutions put into practice their incident response capabilities. These actions, together with compliance with regulations on the matter, allow improving the protection and cybersecurity risks protection and cyber- resilience of the financial sector.

Banco de México, in addition to constantly monitoring cybersecurity matters, maintains continuous communication with financial institutions on the

[156] This indicator is based on news and publications in different specialized forums and provides an overview of the types of cyber-attacks that have been carried out against Mexican financial sector institutions during the period covered by this *Report.*

[157] With data as of November 4, 2024.

[158] ***Access broker****:* threat actor that illegally accesses organizations' computer networks and resells access through clandestine Internet forums. ***APT***: Advanced Persistent Threat, has high levels of expertise in hacking techniques and the resources and time it requires so that, through the use of different sophisticated attack vectors, it manages to breach target organizations, in order to sabotage them, obtain sensitive information or financial gain. ***Card seller****:* Threat actors whose main activity consists in stealing information related to bank cards of financial institutions' clients, in order to sell it in clandestine Internet forums. ***Cyber espionage***: threat whose purpose is to extract sensitive information from government institutions or large corporations. ***Cybercriminal group***: threat derived from criminal activities aimed at exploiting the computer systems that provide services to the clients of the institutions, with the purpose of obtaining economic resources in bank accounts controlled by the attackers. This category groups together the generalized threats to which the institutions' transactionality systems are exposed and which cannot be associated with any of the other categories. ***Malware****: a* threat designed to compromise the confidentiality, integrity or availability of information in 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.

evolution of cybersecurity risks in the Mexican financial sector in order to collaboratively undertake timely actions to mitigate their impact should they occur.

V. Stress Tests and Recovery Plans

V.1. Credit Stress Tests

Stress tests are exercises carried out by the Bank of Mexico to promote the sound development of the financial system. The exercises simulate severe, yet plausible, macroeconomic and financial shocks that could affect commercial banks' solvency or their ability as a financial intermediary, in order to test their capital adequacy.

This exercise evaluated the impact of three distinct macroeconomic scenarios, as well as three historical scenarios that replicate the trajectories of key macro-financial variables during past periods of high volatility and stress, with the aim of observing what would happen if a similar event were to occur.

Results show that the financial system is resilient to shocks across the different scenarios. Both solvency, as measured through the CAR, and the leverage ratio remained above the regulatory minimums throughout the stress horizon.

Although the scenarios are built with certain macro-financial risks in mind, risks discussed in this Report, they should not be assigned a probability of occurrence or interpreted as a prediction of future economic events. Rather, the exercise seeks to identify and analyze the system's vulnerabilities, functioning as a simulation of a counterfactual and partial equilibrium model.

Scenario A: Weakening of Domestic Consumption and Investment

This scenario corresponds to a prolonged and acute weakening of domestic consumption and investment, which would have an adverse effect on the employment rate, household income levels, and companies' economic prospects. This lower level of output and income growth is the main factor that would impact banks' balance sheets.

Scenario B: Slowdown in Global Economic Activity

This scenario simulates the occurrence of a significant slowdown in advanced economies, particularly that of the United States, such that its economy would enter a recession. The deceleration in the United States' imports and industrial activity would affect Mexico's economic growth, causing high volatility in financial markets and the exchange rate. The economic slowdown would be reflected in lower demand for credit, a higher unemployment rate, and an increase in the non-performing loan ratio of the loan portfolio.

Scenario C: Adjustment in Credit Rating

This scenario pertains to a possible loss in the sovereign credit rating, as well as a loss in Pemex's rating, due to credit agencies having a worsened outlook. Increased volatility in domestic financial markets, a depreciation of the exchange rate, and higher risk premiums create upward pressures on interest rates. Hence, this will set forth a contraction in aggregate demand, causing a decrease in the employment rate and production. This environment limits credit growth, and a higher non-performing loan ratio is to be expected, both of which will have repercussions on banks' ability to generate income.

Historical scenarios

Three relatively recent historic scenarios, of high stress and volatility, were considered. They replicate the trajectories of key macro-financial variables: the 1995 economic crisis (H1), the 2008 global financial crisis (H2), and the economic crisis caused by COVID-19 (H3).

Methodological Framework

This exercise uses the same methodology as past editions of the Report. Scenarios are generated using a vector autoregression model (VAR) with a 36-month horizon. Simulations are created around central trajectories, which represent the movements of key macro-financial variables which correspond to a given scenario's narrative. This model generates random shocks that affect the trajectories of those variables while maintaining internal consistency.

The possible market losses of each banking institution are generated from a given scenario. Market losses take into account contagion effects, which could propagate and exacerbate shocks through the banking network.

Using an econometric model, the impact of macro-financial shocks on the composition of banks' reserves, loan default probabilities, and the dynamics of their credit portfolios are measured.

Furthermore, the exercise considers differentiated impacts based on the composition of banks' portfolios across economic sectors. The differences are driven by

the growth of each economic sector and the credit performance of their private non-financial institutions.

Additionally, a simulation process is used to model low-probability, high-severity events, enabling the measurement of the impact of defaults by the largest debtors in the system.

Lastly, the effects on operations and solvency are calculated. To achieve this, financial margins are derived from the elasticity of asset and liability interest rates relative to the Federal Treasury Certificate rate. Non-financial margins and administrative costs are also calculated; both constitute a constant proportion of the total credit portfolio of a given bank and thus will change by the same ratio. Having obtained the operating results, market, contagion, and credit losses, the capacity of banks to absorb shocks and the evolution of the system's net capital in a given scenario are identified.

Nevertheless, the model might underestimate complementary effects between different scenarios that, when combined, could amplify negative shocks, feedback loops between the financial and real sectors, or unexpected non-linear effects.

One of the assumptions of the exercise is that the reactions of banks and regulators are not considered. In other words, throughout the stress horizon, banks are unable to change their business strategy, make equity contributions, or adjust the proportion of their portfolio assigned to repo and derivative transactions. Regulators are also constrained and unable to take actions that could mitigate the magnitude of shocks. Therefore, the exercise functions as a counterfactual and partial equilibrium model.

Main Results

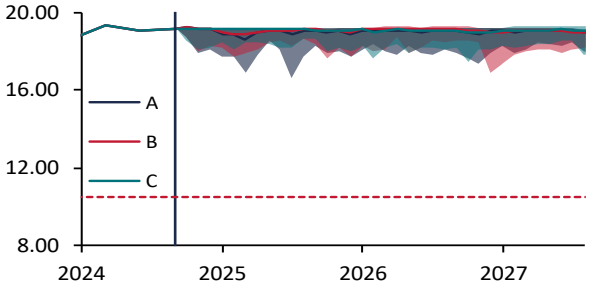
In the simulated scenarios, the system maintains capital levels above the regulatory minimum by the end of the stress horizon (Graph 166a). In contrast, for the historical scenarios, the resulting capital levels are lower; however, they still remain above the regulatory minimum (Graph 166b). Nonetheless, in the short term, a reduction in both net capital (Graph 167a) and risk-weighted assets (Graph 168a) occurs. This result is consistent with diminishing leverage ratios. These effects appear more pronounced for the historical scenarios (Graph 167b and Graph 168b).

Graph 166

System's Capital Adequacy Ratio (CAR)

a) Scenarios A, B and C

Percent

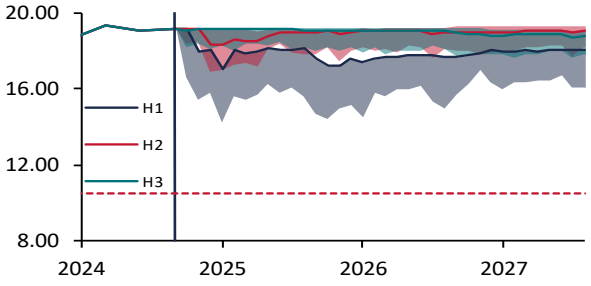


Data as of September 2024 and simulations 3 years thereafter.

Source: Banco de México

b) Historical Scenarios

Percent



Data as of September 2024 and simulations 3 years thereafter.

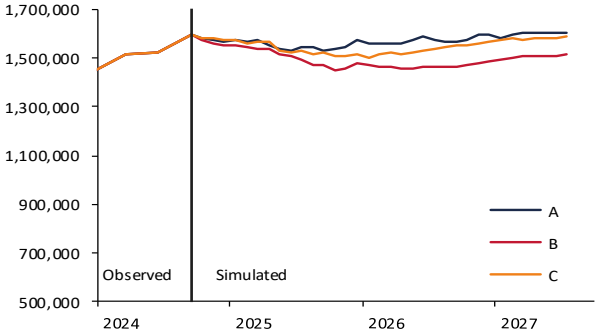
Source: Banco de México

Graph 167

Evolution of the average net capital of the system

a) Scenarios A, B and C

Million pesos

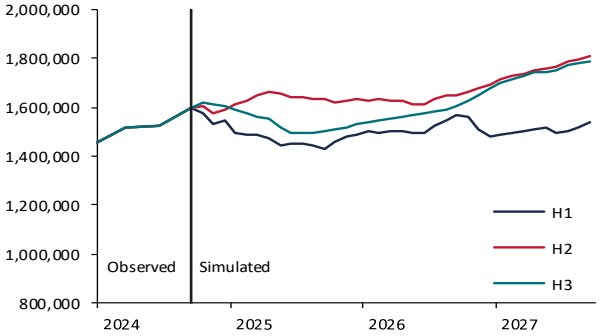


Data as of September 2024 and simulations 3 years thereafter.

Source: Banco de México

b) Historical Scenarios

Million pesos



Data as of September 2024 and simulations 3 years thereafter.

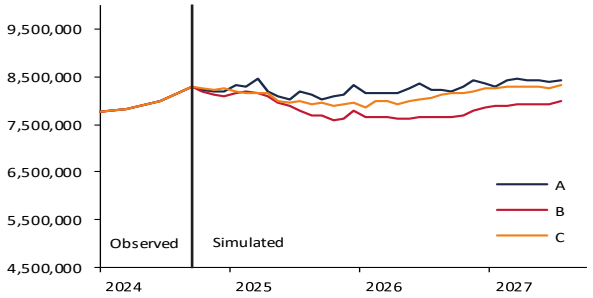
Source: Banco de México

Graph 168

Evolution of the system's average risk-weighted assets

a) Scenarios A, B and C

Million pesos

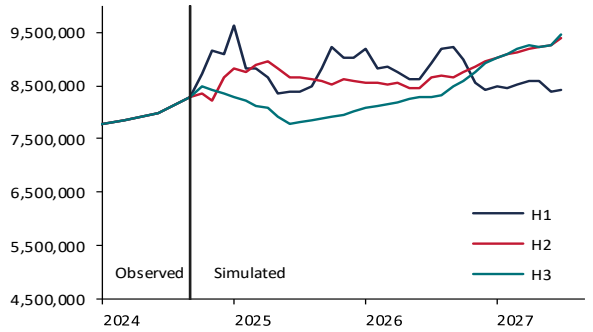


Data as of September 2024 and simulations 3 years thereafter.

Source: Banco de México

b) Historical Scenarios

Million pesos



Data as of September 2024 and simulations 3 years thereafter.

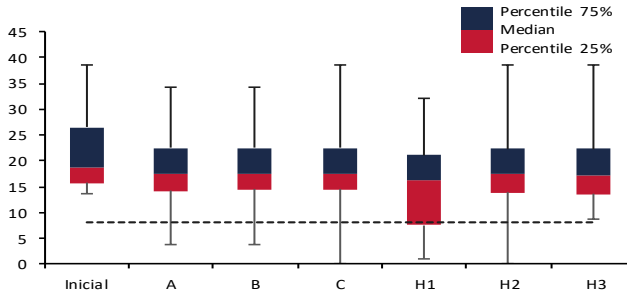
Source: Banco de México

Even though the system as a whole maintains capital above the regulatory minimum, some simulations show intermediaries, that represent a small portion of the system's total assets, that experience more pronounced losses in their capital levels (Graph 169).

Graph 169

Distribution of the average CAR at bank level at the end of the test[1/]

Pecent



Data as of September 2024 and simulations 3 years thereafter.

Source: Banco de México

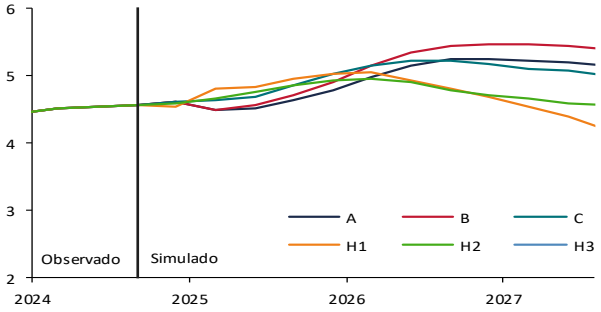
1/ The dotted horizontal line corresponds t o the minimum ICAP without considering capital supplements. In the box and arms diagram, the arms represent 10 and 90% of the distribution.

The average probabilities of default are a useful indicator of the impact of scenarios on the delinquency levels of the system's credit portfolio. As shown in Graph 170, delinquency remained low at the beginning of the exercise, despite the shocks.

Graph 170

Average probabilities of default of the system's credit portfolio

Weighted by the current portfolio of each bank, percent



Data as of September 2024 and simulations 3 years thereafter.

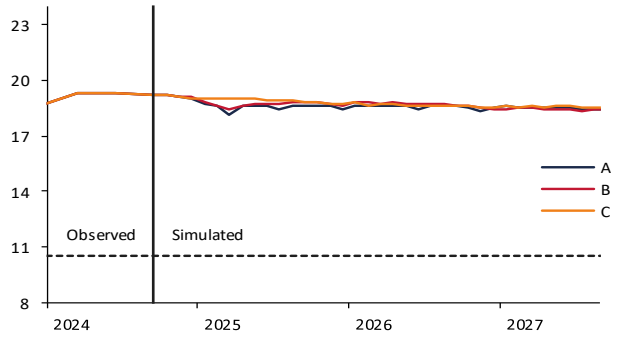
Source: Banco de México

A common characteristic of the Mexican banking system's loan portfolio is its high concentration, whereby a relatively small number of borrowers hold a high proportion of the credit. In order to evaluate the effect that this high concentration may have on the resilience of the system, an exercise is carried out A common characteristic of the system's credit portfolio is its high concentration, where a small portion of debtors account for a large percentage of the total credit granted. To measure the effects that this high concentration might have on the system's resilience, an exercise was conducted to simulate the default of these large debtors (Graph 171a and Graph 171b). The capital

levels in this exercise are lower; nevertheless, the system remains above regulatory minimums.

Graph 171
Average CAR of the system considering an impact per concentration corresponding to 99% of the losses 1/
a) Scenarios A, B and C

Percent



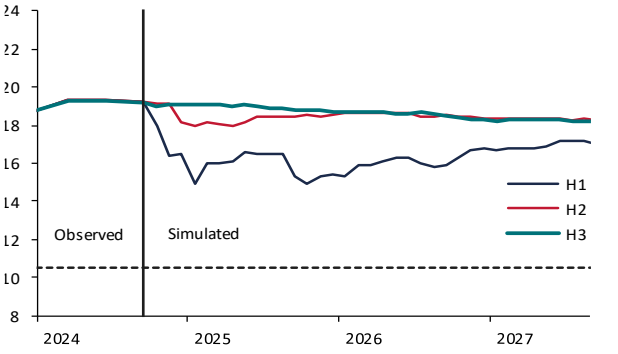
Data as of September 2024 and simulations 3 years thereafter.

Source: Banco de México

1/ The horizontal line corresponds to the minimum CAR plus capital

b) Historical Scenarios

Percent



Data as of September 2024 and simulations 3 years thereafter.

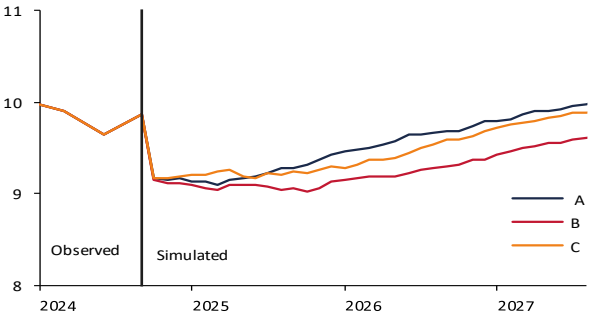
Source: Banco de México

1/ The horizontal line corresponds to the minimum CAR plus capital

This exercise also evaluates the impact of the different scenarios on banks' leverage ratios. The system's average leverage levels remain above the regulatory minimum of 3% (Graph 172a and Graph 172b); however, some individual institutions, which represent a small portion of the system's total assets, show lower levels. It is important to note that there is a high correlation between leverage and capital levels: those institutions with a low leverage ratio also showed a lower capital adequacy ratio. (Graph 173).

Graph 172
Average leverage ratio of the system
a) Scenarios A, B and C

Percent

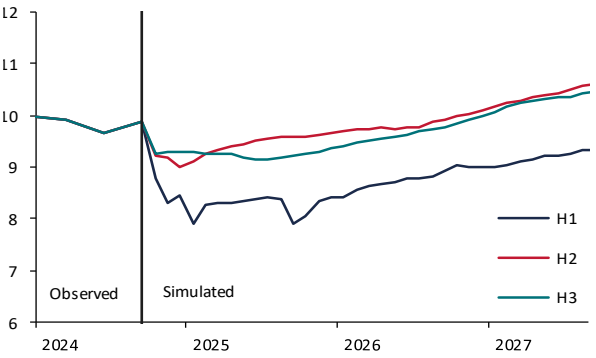


Data as of September 2024 and simulations 3 years thereafter.

Source: Banco de México

b) Historical Scenarios

Percent

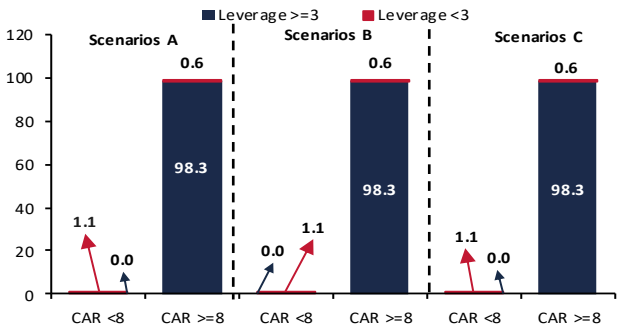


Data as of September 2024 and simulations 3 years thereafter.

Source: Banco de México

Graph 173
Distribution of the average CAR at bank level at the end of the test

Percent of System Assets



Data as of September 2024 and simulations 3 years thereafter.

Source: Banco de México

V.2. Liquidity Stress Tests

The current solid liquidity position of banks would allow them to withstand stress episodes more severe than those experienced in the past and those required by international liquidity standards. Nevertheless, some small and medium-sized banks present poor results in some of the liquidity stress tests in the face of particularly severe scenarios.

The liabilities coverage horizon,[159] with data as of October 2024, indicates that most banks would be able to meet their obligations for a period of at least 30 days using only their stock of liquid assets (Graph 174). The liabilities coverage horizon evaluates funding risk under a more severe scenario than the one assumed for the calculation of the LCR, as it does not take into account the inflow of contractual cash flows normally available to meet banks' obligations.

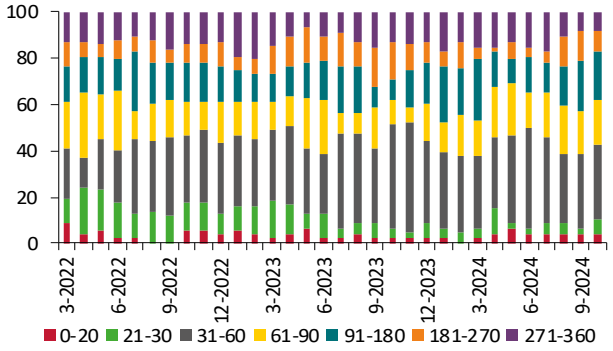
Graph 174

Percentage of banks that could meet their liabilities under the liabilities coverage stress scenario 1/

Vertical axis: percentage of banks

Horizontal axis: date of the calculation

Color: days that banks could cover their obligations



Data as of October 31, 2024.

Source: Banco de México.

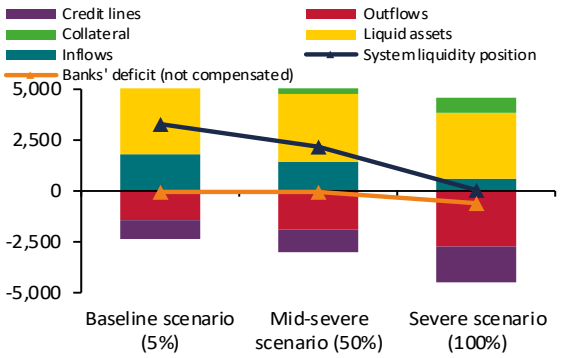
1/ For each month, banks are aggregated by range of days, according to their monthly average calculated with daily observations, of the number of days that they could cover their liabilities in a severe stress scenario. See Box 9 "Stress testing methodologies based on cash flows" of the Financial Stability Report, December 2022.

The cash flow stress tests for a 90-day horizon, with data as of October 2024, indicate that the stressed value of both liquid assets and inflows for banks as a whole would be higher than the modeled stressed outflows. In other words, banks would maintain a liquidity surplus under a severe stress scenario, although some institutions, which represent a low percentage of the system's total assets, would face a liquidity deficit in the most severe hypothetical scenario (Graph 175).[160]

Graph 175

Liquidity stress scenarios over 90-day period 1/

Billions of pesos



Data as of October 31, 2024.

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 outflows and granted credit lines have a 40% run-off factor. The baseline scenario and mid-severe scenario consider a 5% and 50% severity compared to the severe (100%) scenario. The mid-severe scenario estimates an aggregate outflow which is similar in magnitude to the outflow calculated under the LCR (See Box 9 "Stress testing methodologies based on cash flows" of the Financial Stability Report, December 2022).

In addition, several stress exercises were performed, both using the cash flow framework and measuring the sensitivity of the LCR, in both cases under different assumptions associated with the potential vulnerabilities identified in some institutions, as mentioned in the section on liquidity risk (funding concentration, credit lines and intraday liquidity) (Graph 176).

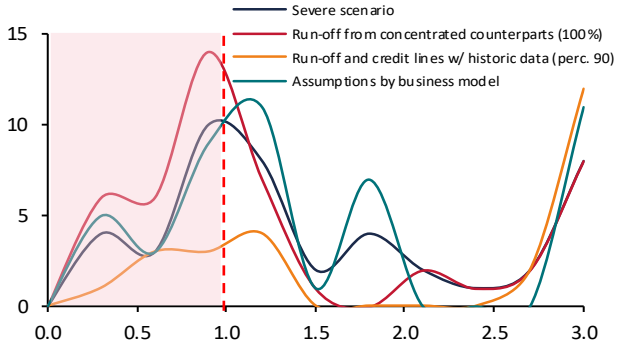
[159] The liabilities coverage horizon evaluates funding risk under a more severe scenario than the LCR, as it does not consider the inflow of contractual cash flows that banks normally have available to meet their obligations.

[160] The cash flow stress tests use 21 scenarios of increasing severity, in which stress situations are modeled on various balance sheet items that impact inflows and outflows, contingent liabilities are assumed to materialize and stress discount factors are applied to the value of liquid assets. Scenario number 21 is the one in which the highest severity is assumed. For a detailed description of the methodology used, see Box 9. Methodology of the liquidity tests based on contractual flows from the December 2022 Financial Stability *Report*.

Graph 176

Distance to Liquidity Stress Indicator under different scenarios

Vertical axis: number of banks
Horizontal axis: index



Data as of October 31, 2024.

Source: Banco de México.

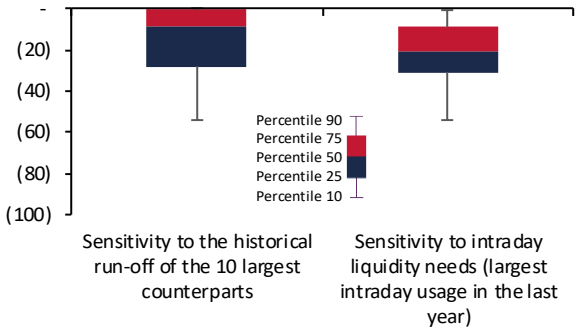
1/ The DLSI refers to the sufficient severity for the institution to present a liquidity deficit. The severe scenario is normalized to 1, values above indicate greater resilience than the assesed scenario. In the severe scenario it corresponds to the scenario calibrated to stress the entire bank (See Box 9 "Stress testing methodologies based on cash flows" of the Financial Stability Report, December 2022). The scenarios adjusted with historical data (historical outflows and credit lines) consider data since 2017 by bank to calculate the 90th percentile of financial, wholesale and retail outflows, or exercise of credit lines. In the event that the 90th percentile is lower than the base scenario (5% of the severe scenario), the assumptions of the base scenario are used. The concentration scenarios (100% outflow rate) consider that in addition to the severe scenario outflows, the 10 main counterparties withdraw their deposits. The scenario by business model considers differentiated cash inflows and outflows assumptions for: large banks, commercial banks, consumer banking, foreign exchange banks, investment banking and others.

As a complementary exercise to assess sensitivity to concentration, a LCR was calculated assuming the outflow of the ten largest creditors according to their historical outflows. To assess the potential impact of intraday liquidity risk, a LCR adjusted by "maximum intraday net liquidity usage" was calculated based on last year's observations for each bank. This metric is part of the liquidity risk monitoring toolkit and allows the different timing of inflows and outflows occurring throughout the day to be incorporated into the analysis. The results of these exercises suggest that the current liquidity of banks would allow them to withstand the scenarios proposed and that most banks have sufficient liquid assets, although, depending on the scenario evaluated, certain vulnerabilities are identified or emphasized for some institutions (Graph 177).

Graph 177

Sensitivity (what-if analysis) of the LCR under different assumptions of concentration and intraday liquidity needs 1/

Percentage, change from the regulatory scenario



Data as of October 31, 2024.

Source: Banco de México.

1/ The graph presents the percentage difference from the regulatory scenario. In the case of the concentration analysis, the historical output (90th percentile) of the 10 counterparties with the highest concentration is assumed. In the intraday liquidity analysis, the largest gap between payments sent and received accumulated on the intraday, observed over a 1-year horizon, is subtracted from the liquid assets.

V.3. Recovery Plans

The recovery plans of the commercial banking institutions, based on the requirements established by Annex 69 of the Single Banking Rulebook (CUB, its acronym in Spanish), which came into force in January 2023, show mixed results. Although some improvements are observed in terms of compliance with this provision, there are also setbacks in some elements of the plans with respect to previous compliance evaluation exercises.

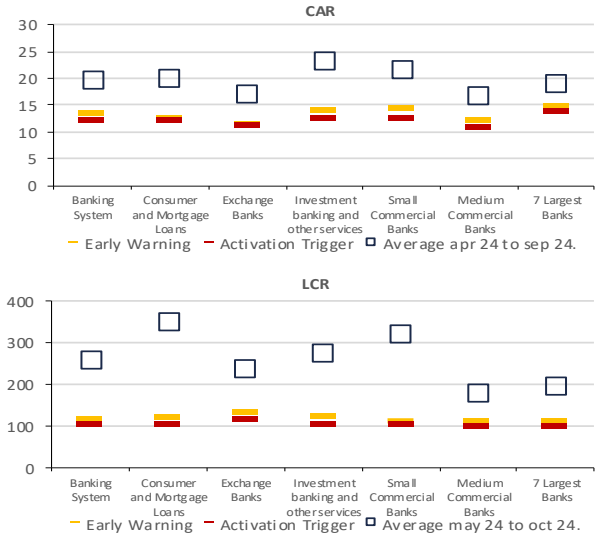
The elements of the plans that show lower compliance are associated with some requirements that were strengthened in the regulation[161], such as those related to stress tests, in particular the one referring to the severity of those tests. The requirements related to recovery actions and the communication plan also show lower compliance after their regulatory strengthening. Commercial banking institutions should improve the measurement of the impact that recovery actions will

[161] With the entry into force of the new requirements of Annex 69, as of 2023 recovery plans must present greater granularity in: i) the description of the institution; ii) the description of the financial or business group; iii) the participation of the administrative units, officers and committees of the institution involved in the planning and implementation of the plan; iv) the communication plan; v) the indicators to assess the financial position; vi) the recovery actions and vii) the stress tests.

have on their solvency and liquidity indicators, the identification of potential incompatibilities between such actions and of factors that could obstruct their implementation, as well as their respective mitigants. It is also necessary to improve the estimates on the cost of implementing the measures and on the time in which they expect the recovery actions to have an impact on their respective indicators.

During the second quarter of 2024, banks presented levels of CAR and LCR above the activation thresholds established in the recovery plans of the different groups of banks (Graph 178).

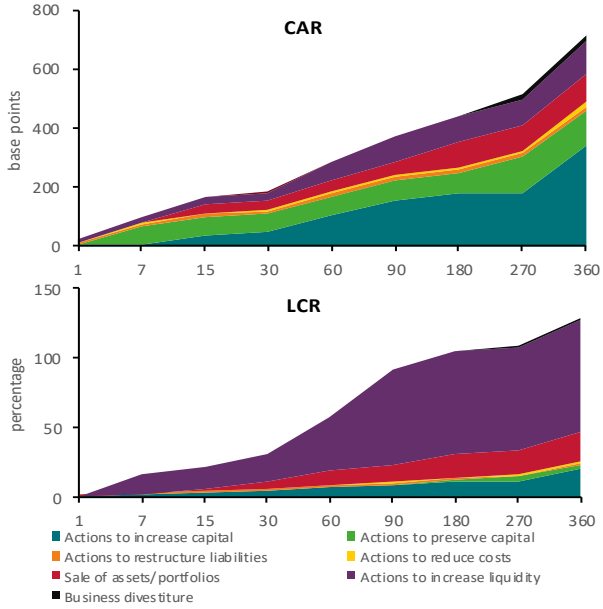
Graph 178
Activation thresholds and observed data of CAR and LCR 1/
Percentage



Data of CAR and LCR from May 2024 to October 2024.
Source: Banco de México and CNBV.
1/ The graph shows capped averages of thresholds and CAR by type of institution, due to scale issues. The LCR is capped to 350 and the CAR is capped to 25. The thresholds presented are considered from the most recent version of the recovery plan.

Regarding the effectiveness of the measures proposed in the plans, the solvency and liquidity recovery margin is reasonable if: i) the institutions correctly execute the measures within the expected timeframe, ii) the potential impact of their recovery actions has the scope foreseen in the plans, and iii) other shocks do not occur (Graph 179).

Graph 179
Recovery Capacity of CAR and LCR 1/
Vertical axis: Base points for CAR and percentage for LCR
Horizontal axis: days



Data of Recovery Plans submitted during 2023 and 2024.
Source: Banco de México.
1/ The expected impact of recovery actions on regulatory indicators is aggregated weighted by total assets.

Final Remarks

The Mexican financial system shows a solid and resilient position as of the second half of 2024, with commercial banks' capital and liquidity levels exceeding regulatory minimums. Internationally, the performance of financial markets was mainly influenced by an inflation dynamic that, in general, is closer to central banks' targets. In addition, the global economy has shown resilience in the face of the disinflation process, which has allowed for a loosening of the monetary stance in the main developed and some emerging economies. Also, due to the geopolitical risks that have permeated investor sentiment at a global level.

In October 2024, the International Monetary Fund's (IMF) global growth projections remained unchanged for 2024 and 2025 compared to what was projected in its April and July reports. However, it noted that downwards risks persist, particularly in emerging economies, due to growing geopolitical tensions and possible financial volatility. Following up on the vulnerabilities and imbalances that could affect the financial system, certain external risks have increased and other internal risks persist. This *Report* considers the following macro-financial risks: i) the occurrence of

unexpected shifts in global financial conditions relative to expectations, ii) an escalation of geopolitical tensions or trade conflicts, iii) the materialization of a systemic event with implications for the global financial system, iv) a further weakening of the domestic economy, and v) unforeseen adjustments in the credit ratings of key domestic issuers.

From the results obtained from the stress tests for the Mexican banking system, it can be concluded that, as a whole, it has sufficient capital levels to face the adverse scenarios simulated, although in some of them there is a deleveraging of the system. Nevertheless, for some of these banks (which represent a low percentage of the system's total assets) there could be greater effects on their capitalization levels, while concentration risk could generate additional pressures. Leverage ratio levels, at the aggregate level, would also remain above the regulatory minimum.

During the period covered by this edition of the *Report*, commercial banks' liquidity and credit risks remained stable and limited. On the other hand, market risk decreased slightly, while contagion risk showed a marginal increase; however, it later returned to its 2023 average.

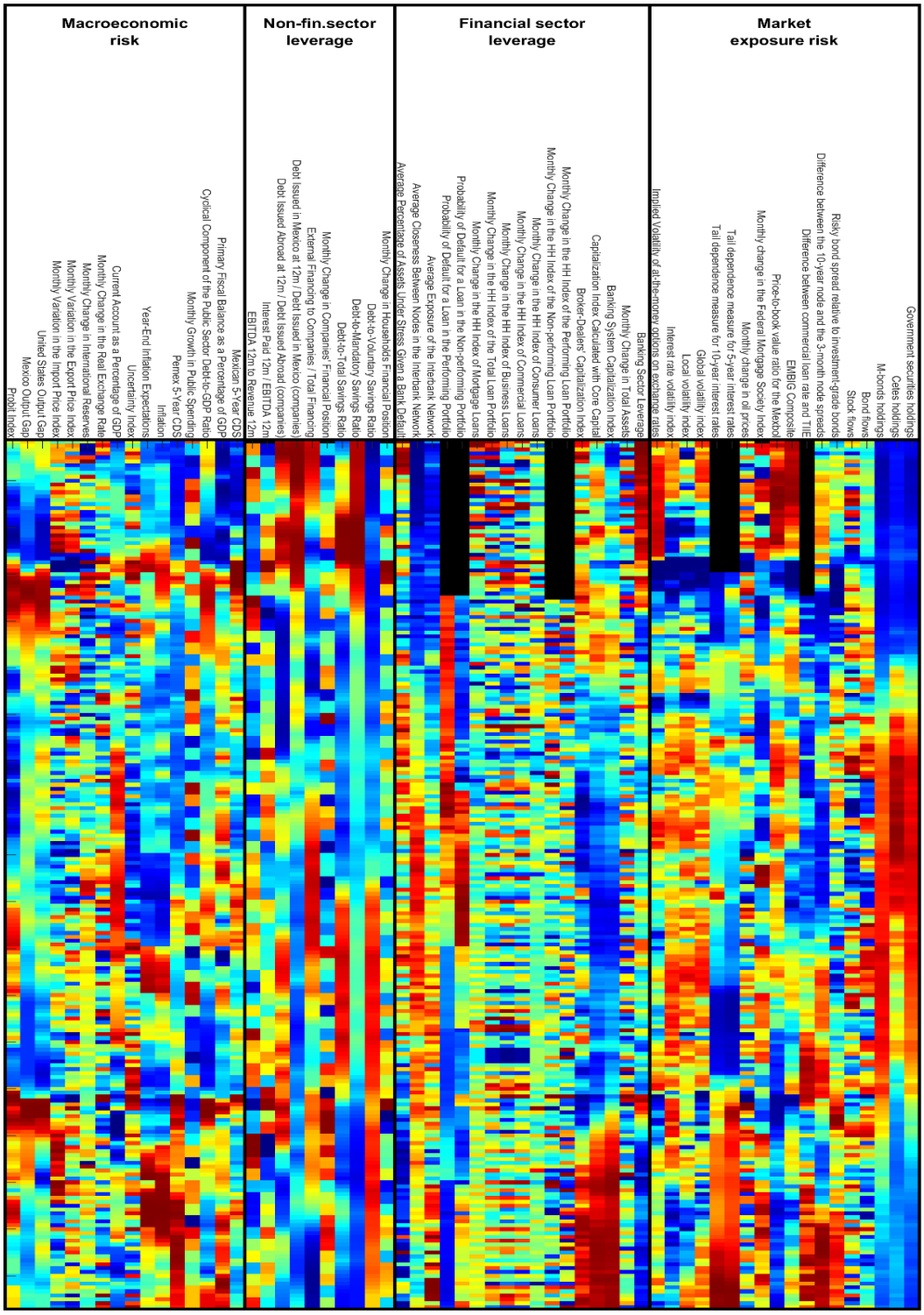
Other non-bank financial intermediaries still face significant challenges in obtaining funding. Nevertheless, the sector as a whole increased (in real annual terms) the total financing granted to the non-financial private sector at the end of September 2024. Some entities in the sector present risk indicators at levels that suggest financial vulnerabilities, with an increase in the number of these. However, the country's banks' exposure to these entities is low with respect to their regulatory capital, so a default on their part would not represent a risk for the banking system.

During the second half of the year, the financial authorities implemented actions to improve the regulatory framework, including the adoption of best practices and international standards, in order to keep it robust and up to date. Thus, regulatory changes were made in the areas of credit and market risk, derivatives markets and sustainable finance.

Banco de México remains attentive and vigilant to the evolution of the country's financial markets and will take the necessary measures, in coordination with other authorities and in the exercise of its powers in strict compliance with the legal framework, to preserve the stability of the financial system and the proper functioning of the payment systems.

Annex 1

Disaggregated Heat Maps of Mexican Financial System Risks



Data as of September 2024.
Source: Banco de México.

List of acronyms and abbreviations

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*
CBFI	Real Estate Investment Trust Stock Certificate *(Certificados Bursátiles Fiduciarios Inmobiliarios)*
CCE	Special Accounting Criteria (*Criterios Contables Especiales)*
CCV	*La Contraparte Central de Valores, S.A. de C.V.*
CDS	Credit Default Swaps
CENAPRED	National Disaster Prevention Center *(Centro Nacional de Prevención de Desastres)*
Cerpis	Trust on Entergy and Infrastructure Projects (*Certificados bursátiles fiduciarios de proyectos de inversión)*
Cetes	Federal Treasury Bills *(Certificados bursátiles fiduciarios de proyectos de inversión)*
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)*
CME	Chicago Mercantile Exchange
CNBV	National Banking and Securities Commission *(Comisión Nacional Bancaria y de Valores)*
CNSF	National Insurance and Bonding Commission *(Comisión Nacional de Seguros y Fianzas)*
Conavi	National Housing Commission *(Comisión Nacional de Vivienda)*
Condusef	National Financial Services Users' Protection and Defense Commission *(Comisión Nacional para la Protección y Defensa de los Usuarios de Servicios Financieros)*
Consar	National Retirement Savings System Commission *(Comisión Nacional del Sistema de Ahorro para el Retiro)*
CRLB	Banking Liquidity Regulation Committee *(Comité de Regulación de Liquidez Bancaria)*
CUB	Single Banking Circular *(Circular Única de Bancos)*
CVAR	Conditional Value at Risk
DRM	Monetary Regulation Deposits *(Depósitos de Regulación Monetaria)*
D-SIBS	Domestic Systemically Important Banks
ECB	European Central Bank
ESG	Environmental, Social and Corporate Governance
FANVIT	*Infonavit*'s Housing Fund *(Fondo de la Vivienda del Infonavit)*
FCA	Financial Conduct Authority
FEIEF	State Revenue Stabilization Fund *(Fondo de Estabilización de Ingresos para las Entidades Federativas)*
FIBRA	Real Estate Infrastructure Trust -REIT *(Fideicomisos de infraestructura y bienes raíces)*
FIFOMI	Mining Development Trusts *(Fideicomiso de Fomento Minero)*
FIRA	Agricultural Trusts *(Fideicomisos Instituidos en Relación con la Agricultura)*
FLAO	Additional Ordinary Liquidity Facility *(Facilidad de Liquidez Adicional Ordinaria)*
FND	National Farming, Rural, Forestry and Fisheries Development Bank *(Financiera Nacional de Desarrollo Agropecuario, Rural, Forestal y Pesquero)*

FOVI	Banking Housing Financing Operation Fund *(Fondo de Operación y Financiamiento Bancario a la Vivienda)*
Fovissste	State Workers' Social Security and Services Institute Housing Fund *(Fondo de Vivienda del ISSSTE)*
FRTC	Corporate Repurchase Agreements Facility *(Facilidad de Reporto de Títulos Corporativos)*
FSB	Financial Stability Board
IBA	ICE Benchmark Administration
IBOR	Interbank Offered Rate
ICF	Financial Conditions Index *(Índice de Condiciones Financieras)*
ICRCS	Capital Solvency Requirement Hedging Index *(Índice de Cobertura del Requerimiento de Capital de Solvencia)*
ICRT	Technical Reserves Hedging Index *(Índice de Cobertura de Reservas Técnicas)*
IEMF	Financial Market 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
Imor	non-performing loan ratio (NPL ratio) (Índice de Morosidad)
Imora	Adjusted non-performing loan ratio (Adjusted NPL ratio) *(Índice de Morosidad Ajustado)*
INEGI	National Geographical Statistics and Information Institute *(Instituto Nacional de Estadística y Geografía)*
Infonacot	National Fund for Employee Consumption *(Instituto del Fondo Nacional para el Consumo de los Trabajadores)*
Infonavit	Federal Housing Fund *(Instituto del Fondo Nacional de la Vivienda para los Trabajadores)*
IOSCO	International Organization of Securities Commissions
ISDA	International Swaps and Derivatives Association
IPYC	Stock exchange index *(Índice de Precios y Cotizaciones)*
IPCC	Intergovernmental Panel on Climate Change
LCR	Liquidity Coverage Ratio
LGOAAC	General Credit Organizations and Auxiliary Activities Law *(Ley General de Organizaciones y Actividades Auxiliares del Crédito)*
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
MexDer	Mexican Derivatives Market *(Mercado Mexicano de Derivados)*
mipymes	Micro-, small and medium-sized companies *(Micro, pequeñas y medianas empresas)*
Nafin	Mexican Development bank *(Nacional Financiera)*
NGFS	Network for Greening the Financial System
NICAP	Capitalization Level *(Nivel de Capitalización)*
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)*
pymes	Small and medium-sized companies *(Pequeñas y medianas empresas)*
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)*
SCV	Mortgage Credit Insurance *(Seguros de Crédito a la Vivienda)*
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)*
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)*
UMA	Unit of Measurement and Actualization *(Unidad de Medida y Actualización)*
VSM	Minimum Wage Multiples *(Veces Salario Mínimo)*



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