



BANCO DE MÉXICO®

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Unless otherwise specified, this document has been drafted using information available as of the third quarter of 2022 for the macroeconomic and financial institutions' variables, and as of December 5, 2022, for the market information. Data is preliminary and subject to review.

USE OF INITIALS, ACRONYMS AND OTHER TERMS

In this Report, initials and acronyms that correspond to names in Spanish and the references to this Report have been written in italics, whereas those that correspond to names in English appear in regular Roman characters. The meanings of all acronyms are presented at the end of the document. The term ‘billion’ is used in the English-language sense, i.e., a thousand million (1,000,000,000). The term ‘trillion’ is used in the English language sense, i.e., a thousand billion (1,000,000,000,000)

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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 payment systems, 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 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 and 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, in this way, reduce vulnerabilities and increase the resilience of the system.

Executive summary

The Mexican financial system continues to be in a solid and resilient position. In particular, commercial banks have capital and liquidity levels well above regulatory minimums. Nevertheless, the current international environment has become more complex and uncertain, characterized by high levels of inflation, a deteriorating growth outlook, tighter global financial conditions, and risks to financial stability in advanced economies.

Throughout 2022, economic activity in Mexico has continued to gradually recover. Thus, as of the third quarter of 2022, GDP is already at levels similar to those observed in the fourth quarter of 2019, prior to the public health emergency.

With respect to the global economy, the International Monetary Fund's (IMF) growth estimates for 2023 were revised downwards. These adjustments were made in response to expectations of tighter global financial conditions caused by interest rate increases, the possibility of a further slowdown in China due to the worsening of the real estate crisis and the country's strict lockdowns resulting from COVID-19, as well as the effects that the military conflict between Russia and Ukraine has had on European energy markets. Global inflation rates increased, with rapid increases in food and energy prices.

In an environment of persistently high inflation, expectations of lower economic growth, greater uncertainty regarding the evolution of global financial conditions, and geopolitical tensions, monitoring the evolution of the financial system will be of utmost importance. Additionally, lending in Mexico has yet to register the robust and generalized recovery required to support and boost economic growth.

International financial markets have been affected by the challenging environment, exhibiting episodes of high volatility and greater risk aversion, as well as a significant tightening of financial conditions. This financial tightening occurred due to a faster pace of

monetary policy adjustment by the main central banks in response to persistently high readings on inflation and to upward revisions of inflation expectations.

In particular, financial markets in emerging economies have been affected. Since June 2022, these economies' currencies have depreciated against the US dollar. The Mexican peso, however, has remained the only currency in this group that appreciated during the period. This is primarily due to the following factors: the Mexico-US interest rate spread compared to the spreads for other economies, Mexico's relatively prudent implementation of fiscal and monetary policies, and its balanced external accounts.

In this environment, certain aggregate risk indicators increased slightly since the last *Report*. The Mexican Financial Markets Stress Index (*IEMF*, its acronym in Spanish), albeit showed some improvements during the period, registered levels similar to those observed in June 2022 and is still above its pre-pandemic level. Meanwhile, the domestic Financial Conditions Index (*ICF*, its acronym in Spanish) tightened between June and October 2022 and was mainly driven by the hike in domestic interest rates resulting from inflationary pressures. A similar behavior was also observed in the financial conditions indexes of other countries. Uncertainty persists regarding the future evolution of financial markets, and new episodes of deteriorating financial conditions cannot be ruled out possibly affecting capital flows to emerging market economies, including Mexico. Firms and households' financing costs could thus possibly increase.

Certain vulnerabilities and risks for the domestic financial system, which arose during the pandemic, have been diminishing. Among these, according to data up to November 2022 for an economic policy uncertainty index based on Twitter, uncertainty associated with the country's economic policy decreased compared to six months earlier and is at a relatively low level compared to those observed over the last three years.

Total financing in the economy contracted in real annual terms during the third quarter of 2022. Financing for household consumption registered and increase, while mortgage loans and financing to the public sector contracted. The financing gap has registered six quarters with negative figures.

During the second and third quarters of 2022, consumer credit granted by commercial banks and their subsidiary sofomes continued recovering, registering positive annual growth rates in practically all its segments. In contrast, as of September 2022, total mortgage loans decreased in real terms with respect to the prior year. Total financing to non-financial private firms in Mexico also continued decreasing in real terms, both the external and domestic components. Both sources of financing have been decreasing for eight consecutive quarters. The contraction in external financing is mainly attributed to a reduction in bond issuance in international markets.

Regarding the public sector's financial position, in January-September 2022, the budget deficit was lower than planned for in the 2022 Economic Package, although both revenues and budgetary expenditure were higher than projected. As for state-owned enterprises, at the end of the third quarter of 2022, Pemex registered a quarterly loss lower than that observed during the same quarter of the previous year. In addition, a credit rating agency downgraded the company's global scale rating on July 11, 2022 highlighting its high liquidity risk, as well as its high dependence on support from the Federal Government. Meanwhile, the Federal Electricity Commission (CFE, *its acronym* in Spanish) registered at the end of September 2022 a quarterly loss larger than that observed in the same quarter of the previous year, in response to the increase in fuel prices associated with the military conflict between Russia and Ukraine. In July 2022, two rating agencies downgraded the company's individual credit profile by one level. The company's overall rating is equal to the sovereign rating and maintains its investment grade.

In April-June 2022, inflows remained below their historic trend, although exhibiting some improvement with respect to recent periods. Commercial banks' assets recovered during 2022, which, to a large extent, reflects the recent expansion of their credit portfolios. However, the current environment of uncertainty could lead to a new reconfiguration of commercial banks' balance sheets. The recovery of the credit portfolio, as well as the increase in funding costs, was reflected in higher, although differentiated, financial margins of commercial banks.

With respect to March 2022, liquidity, credit, and bank-contagion risks have decreased, while market risk has increased. Specifically, during the second half of 2022, both the capitalization and the liquidity position of the Mexican banking system have remained far above the regulatory minimums. This sector has thus continued to contribute to the overall financial system's resilience and generally solid position. Nevertheless, under the current environment, it will be important to monitor the evolution of these banks' position.

Development banks and other development financial institutions remain financially sound. Despite having a smaller loan portfolio and greater holdings of reserves, the health of these entities reflects the favorable evolution of their main balance sheets and financial statement items. They registered higher net profits, mainly obtained from higher income from investments in financial instruments and portfolio interest.

Risk indicators of other non-bank financial intermediaries (OIFNB, *its acronym* in Spanish) are relatively stable. However, the outlook for some of them has deteriorated in view of the conditions prevailing in both the global and domestic environment. The situation in the non-regulated sector poses complex challenges, such as reduced access to financing due to the materialization of certain credit events and the tightening of both local and global financial conditions. This sector's assets represent a small fraction of the financial system and

there is limited interconnectedness among these institutions, the country's banks and other institutional intermediaries. Hence, they do not represent a factor for systemic risk.

This *Report* analyzes the following macro-financial risks to financial stability: i) a greater and faster tightening of global financial conditions; ii) lower-than-expected global economic growth, characterized by a downward trend; iii) a further weakening of aggregate demand; and iv) additional negative adjustments of credit ratings for both sovereign debt and Pemex.

Stress tests were also conducted to evaluate the resilience and loss absorption capacity of Mexican banking institutions under extreme adverse, but plausible scenarios. As part of the stress tests conducted in this *Report*, three sets of macroeconomic scenarios consistent with the macro-financial risks presented in this document are considered, as well as three sets of historical scenarios qualitatively similar to crisis episodes that the Mexican economy has faced. The results show that the capitalization index of banking institutions in Mexico would allow the system, at the aggregate level and in the six scenarios considered, to conclude the simulation with levels well above regulatory minimum, including capital buffers. However, at the individual level, there are certain banking institutions, representing a low percentage of the system's total assets, which, in some of the simulated scenarios, could see deteriorated capitalization levels. The leverage ratio of banking institutions would be, on average and in all simulated scenarios, above the regulatory minimum of 3 %, although some institutions would end the simulation below this level.

In addition to the risks described above, there are others related to financial institutions' operations, such as business continuity risk. These have been closely monitored in recent years by the financial system in general and within Banco de México, in particular. Cyber-risks are equally important, as they have been increasing at the global level. As for Banco

de México, the financial market and payment systems infrastructures it manages and operates have maintained high levels of operability, with no incidents reported in either their technological infrastructure or in their operating processes. Cyber-risks continue increasing and have become one of the major non-financial risks to the global financial system, with a high potential to have a systemic impact and affect financial stability, if they were to occur. With this in mind, Banco de México has implemented tools that allow for permanently monitoring the levels of cybersecurity in Mexico's financial system.

The economic and financial impact of climate change can lead to considerable future losses for financial institutions and pose a risk to the financial system overall. To strengthen the resilience of the financial system to these eventualities, Banco de México has been actively working on making Mexico's financial system participants include climate-related risks in their risk management practices. Banco de México is also continually improving and developing tools and conducting analysis related to climate change.

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

I. Introduction

The global macroeconomic environment has become more complex and uncertain, characterized by persistently high inflation levels and a deterioration in growth prospects. This increases the risk of tighter than expected global financial conditions, given the adjustment of monetary policy positions at the global level in an environment of greater volatility. The materialization of this risk could have an impact on financing costs in the economy, the economy's expansion rate, the selection of productive projects, as well as on the rebalancing of portfolios towards lower-risk assets. Notwithstanding this environment of increased uncertainty, the domestic financial system continues to be in a solid position, in general, but the challenge of a more vigorous and prudent reactivation of credit remains.

Throughout 2022, economic activity in Mexico has continued to gradually recover. Thus, as of the third quarter of 2022, GDP is already at levels similar to those observed in the fourth quarter of 2019, prior to the public health emergency.

In general, commercial banking has a relatively favorable state and performance. However, some challenges remain for the financial system. Although the risk indicators of the other non-banking financial brokers (OIFNB, *its acronym* in Spanish) are relatively stable. The situation in the non-regulated sector poses complex challenges, such as a reduced access to financing due to the materialization of certain credit events and the tightening of both local and global financial conditions. It should be noted that the assets of the sector represent a small fraction of the financial system, there is a limited interconnectedness among these institutions, the country's banks and other institutional intermediaries. Hence, they do not represent a factor for systemic risk.

Considering the context described, forward, Banco de México will continue to take the actions required in the exercise of its powers, in strict adherence to the legal framework and in coordination with other

financial authorities, to promote the orderly functioning of markets, the stability and sound development of the financial system and the proper functioning of payment systems.

II. Macro-financial conditions

II.1. International economic outlook

Global economic activity showed weakness in the second and third quarters of 2022, albeit with heterogeneity between countries. This is largely associated with the Russian-Ukrainian conflict, a slower-than-expected recovery in China, and tightening global financial conditions for less monetary stimulus globally.

The growth forecasts for the global economy of the International Monetary Fund (IMF) were maintained for 2022 and revised downwards for 2023 (Graph 1 and Graph 2). These adjustments are a consequence of the prospect of tightening global financial conditions due to higher interest rates, the possibility of a further slowdown in China due to the intensification of a housing crisis and the closures resulting from COVID-19, as well as the effects of a reduction in the supply of Russian gas to Europe.

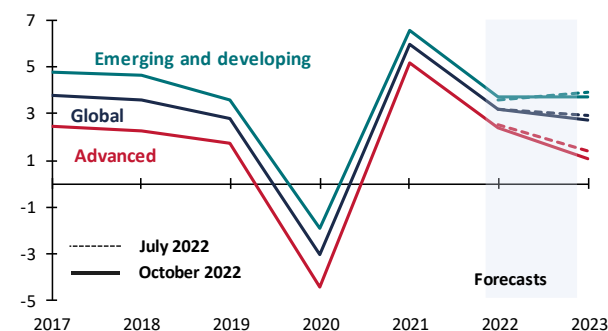
Graph 1
2021 growth, and 2022 & 2023 forecasts
Annual percentage change



Data as of October 2022

Source: IMF, World Economic Outlook, July and October 2022.

Graph 2
GDP growth forecasts
Annual percentage change



Data as of October 2022

Source: IMF, World Economic Outlook, July and October 2022.

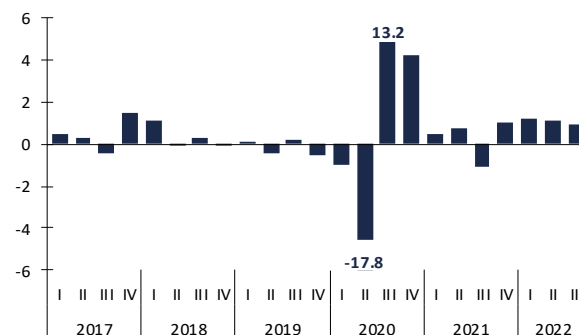
Global inflation increased in the second quarter and remained high in the third quarter of 2022. Despite lower energy pressures on headline inflation in some economies, most of these countries showed increases in underlying inflation, with price increases across a wide range of categorizations. Thus, in most advanced and emerging economies, inflation remained above the objectives of their respective central banks.

In the period covered by this *Report*, the Federal Reserve Board increased the target range of the interest rate of federal funds by 300 basis points, which are derived from the increases of 75 basis points in each of its meetings in June, July, September, and November, placing it between 3.75 and 4.00 %. In its latest monetary policy statement, the Federal Reserve Board stressed its firm commitment to the goal of bringing inflation back to 2%.

II.2. Domestic economic outlook

In the second quarter of 2022, economic activity improved its performance, registering a quarterly seasonally adjusted growth of 1.1 %, supported by the three main sectors of the economy (primary, secondary, and tertiary activities). For the third quarter of this year, GDP showed a quarterly increase of 0.9 %, given the good performance of services and the upward trend that manufacturing maintains (Graph 3).

Graph 3
Gross domestic product a.e./
Quarterly % change

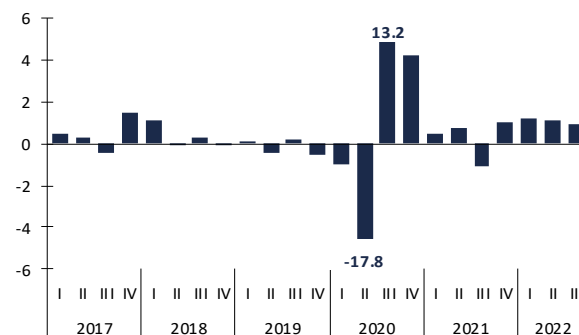


Data as of Q3 2022

Source: INEGI

a.e./Seasonally adjusted figures

Gross domestic product a.e./
Quarterly % change



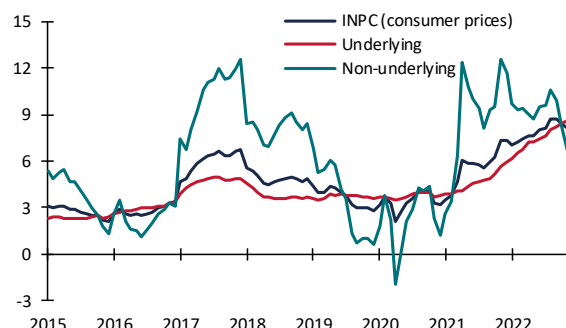
Data as of Q3 2022

Source: INEGI

a.e./Seasonally adjusted figures

Annual headline inflation averaged 7.77 % during the second quarter of 2022 and rose to 8.52 % during the third quarter, affected by inflationary pressures stemming from the pandemic and the war conflict between Russia and Ukraine (Graph 4). In the first half of November, the indicator stood at 8.14 %.

Graph 4
National Consumer Price Index
Annual percentage change

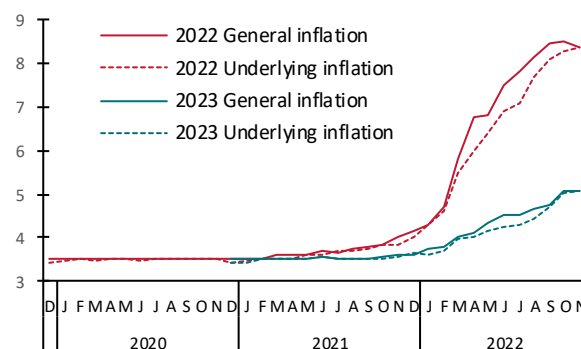


Data as of the first two fortnights in November 2022

Source: INEGI

Banco de México's general inflation projections, published in the July-September 2022 Quarterly Report, stood at 8.3 % and 4.1 % for the end of 2022 and 2023, respectively. The median general inflation expectations in the November Private Sector Specialists stood at 8.36% and 5.07 % by the end of 2022 and 2023, respectively (Graph 5).

Graph 5
Inflation expectations ^{1/}
Percentage



Data as of November 2022

Source: Banco de México, Private Sector Economics Specialists' Expectations Survey.

1/ Median of annual inflation expectations

In the period covered by this *Report*, the Board of Governors of the Banco de México increased the reference rate by 75 basis points at each of its meetings in June, August, September, and November. The reference rate increased from 7.0 % to 10.00 %. In its monetary policy decisions, the Board of Governors considered the forecasts for inflation and the risks to which they are subject, as well as the need to consolidate a declining path for general and underlying inflation towards the Banco de México's target. It was also reiterated that going forward, the conduct of monetary policy would depend on the evolution of factors affecting headline and underlying inflation, their projected trajectories over the forecast horizon, and their expectations.

Box 1: Inflation and non-performing loans in non-revolving consumer credit

I. Introduction

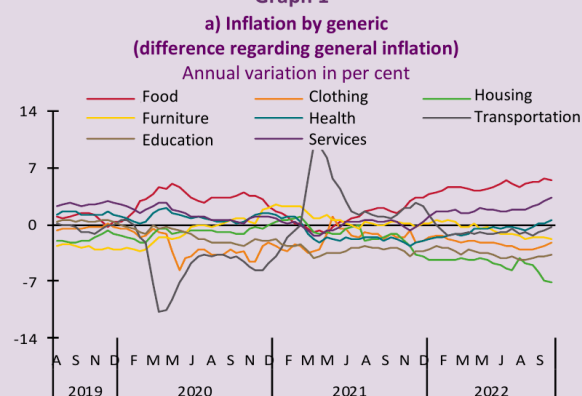
This box studies the relationship between inflation and non-revolving consumer credit, distinguishing amongst types of loans (automotive, payroll, personal and for the acquisition of durable consumer goods -ABCD-) and regions of the country with different income distributions.

High and unstable inflation can affect the financial system through different channels, for example by reducing financial intermediation and discouraging the development of credit markets.¹ More volatile inflation increases uncertainty about investors real resilience, which tends to increase the inflation risk premium and might reduce credit availability.² Thus, the consolidation of low and stable inflation in the 2000s led to the development of credit markets in which supply had decreased significantly or did not exist, such as mortgages or long-term government bonds.³

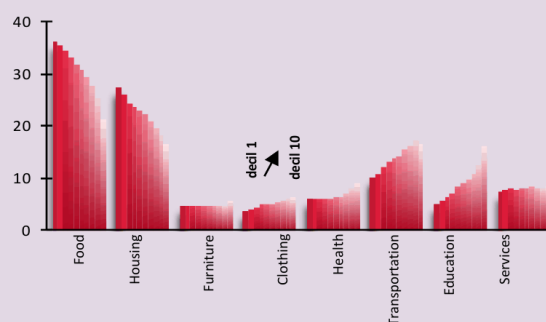
Likewise, inflation reduces the real income of the people who cannot adapt their nominal income to price increases, most often those with lower purchasing power. This decreases their ability to pay and can increase its likelihood of default.⁴ In addition, lower-income individuals often do not have verifiable income, collateral, or credit history, so they generally are only able to access loans with less favorable financing conditions, such as shorter terms and/or higher interest rates. This makes it more likely that delinquency among lower-income people will increase with inflation.⁵

It is important to study the relationship between inflation and delinquency in a context such as the current one, in which there is high inflation at the global and national level and in which the rise in inflation has been driven to a large extent by higher food prices, that in turn represent a greater proportion of expenditure for people with lower incomes (Graph 1).

Graph 1



b) Share of expenditure by decile of income
Per cent



II. Financing conditions and characteristics of non-revolving consumer credit portfolios

The relationship between inflation and delinquency may be different for each type of consumer credit portfolio. Certain characteristics within a portfolio, such as financing conditions or the employment status of borrowers, can amplify or attenuate that relationship. Graph 2 shows that the average proportion of formal employment is lower in municipalities with personal or ABCD loans than in those municipalities with payroll or automotive loans. In addition, personal credit and ABCD are granted under less favorable financing conditions, such as higher rates and shorter terms. In general, there is a higher delinquency

¹ For a more detailed analysis of the effects of high inflation on financial stability, see Chapter 1 of the document "Global Financial Stability Report" (October 2022) of the IMF.

² See Huizinga (1993), Baldwin and Ruback (1986) and Gupta (1987).

³ See Box 3 of the document "US dollar funding and emerging market economy vulnerabilities" of the Financial Stability Board (FSB).

⁴ The Financial Stability Review document, May 2022 of the European Central Bank (ECB) gives a synthesis of the effects of inflation in Financial stability.

⁵ Related to this point, the evidence shown by Jaume, D., Heres, D., Tellez de la Vega, E., & Tobal, M. (2022) suggests that a negative shock to real income, given by lower remittances, increases delinquency among lower-income earners.

for these types of loans since they have no guarantee or verifiable source of payment (Graph 2). These aggregate characteristics of the loans and borrowers suggest that in the face of higher inflation ABCD and personal credit types are more likely to increase non-performing loans than the other types of credit.⁶

III. Relationship between inflation and delinquency

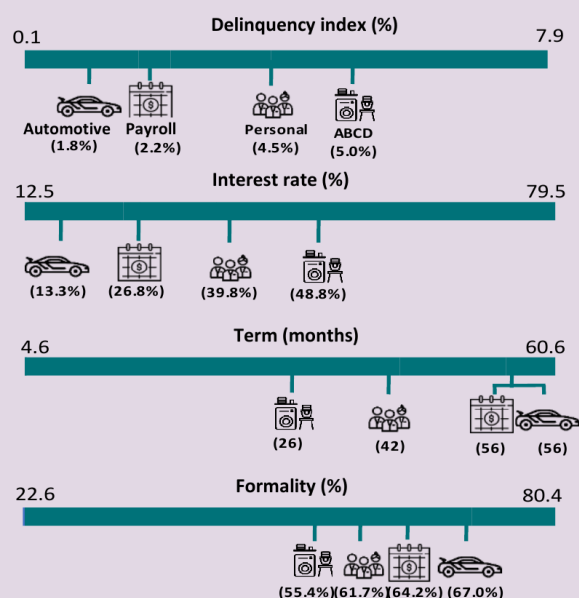
The relationship between inflation and delinquency is studied with information from the consumer credit portfolio from the Banco de México⁷ and the state-level price indices reported by INEGI. A panel data model is used annually at the municipality level and the following statistical specification:

$$Y_{m,a} = \beta_1 \cdot \ln(INPC_{e,a}) + \delta_a + \gamma_m + \theta_m \cdot t + \varepsilon_{m,a}$$

where $Y_{m,a}$ is the delinquency rate of the municipality m in the year a ; $INPC_{e,a}$ is the consumer price index of the state e to which that municipality belongs during the same year a ; δ_a is a fixed effect of year a ; γ_m is a fixed effect of municipality m and $\theta_m \cdot t$ is the linear trend of the municipality. The analysis is performed for the period for which the data is available, that is from 2018 to 2021.⁸

With the incorporation of fixed effects and linear trends, the strategy is based on relating the changes in inflation of a state with the changes in delinquency that the municipalities have on average during the same period. The analysis is performed for the non-revolving consumer credit portfolio in aggregate and for the automotive, payroll, personal and ABCD credit portfolios individually, focusing on the coefficient β_1 . This coefficient captures the increase of the delinquency rate of a state that is associated with inflation above its historical average and the national average.⁹

Graph 2
Financing conditions and characteristics of non-revolving consumer credit portfolio ^{1/}
(Average of municipalities to which a specific type of credit is granted)



Figures as of April 2022.

Source: Own calculations with information of Banco de México and INEGI.

^{1/}For each distribution, the upper left number indicates the level of the variable that corresponds to the 5% percentile, while the upper right number represents the value of the variable at the 95% percentile. The symbol represents each credit portfolio and its position within the distribution; it is assigned according to the weighted average by type of credit. The municipalities with the highest proportion of vulnerable population by income have 96.6% of auto loans, 94.7% of payroll loans, 92.9% of personal loans and 88.3% of ABCD loans.

IV. Results

The results show that the states of the country with the highest inflation are those where the delinquency rate of the total consumer credit increased the most (Table 1, Column A).

⁶ For building the Graph 2, the information of the different variables (rate interest, delinquency, etc.) is aggregated at the municipality level and then taken as an average of all municipalities. The information of the percentage of formality is constructed with information at the municipal level obtained from the 2020 Census, where formality was defined according to the proportion of the population that worked and had access to health services at their source of work. For each distribution, the lowest and highest 5% were removed to eliminate outliers. For each characteristic, the weighted average by type of credit is obtained and assigned at the position within the distribution shown in the graph.

⁷ The information comes from non-revolving consumer credit forms: ABCD, Automotive, Microcredit, payroll, personal and others for Banks and Sofomes ER (Bimonthly Report).

⁸ Time fixed effects controls for the impact that could arise from events such as the COVID-19 pandemic.

⁹ Strictly speaking, the increase of the average delinquency rate of all the municipalities that belong to a state is measured and inflation is the one that is above the national average, the historical average of the state and its linear trend.

Table 1
Relationship between inflation and the delinquency rate of non-revolving consumer credit portfolios ^{1/}

	Delinquency rate (%)				
	Total (A)	Automotive (B)	Payroll (C)	Personal (D)	ABCD (E)
Inflation	0.24*** (0.08)	1.73 (6.36)	20.75** (8.19)	31.17** (12.51)	55.7*** (17.9)
Observations	9,810	8,861	9,685	9,721	8,956
R²	0.79	0.73	0.68	0.83	0.83

Source: Own calculations with information from Banco de México

Notes: Robust standard errors in parentheses

Statistical significance at 10% (*), 5% (**) and 1% (***)

However, the relationship between inflation and non-performing loans, as well as their intensity, are heterogeneous among portfolios (Table 1, Columns B-E).¹⁰ There is no relationship between delinquency and inflation for the automotive loan portfolio. In contrast, a positive link of delinquency and inflation is found for the rest of portfolios, being stronger for personal credit and ABCD credit types. These are the portfolios where there are usually fewer people accredited with formal employment, where there are no guarantees and in which financing conditions are usually less favorable. Therefore, the results suggest that these characteristics of portfolios and their borrowers make them more sensitive to increases in non-performing loans in high inflation environments.¹¹

Regions of the country with different percentages of the low-income population are also considered.¹² The results suggest that there is only a positive relationship between inflation and delinquency for the regions of the country with higher share of low-income population (Table 2). In addition, in these regions, the relationship is stronger for personal and ABCD credit types. These results seem to confirm that the characteristics of borrowers such as their income level may be important to understand whether higher inflation is associated with higher delinquencies rates.

Table 2
Relationship between inflation and delinquency of consumer credit, for regions with different percentages of the population vulnerable by income ^{1/}

Municipalities with a higher percentage of the vulnerable population by income ^{2/}				
	Delinquency rate (%)			
	Automotive (B)	Payroll (C)	Personal (D)	ABCD (E)
Inflation	3.44 (6.53)	23.86*** (8.73)	32.99** (13.53)	65.99*** (20.64)
Observations	4,760	4,915	4,907	4,693
R²	0.78	0.71	0.85	0.83

Municipalities with a lower percentage of the population vulnerable by income ^{3/}				
	Delinquency rate (%)			
	Automotive (B)	Payroll (C)	Personal (D)	ABCD (E)
Inflation	-35.68 (23.93)	-5.60 (22.77)	6.674 (16.99)	2.335 (24.23)
Observations	4,101	4,770	4,814	4,263
R²	0.60	0.60	0.76	0.68

Source: Own calculations with information from Banco de México and INEGI

Notes: Robust standard errors in parentheses

Statistical significance at 10% (*), 5% (**) and 1% (***)

1/ The median of the percentages of the vulnerable population by income in the municipalities was used as the threshold to identify the most and least vulnerable municipalities by income

2/ Municipalities above the median distribution

3/ Municipalities below the median distribution

V. Final considerations

The results suggest that a high inflation environment is associated with higher non-performing loans of non-revolving consumer credit. Increases in delinquency associated with high levels of inflation are only statistically significant in regions of the country with a higher proportion of their population of low income, this

¹⁰ The coefficient associated with the aggregate portfolio regression (0.24) is lower than that obtained for each of the four segments in columns B-E. This is largely because: (i) the value of the estimated coefficient in each regression depends, in turn, on the estimated value of the fixed effects of municipality and year of each specification; and (ii) the estimated value of the fixed effect in the aggregate portfolio regression depends on the correlation between the fixed effects of the regression of the four segments, not only on the value of these estimated values. To support this argument, an exercise was carried out in which, instead of using the values associated with the aggregate portfolio, the values of each of the four segments were considered in a "stacked" way, that is, a regression where these values were taken as different observations, and fixed effects of type of portfolio-municipality and type of portfolio-time are added. In this estimate, the coefficient is equal to 20.97, which is effectively among the values estimated in columns B-E (the value is statistically significant at 1%). The advantage of the first regression

(Column A) is that its interpretation refers to the total CNR portfolio of the municipality, while the second refers to the average effect of the portfolio-municipality cells.

¹¹ Using these results, it is calculated that, for the set of states that are above average in terms of inflation and participation in the consumer credit portfolio, the increase in delinquency in 2021 was 0.08 percentage points (pp) for ABCD, 0.04 pp in personnel and 0.03 in payroll.

¹² The definition of vulnerability by income used is from the National Council for the Evaluation of Social Development Policy (Coneval). The Coneval defines it as "that population that does not present social deprivation but whose income is less than or equal to the welfare line". This definition considers the percentage of population that has enough assets of different nature to access bank credit, but low enough income to belong to the part of the population for which real income might decrease with higher inflation.

effect is larger for personal credit portfolios and ABCD, which traditionally have less favorable financing conditions.

The results emphasize the importance of preserving a sound macro-financial environment which makes consistent with low and stable inflation and in this way, contribute to the reduction of the credit risk associated with higher inflation.

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II.3. Financial markets

During the second half of 2022, the behavior of global financial markets has been dictated by several factors:

- First, the persistence of high inflation at the global level has resulted in the implementation of more restrictive monetary policies than anticipated in both developed and emerging economies. In addition, the expectation that monetary policy rates will remain at high levels for a longer period than originally anticipated has been heightened.
- The geopolitical conflict between Russia and Ukraine continues to affect global supply chains, thereby maintaining additional upward pressure on inflation and downward pressure on economic growth.
- China's zero COVID-19 policy has also represented a challenge on the recovery of global value chains. Moreover, such a policy has resulted in a weakening of economic activity in that country and, consequently, in the growth expectations of other economies, particularly emerging economies.

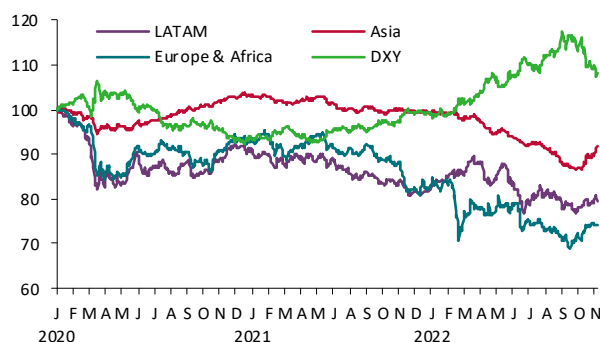
- Finally, the implementation of expansionary fiscal policies in some countries has made it difficult to implement monetary policy and affected the behavior of financial markets.

In this environment, financial markets have shown greater volatility and changes in financial assets have resulted in a significant tightening of global financial conditions. In particular, interest rates rose sharply, stock indices adjusted downward, and the dollar strengthened.

The above events have had a significant impact on the financial markets of emerging economies. Thus, since June 2022, the currencies of these countries have mostly performed negatively (Graph 6). However, it should be noted that the Mexican peso has remained the currency of this group that has shown a greater appreciation in the period. This behavior is due, among many factors, to the prudent of fiscal and monetary policies, the balance of external accounts, the interest rate differential relative to other economies and the lower implicit volatility in the Mexican peso options compared to that observed in other currencies.

Graph 6

Foreign exchange indexes performance ^{1/2/}
Index (January 2020 = 100)



Data as of December 2022

Source: Banco de México with Bloomberg data.

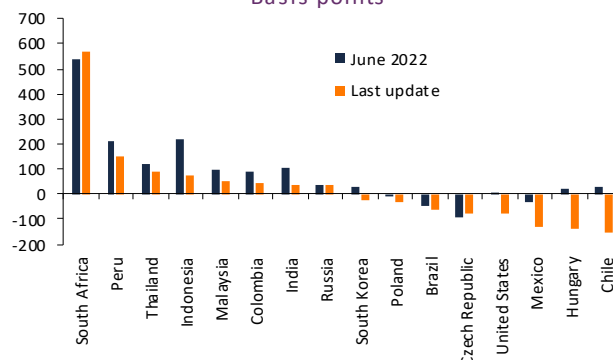
^{1/} Latin America includes Peru, Brazil, Colombia, Chile and Mexico. Asia includes the Philippines, South Korea, China, Malaysia and India. Europe and Africa includes Poland, Hungary, Russia, Czech Republic and South Africa.

^{2/} DXY: It refers to the US dollar index calculated by the Intercontinental Exchange (ICE) as a weighted average of the nominal exchange rate of six currencies: euro, Japanese yen, pound sterling, Canadian dollar, Swedish krona and Swiss franc.

The performance of the fixed income market was characterized by episodes of volatility. The yield curves showed generalized increases, reaching in some cases historical levels during the period, although this adverse dynamic has recently shown a moderation. The more pronounced adjustments in the short part of the yield curves are due to the expectation of a more restrictive monetary policy at the global level, in order to cope with rising price pressures. Against this backdrop, yield curves showed a flattening dynamic, and in several economies, an inversion (Graph 7).

Graph 7

10Y 2Y rate spread for selected emerging countries
Basis points



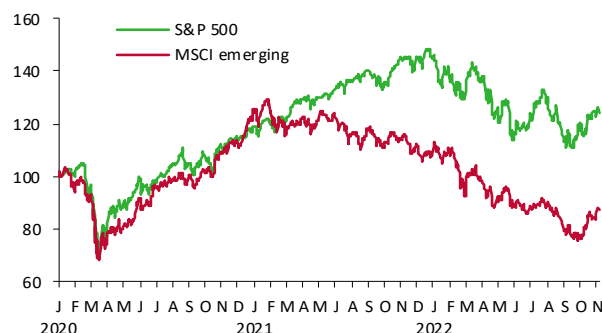
Data as of December 2022

Source: Banco de México with Bloomberg data.

Finally, stock market performance was characterized by movements without a definite trend (Graph 8), although they have recently had a positive bias. The above was associated with different factors, such as the prospects of lower economic growth at a global level, coupled with the existence of idiosyncratic risk factors, and on the positive side, a good corporate reporting season, and a growth in consumption.

Graph 8

Stock index performance
Index (January 2020 = 100)



Data as of December 2022

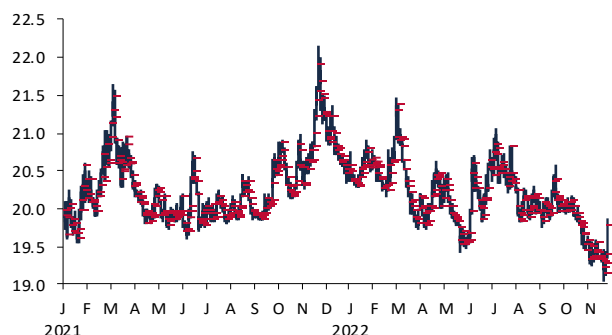
Source: Banco de México with Bloomberg data.

II.3.1. Foreign exchange market

The Mexican peso has had a remarkably positive performance during the second half of 2022, highlighting the stability and resilience to episodes of risk aversion at the global level, derived from the factors mentioned above, as well as significant remittances flows and the start of the monetary policy normalization cycle implemented since last

year in Mexico. Against this backdrop, the Mexican peso traded in a range between 19.04 and 21.05 pesos per dollar during the period covered by this Report (Graph 9).

Graph 9
Mexican peso trading range ^{1/}
Peso-dollar exchange rate



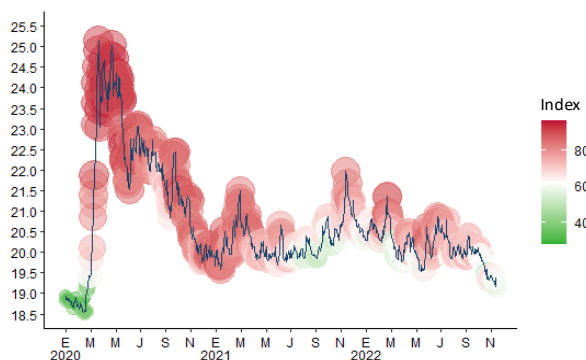
Data as of December 2022

Source: Bloomberg

^{1/} The red lines show the closing exchange rate, while the blue bars show the trading range.

The foreign exchange market showed good liquidity, depth, and agile transaction conditions (Graph 10). Additionally, prospective operating conditions also showed an improvement (Graph 11).

Graph 10
Mexican peso trading conditions ^{1/}
Pesos per dollar; Index

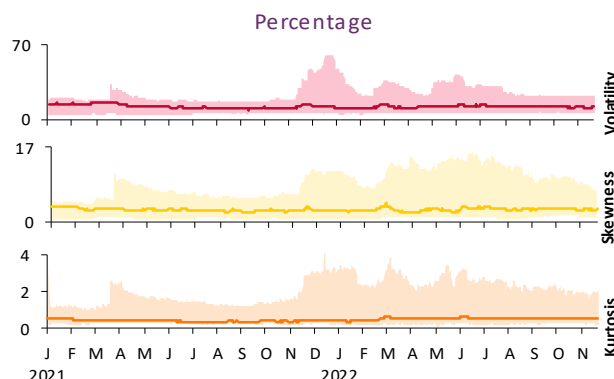


Data as of December 2022

Source: Banco de México estimates with Bloomberg and Refinitiv data.

^{1/} The index is estimated as the average of the percentiles calculated since 2018 of the one month implied volatility and skewness, and of the observed volume and bid-ask spread; where the red color (green) indicates a greater (minor) deterioration in foreign exchange market operating conditions.

Graph 11
3M implicit trading conditions in FX options for Mexico and
selected emerging economies ^{1/}



Data as of December 2022

Source: Bloomberg

^{1/} The emerging countries included in the shaded area (interval between highest and lowest values) are Brazil, Chile, Colombia, the Philippines, Hungary, India, Indonesia, Malaysia, Poland, South Africa and Turkey; Brazil, Chile, Colombia, Hungary, India, Indonesia, Malaysia, Philippines, Poland, South Africa and Turkey. The solid line shows the value for Mexico. Implied skewness is assessed through Risk Reversal operations at 25 deltas. The kurtosis is measured with Butterfly operations at 25 deltas.

On October 27, the triennial Bank for International Settlements' survey on trading volumes in foreign exchange markets and non-standardized derivatives was published, highlighting that the Mexican peso ranks as the third most traded currency in emerging countries, and the sixteenth most traded currency in the world.

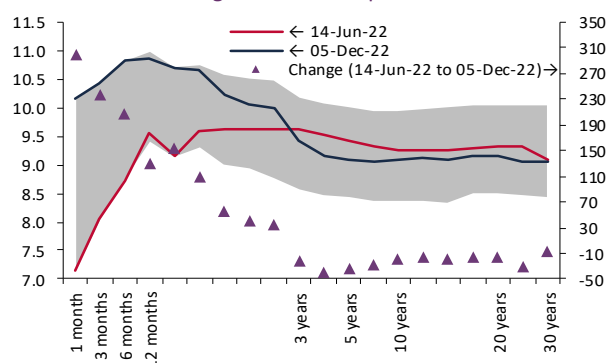
II.3.2. Fixed-income market

In Mexico, during the second half of 2022, the yield curve of government securities showed an inverting dynamic with increases of up to 300 basis points in the short term and decreases of up to 40 basis points in the long term (Graph 12). This led to the spread between the 30 and 3-year terms being at negative levels throughout the period. This performance was influenced by the expectation of a continuation of the reference interest rate hike cycle by Banco de México a higher than anticipated terminal rate for the monetary tightening cycle, and the continued outflow of foreign investors in short-term securities.

Graph 12**Bond Yield Curve M^{1/}**

Left axis: Percentage

Right axis: Base points



Data as of December 2022

Source: Banco de México with PIP data.

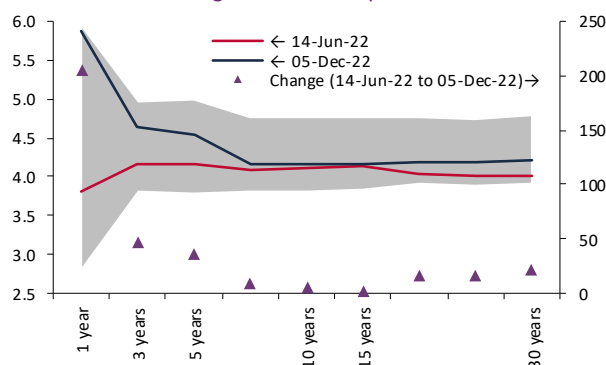
^{1/} The gray area relates to the daily yield curve range from June 14th, 2022.

The real yield curve showed increases in the short end of the curve that averaged 100 basis points, while the medium and long term remained virtually without changes (Graph 13). Thus, the compensation due to inflation and inflationary risk decreased marginally during the period. It is worth remarking that during the year foreign investors have shown interest in participating in the real-rate bond market, suggesting an increased appetite for assets that offer inflation protection.

Graph 13**Udibonos yield curve^{1/}**

Left axis: Percentage

Right axis: Base points



Data as of December 2022

Source: Banco de México with PIP data.

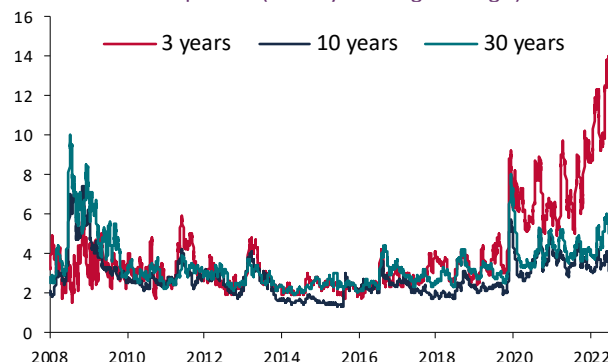
^{1/} The gray area relates to the daily yield curve range from June 14th, 2022.

The generalized increases in the yield curve of government securities occurred in a context in which

the operating conditions of this market deteriorated (Graph 14).

Graph 14**Bid-ask Spread for selected Bonos M**

Basis points (10-day moving average)



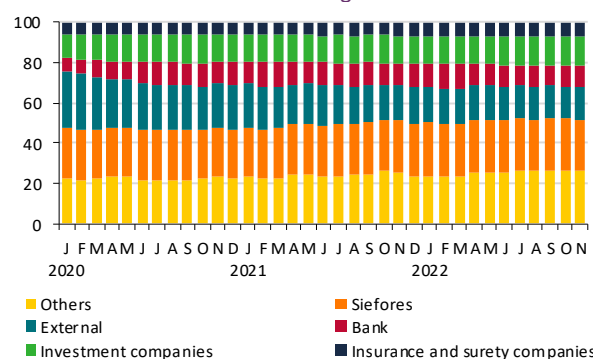
Data as of December 2022

Source: Banco de México

In terms of flows to assets denominated in pesos, foreign investors have continued to reduce their positioning in the government securities market (Graph 15). However, the pace of outflows, compared to what was observed in 2020 and 2021, has slowed down. Since the last publication of this *Report*, the net positioning of this sector has decreased by 19 billion pesos, as a result of outflows in Bonos M and bonds at a floating rate partially offset by an increase in the position in real rate instruments and zero-coupon bonds (Graph 16).

Graph 15**Government securities holdings by sector as percentage of amount outstanding^{1/}**

Percentage



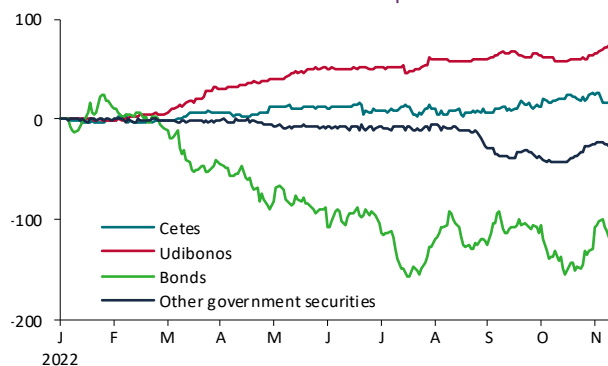
Data as of November 2022

Source: Banco de México with Indev data.

^{1/} This includes cetes, M bonds, udibonos and Bondes. Other include values acquired by Banco de México, repos with Banco de México, guarantees received by Banco de México and other national residents.

Graph 16

Foreign investors flows by security during the year
Flows in billions of pesos



Data as of November 2022

Source: Banco de México with Indeval data.

During the second semester, the activity of debt issuance referenced to the TIIE Funding Rate (TIIE, its acronym in Spanish) continued, with three institutions in the banking sector (BBVA, Santander and Banobras) using this rate as a reference, replacing the 28-day TIIE.

Box 2: Progress in the transition to the Funding TIE

I. The TIE of Funding

In recent years, an international transition process has taken place to shift reference rates in major markets from being based on surveys (as is the case with LIBOR) and to be agreed at rates based on transactions observed in the market¹. In this context, the Bank of Mexico began to calculate and publish, as of January 16, 2020, a reference rate that complies with international standards and principles: the TIE of Funding to a banking business day². This Box describes recent progress in the transition of reference rates in Mexico and details that preliminary dates have been defined beyond which TIE for maturities longer greater than one day can no longer be used as reference rates.

II. Development of the market for instruments linked to the FUNDING TIE

One of the main objectives of the Bank of Mexico, once the funding TIE was created, has been to develop the markets of instruments linked to this rate to make it the main reference in the Mexican market. To support this task, the Working Group on Alternative Reference Rates in Mexico (GTTR) was created in September 2020. This group is coordinated by the Bank of Mexico and has been established as a discussion forum for participants of the national fixed income market³. Within the GTTR, the creation of new financial instruments referenced to the FUNDING TIE has been promoted, highlighting the following developments:

- **In the derivatives market**, with the help of the GTTR sessions and with the support of Banco de México and other authorities such as the Ministry of Finance and Public Credit (SHCP) and the National Banking and Securities Commission (CNBV), the *Chicago Mercantile Exchange* (CME) and the Mexican Derivatives Market (MexDer) have created futures referenced to the TIE of Funding.
- **In the debt market**, with the support of the technical advice presented in the GTTR, debt instruments linked to the FUNDING TIE have been designed and issued, highlighting the F and G Bonds issued by the shcp, in addition to other instruments issued by financial institutions based on the structure of said Bonds.
- Additionally, in the sessions of the GTTR, market participants have begun to encourage the **banking instruments** used by households and entities of the public and private sector to be linked to the Funding TIE.

III. Next steps in the transition

The next steps in this transition process are shaping up towards restricting the use of TIE for terms longer than one banking business day (28, 91 and 182 days). In particular, TIE for terms longer than one day do not meet all internationally established criteria for reference rates, as they are not based on transactions observed in the money market. That is why, after a joint analysis with market participants, the following actions are being planned:

- Restrict the use of the TIE to terms greater than one banking business day considering the following dates:
 - ✓ For the **91-day and 182-day TIE**, the final date on which these rates could be used for new operations would be **December 31, 2023**.
 - ✓ In the case of the **28-day TIE**, the final date for use in new operations would correspond to **December 31, 2024**.
- Define a transition strategy through which the term TIE will continue to be published by the Bank of Mexico so that the contracts referenced to these rates, and that remain in force after the deadlines, have a reference to continue calculating interest, until its conclusion.

IV. New methodology of TIE with terms greater than one banking business day for existing contracts

From the day following the deadlines for the use of forward TIES in new contracts, it is considered relevant to change the methodology of forward TIES, which would be in line with international experience, as linked to a rate based on market operations. The above, in order to comply with international standards of reference rates. In this way, the term TIE, instead of being determined based on surveys, would be determined by a methodology based on the Funding TIE (market reference), which in turn, would promote the use of the FUNDING TIE as a reference.

This new form of calculation would replicate, in general terms, the behavior of the term TIE under its current form, especially in its most used term (28 days). Additionally, this rate would be known at the beginning of the interest calculation period, a condition requested by several market participants so that it can

¹ The FSB recommends that reference rates comply with the principles set by IOSCO. These principles aim to provide legitimacy to the process of determining these rates by addressing relevant aspects such as governance, calculation methodology, accountability and quality of the reference rate. For more information, see <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD415.pdf> (available in English only).

² The overnight funding TIE is determined by the Banco de México based on the one-day banking reporting operations carried out by banks and brokerage houses

with debt securities issued by the Federal Government, the IPAB and the Banco de México.

³ The members of this Working Group represent credit institutions, brokerage firms, electronic trading platforms, brokerage houses, stock exchanges, financial authorities, price providers, custodians, non-banking financial entities, corporate, among others, with significant participation in the local fixed income market.

be used by all financial instruments. Finally, this new methodology would allow derivatives chambers to convert current forward IRS swap contracts (*IRS*) into overnight index swap contracts (OIS) linked to the FUNDING TIIE.

V. Final considerations

The next step in this transition is to make the corresponding modifications to the applicable Circulars, which will be submitted to public consultation. In this regard, as previously mentioned, the use of TIIE will be restricted to terms longer than one banking business day in new contracts (as an end date of December 31, 2023 for TIIE to 91 and 182 days and December 31, 2024 for TIIE 28). In addition, the TIIE forward methodology used in contracts in force from those deadlines will be changed. This will allow financial institutions to take the necessary steps for an orderly transition.⁴

It is worth mentioning that there are some risks that may arise in this transition, among which are:

- The operation of Funding TIIE futures is limited, which could complicate the transition of other derivative instruments towards **the** FUNDING TIIE, such as the conversion of *IRS* contracts to OIS contracts mentioned above.
- If market participants do not start reducing the operation of financial instruments linked to forward tiie now, the development of markets linked to the FUNDING TIIE could be delayed, which could result in the latter not having sufficient liquidity in the deadlines, making an orderly transition complicated.
- If financial institutions do not take adequate steps to transition before deadlines, their systems may not be prepared for baseline changes.

In order to mitigate these risks, Banco de México will continue to urge market participants to use the FUNDING TIIE in the new financial instruments that it operates through different forums, especially through the GTTR.

⁴ For more information on the progress of the transition see the GTTR page at <https://www.banxico.org.mx/mercados/grupo-trabajo-tasas-referen00001.html>

II.3.3. Equity market

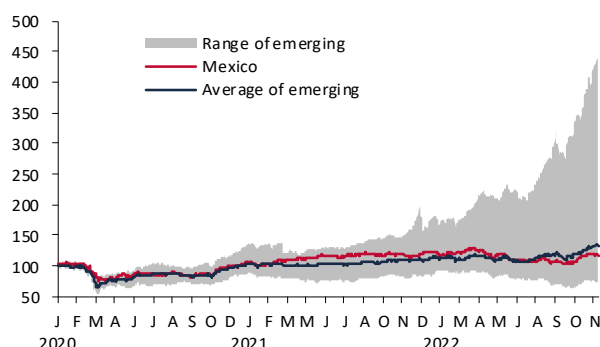
Since the last publication of this *Report*, equity markets in Mexico presented a positive and limited movement (Graph 17) but differentiated by sector.

Graph 17

Stock indexes' cumulative performance in emerging countries

1/

Index (02 Jan 2020 = 100)



Data as of December 2022

Source: Banco de México with Bloomberg data.

1/ The emerging countries included are: Brazil, Chile, Colombia, Hungary, India, Indonesia, Malaysia, Philippines, Poland, South Africa and Turkey.

Thus, since the last publication of this Report, the Prices and Quotes Index (*IPC*, its acronym in Spanish) of the Mexican Stock Exchange (*BMV*, its acronym in

Spanish) has shown an increase of 6.37 %. The sector with the best performance was that of basic consumption, while materials companies have shown a negative performance.

It is worth mentioning that the activity in initial public offerings (IPO) in Mexico remains null, and the interest of some companies to cancel their registration in the Mexican Stock Exchange continues. According to the opinion of equity and investment banking analysts in Mexico, the low dynamism in the equity market in Mexico, compared to its peers in Latin America and other countries, affects the valuations of companies. The above, combined with a low floating share percentage and/or highly concentrated floating share percentage, stock prices well below historical averages, which do not reflect fundamental book valuation, and possibilities for leverage generate ideal conditions for majority shareholder buybacks.

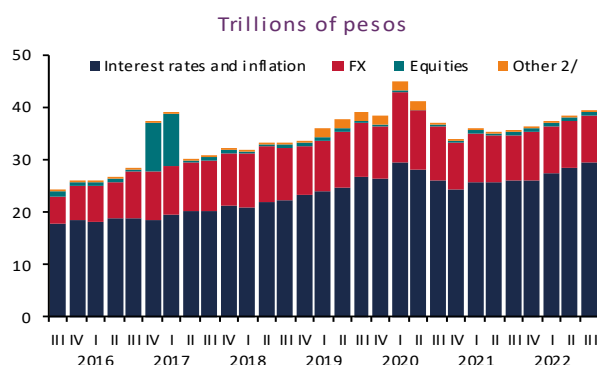
Finally, as for the positioning in this market by foreign investors, there was a negative outflow during the second half of 2022 totaling -2,013 million dollars.

II.3.4. Derivatives market

The derivatives market in Mexico showed, between March and September 2022, an increasing trend in terms of the notional amount outstanding of derivative transactions. This trend, which started since the third quarter of 2021, has allowed the notional value to reach levels similar to those observed in 2019, mainly due to the amount traded in *swaps* linked to the 28-day TIE and, to a lesser extent, to the amount traded in currencies (MXN peso/US dollar) (Graph 18). In particular, during 2022, the agreed notional amount of *swaps* with standardized trading characteristics showed a growth rate of around 60 percent, in nominal terms (Graph 19).

Graph 18

Outstanding notional amount by underlying asset type ^{1/}



Data as of September 2022

Source: Banco de México

1/ As of the Financial Stability Report June 2021, Cross Currency Swaps (CCS) are classified as Foreign Exchange underlying asset.

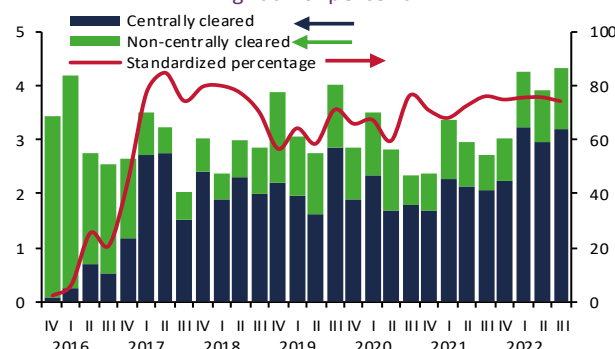
2/ Includes debt, other derivatives and commodities.

Graph 19

Agreed notional amount of standardized swaps

Left axis: trillions of pesos

Right axis: percent



Data as of September 2022

Source: Banco de México

In the Thirteenth Triennial Central Bank Survey of foreign exchange and Over-the-counter (OTC) derivative markets, the BIS found, at the global level, a decrease in the average daily trading volume in interest rate derivatives, with the exception of interest rate swaps, which showed an increase in the average of the notional amount traded. In the case of Mexico, the average amount linked to interest rate transactions showed an increase compared to the previous triennial survey.

On the other hand, the results of the survey also indicate that the 2019-2022 period was characterized by uncertain conditions on interest rates and high volatility in exchange rates in the main currencies, due to the restrictions imposed by COVID-19, geopolitical tensions, the increase in commodity prices and the LIBOR rates transition process (see Box 2). Thus, volatility conditions have recently generated an increase in the required margins for derivative transactions on some underlying assets, such as commodities and energy.

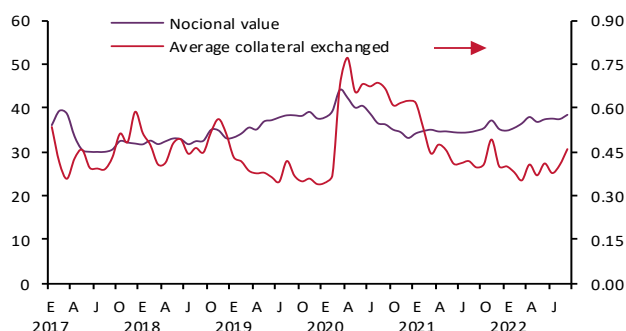
Against this backdrop, the average of collateral exchanged with respect to the derivatives portfolio, at notional value, of financial intermediaries in Mexico, has shown an upward trend, although on average they are still below the levels observed in 2021 (Graph 20).

Graph 20

Notional value of the portfolio and ratio of the collateral to the outstanding notional amount

Left axis: trillions of pesos

Right axis: percent



Data as of September 2022

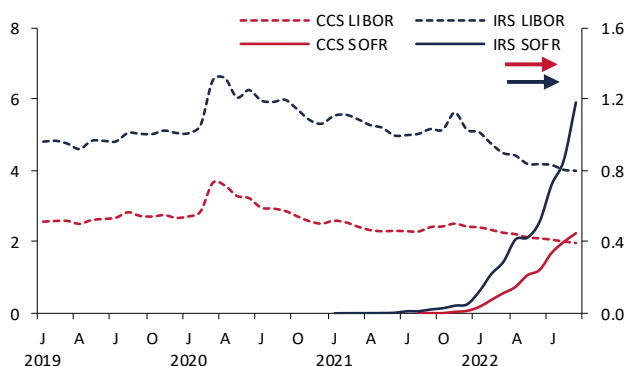
Source: Banco de México

With regard to derivatives transactions linked to LIBOR, in December 2021 the publication of LIBOR-USD for certain terms, as well as for all other currencies, ceased, which caused foreign financial institutions to reduce their derivatives trades linked to said rates. In this context and as part of the process of transition to the new reference rates, during 2022 there was a higher notional value of outstanding derivative transactions linked to the new reference rates, such as SOFR and ESTR, replacing the LIBOR rates (Graph 21).

Graph 21

Outstanding notional amount by rate type in interest rate swaps (IRS) and cross-currency swaps (CCS) transactions

Trillion pesos



Data as of September 2022

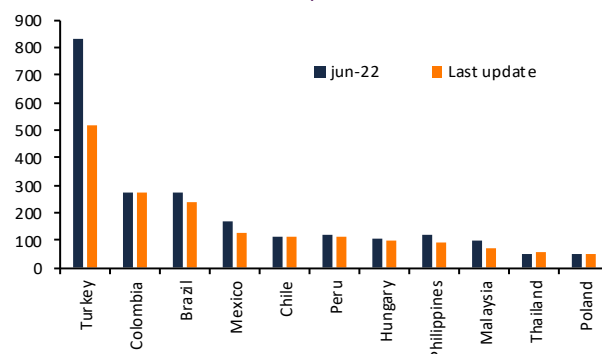
Source: Banco de México

II.3.5. Risk premiums

Global credit risk premiums, measured by the price of the credit default swap (CDS), performed negatively during the period covered by this Report, with limited movements for all emerging countries (Graph 22), although the closing levels were lower than those observed during the first half of the year.

Graph 22

Credit default swaps for emerging markets
Base points



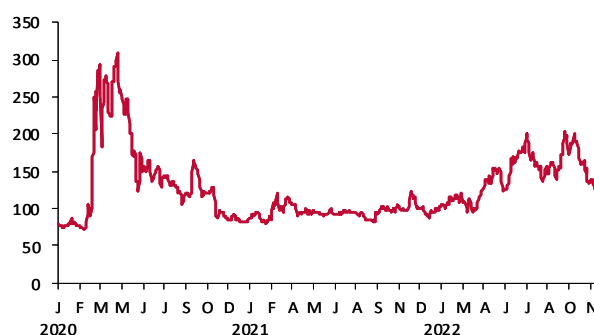
Data as of December 2022

Source: Banco de México with Bloomberg data.

Thus, the 5-year CDS of Mexico's sovereign debt has shown a decrease of 40 basis points and is at levels of 125 basis points (Graph 23), in line with what was observed in the rest of the emerging economies.

Graph 23

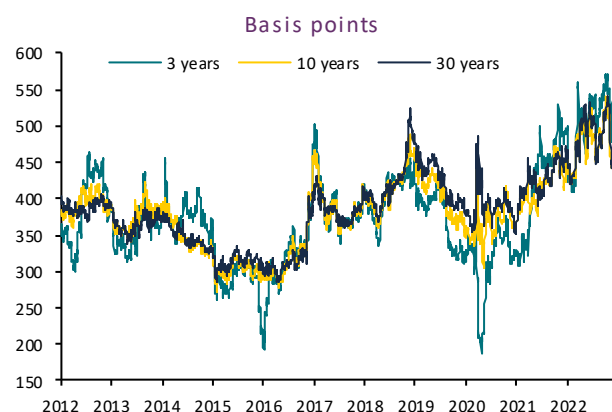
Five-year CDS Mexico
Base points



Data as of December 2022

Source: Bloomberg

On the other hand, the inflation compensation presented a positive dynamic in most terms, reaching values of lower than 450 basis points at the end of the period for the 10 and 30-year terms (Graph 24).

Graph 24**Implicit inflation compensation in government securities rate curves**

Data as of December 2022

Source: Banco de México with PIP data.

II.4. Macro-financial risks

The Mexican financial system faces greater challenges in the current situation, characterized by an environment that has become more complex and uncertain. On the one hand, there have been persistently high levels of inflation, which along with a deterioration in growth prospects, represent a risk to observe a greater-than-expected tightening in global financial conditions, given the adjustment of monetary policy stances at a global level. All of the above, in a context of greater volatility and uncertainty, with a deteriorated geopolitical environment, have increased risks to financial stability in a number of advanced economies. These factors could translate into greater challenges for the financial system, considering that Mexico is a small and open economy, that its currency is one of the most traded globally and that its markets and financial intermediaries have direct and indirect connections with the global financial system.

In this environment, the Mexican financial system maintains a solid and resilient position, with a commercial banking that has levels of capital and liquidity that exceed regulatory minimums.

Thus, although vulnerabilities in the Mexican financial system are limited, a severe external shock could generate additional risks for the financial system and its proper functioning.

II.4.1. An accelerated tightening of global financial conditions

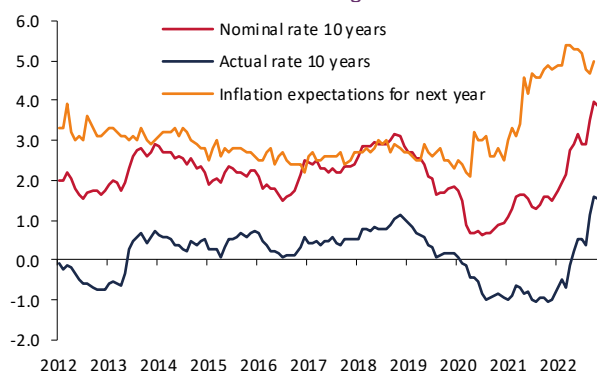
Since the last publication of the *Report*, international financial markets recorded episodes of high volatility and risk aversion, as well as a significant tightening of financial conditions (Graph 25). This stems from an acceleration in the monetary policy adjustment process by major central banks in response to persistently high inflation readings and increases in their inflation expectations. Likewise, these markets were affected by the increase in uncertainty regarding the armed conflict between Russia and Ukraine, as well as by the implementation of expansionary fiscal policies in some countries, which has hindered the implementation of monetary policy and affected the behavior of financial markets.

Moving forward, the risk remains that global financial conditions will continue to tighten more pronouncedly and more rapidly. This could lead to increases in risk premiums and generate disorderly adjustments in investors' portfolios, as well as events that put global financial stability at risk, affecting capital flows to emerging market economies, including Mexico. Furthermore, liquidity pressures in international financial markets could arise as monetary stimulus from a number of advanced economies is withdrawn.

The effects on financial conditions, both internal and external, would increase the financing costs of companies, households and governments, to the detriment of the economic recovery. In addition, they could exacerbate certain vulnerabilities in some economies, such as high levels of debt, both public and corporate, and high valuation of some assets. It should be noted, however, that Mexico's relative position is better than that of other emerging market economies, both in macroeconomic terms and in terms of the capitalization and liquidity of the financial system as a whole.

Graph 25

10-year Treasury bond interest rates and inflation expectations in the United States
Percentage



Data as of November 2022

Source: Federal Reserve and University of Michigan

II.4.2. A lower economic growth than expected and with a downward trend

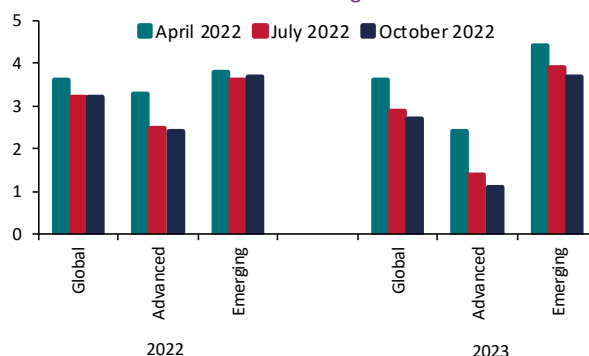
Global economic activity has continued to decelerate more broadly and, in some cases, more sharply than anticipated, while economic growth prospects have deteriorated (Graph 26). This is due in large part to the various economic and financial repercussions of the development of the military conflict between Russia and Ukraine and its possible effects on various markets, particularly the energy and some commodities and raw materials markets. In this environment, the short-term risk of further global economic slowdown has increased, including the possibility of recessionary periods in some economies.

Risks to the growth of the global economy in the medium term remain, which could reflect the effects of the different shocks it has faced in recent years. Through a diversity of channels, these could have a wider and deeper impact on the global economy, both in the real and nominal spheres, while potentially structural implications for the long-term growth of some countries cannot be ruled out.

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

Graph 26

Annual GDP growth expectations
Percentage



Source: IMF, Global Economic Prospects

II.4.3. Additional weakening of aggregate demand

Although national economic activity has followed a gradual recovery process after the shock caused by the COVID-19 pandemic, the projections for the pace it keeps in the future have decreased and have become more uncertain, in line with what has been observed on a global scale.

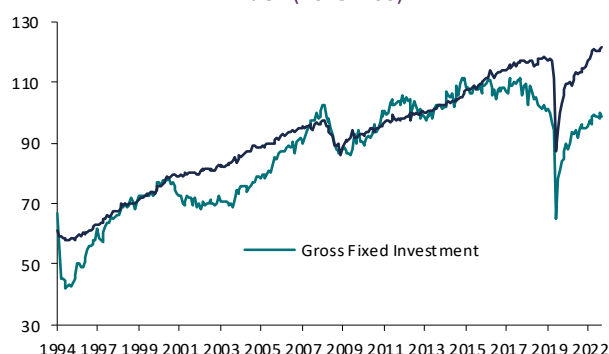
Combined with persistently high inflation readings, this could have implications for the overall levels of real income in the economy, both for households and businesses. Given this, there is still a risk that the weakening previously shown by domestic demand, particularly in private consumption and investment (Graph 27), will accentuate and extend over a prolonged period. In addition, there could be a potential loss of export dynamism, in the context of a slowdown in the global economy, particularly in the United States, and further disruptions in value chains resulting from possible complications in the Chinese economy.

The evolution of spending on physical investment is of particular relevance for the long-term performance of the economy, since the marked sluggishness of this item of aggregate demand recorded in recent years represents an additional downward pressure on the capacity and dynamism of the national productive apparatus as a whole. For the financial system, the lower demand for financing for investment projects would mean a decrease in

interest income, and the credit risk may also increase in the event of possible effects on the repayment capacity of the borrowers.

Graph 27

Gross Fixed Investment and Private Consumption ^{1/}
Index (2013=100)



Data as of September 2022

Source: INEGI

1/ Seasonally adjusted figures

II.4.4. Additional adjustments in credit ratings for the sovereign and Pemex debt

Since the publication of the last *Report*, most agencies have confirmed ratings for both sovereign debt and Pemex debt, however, one of the major credit rating agencies downgraded (in July) the corresponding credit ratings (Graph 28). Following this adjustment, all agencies assign a stable outlook to the credit ratings of both issuers, although given the persistence of certain risks, as indicated above, the possibility of additional downgrades is not ruled out.

As for the sovereign, the agencies highlight the risks deriving from an unfavorable investment outlook, whose performance would be limited by losses in confidence levels on the part of investors (derived, for example, from setbacks in the dialogue between the USMCA partners), which in turn would restrict economic activity and, therefore, public debt. They also point out that fiscal room for maneuver is limited and further deteriorations could be observed, both due to structural factors (such as pension expenditure) and cyclical factors (reduced ability to handle shocks in a situation of low financial reserves),

as well as due to policy decisions (for example, more extraordinary support for Pemex and CFE).

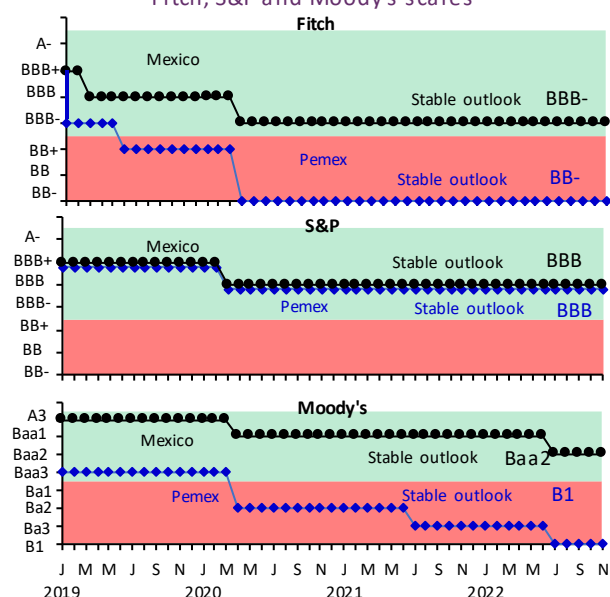
As for Pemex, it should be noted that, according to the rating agencies, its medium-term financial viability continues to face fundamental challenges associated with its business model and its level of debt. The latter, in addition to facing significant maturities in the coming years, has limited refinancing options in view of its high credit risk, since its rating maintains the investment grade t by only one of the main agencies. Moreover, according to the agency, the perception that Pemex remains highly dependent on federal government support continues to represent a risk factor for the assessment of its debt.

In the event of rating downgrades for these entities, increases in the associated risk premiums would be observed. By virtue of the market benchmark provided by the bonds of these issuers, generalized adjustments in such risk premiums would also affect the cost of financing of domestic households and companies, including financial institutions. Thus, the materialization of scenarios of this type would represent a deterioration of the macro-financial risk profile of the national economy.

Graph 28

Mexico and Pemex's foreign currency credit rating performance ^{1/}

Fitch, S&P and Moody's scales



Data as of November 2022

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.

III. Update of challenges facing the economy

Nearshoring: risk profile and access to credit in sectors most prone to relocation

The disruptions in supply chains that generated COVID-19 and the conflict between Russia and Ukraine, as well as the increase in tariffs resulting from the trade war between China and the US have opened the possibility of a reconfiguration of global value chains. Thus, nearshoring, the practice through which companies move part of their production processes to closer countries to reduce transport and production costs, has begun to be part of the debate between academics and public policy makers.

The possibility of nearshoring is important for Mexico, a country that, due to its geographical position, could benefit greatly.

Access to finance is essential for companies that perform nearshoring, as well as the countries that receive them, to benefit. In general, credit provides liquidity to companies that need financial resources and working capital to invest. As far as nearshoring is concerned, this need for funding may be even greater. This is because the investments needed to relocate production can be significant and because companies related to international trade often need more liquidity, as there are major delays in this trade between the production of goods and services and the receipt of export earnings (see Box 3).¹

¹ See in this vein the works of Amiti and Weinstein (2011) and D'Amato, Sangiácomo and Tobal (2020).

Box 3: Credit risk and access to finance in the sectors most prone to nearshoring

I. Introduction

This box describes the credit risk profile and credit accessibility in the sectors most prone to international relocation. Given the specific characteristics of the production and supply chains in these sectors, they are seen as the ones where it might be more profitable for firms to move their production to nearby countries where they can take advantage of geographical advantages, that is, there could be more nearshoring.

Since the global financial crisis, various events have generated a tendency to reverse the trend towards globalization that had accelerated in previous decades in the field of international trade.¹ The trade disputes between the United States and China, COVID-19, and the war between Russia and Ukraine have increased costs for international trade and highlighted the risks of relying on input suppliers located in remote regions from importing countries. Thus, the possibility has been raised for companies to move part of their production to geographically closer countries.²

Due to its geographical proximity to the United States and the prevalence of its multiple trade agreements, Mexico is in a privileged position to take advantage of the opportunities of this new global environment. Various analysts and international organizations have argued that nearshoring would bring new companies to Mexico and this relocation would generate benefits for the country.³

In this context, the south-southeast of Mexico stands out for several reasons. The Federal Government announced that in conjunction with the Inter-American Development Bank (IDB) will implement a financing package through development banks to promote the relocation of companies to that region.⁴

If the right conditions are given for the relocation of firms, nearshoring could trigger economic growth in the south-southeast region of Mexico.⁵ This opportunity could generate significant benefits because: (i) the South-Southeast would have a geographic advantage to supply goods to the East Coast of the United States by sea, such as the ports of Progreso and Coatzacoalcas; and (ii) within the United States, Mexican products are less represented precisely on the East Coast. Considering the above, the analysis of this Box emphasizes the south-southeast region of Mexico.

II. Sectors most prone to fragmentation and international relocation

Based on working documents of the World Trade Organization (WTO), the following characteristics of the sectors and their production processes are identified as factors that facilitate fragmentation and international relocation:⁶

1. Degree of complexity of tasks: when the production of a good requires the performance of specific tasks that take time to be taught, training is required for the personnel of the new country of destination, which can take time to have the same level of competence that existed in the country of origin. Therefore, production processes that require complex tasks are often more difficult to move.
2. Cooperation and coordination with suppliers: When the production of a good requires a lot of cooperation and coordination, the communication and trust between a company and its suppliers are critical.⁷ The communication can be difficult if the company and its suppliers are in different countries, which in turn makes it difficult to fragment production processes if they require coordination. In addition, building trust with suppliers in a new destination country is expensive, so production processes with these characteristics are also difficult to relocate.
3. Degree of product differentiation: The production of a differentiated good requires specific machinery and personnel with a higher level of education, which are expensive to obtain and are not available at every region. Therefore, the less differentiated goods are easier to move to other locations.

These three characteristics of sectors and their production processes are used to identify sectors where firms might have the easiest time fragmenting their production and relocating into another country. To measure the first of these characteristics, the degree of complexity of the tasks, the Costinot index (2009) is used. This index collects information on the number of months it takes for a worker with the right experience and education to be

¹ For a summary of how these events have led to an anti-globalization movement, see Esquivel's document (2022, April 5).

² For a historical analysis of Mexico's insertion in Global Value Chains (GVCs) see Chiquiar and Tobal (2019).

³ In the framework of the IX Summit of the Americas, the Inter-American Development Bank (IDB) mentioned that the nearshoring could generate a profit of seventy-eight billion dollars for Latin America and the Caribbean. For Mexico, this gain was estimated at \$35 billion dollars. <https://www.iadb.org/es/noticias/nearshoring-agregaria-us78000-millones-en-exportaciones-de-america-latina-y-caribe>

⁴ View press releases from the SHCP (2022, July 6) and the IDB (2022, July 6).

⁵ For a review of the opinions and Positions in this regard consult Abugaber, J. (August 10, 2022), Stein, E. (August 18, 2022), and De la Calle, L. (November 18, 2020).

⁶ See Bacchetta, M., BekkersAnd. Piermartini, R., RubinovaS. Stolzenburg, V., and Xu, A. (2021).

⁷ There is an extensive literature in economics and marketing on such productive relationships, often referred to as specific investment relationships (see, for example, Crawford, V. P. (1990)).

fully trained to perform tasks in a sector. To measure the second characteristic, cooperation and coordination needs, the Nunn index (2007) is used. This index reports on the intensity with which a sector uses contracts to interact with its suppliers. The sectors with more cooperation and coordination use more contracts because they need to stipulate specifically the supplier's responsibilities. Finally, for the third characteristic, the Rauch index (1999) is used, which measures the differentiation of a product depending on whether or not it is exchanged in an organized market and whether or not it has a reference price.

Subsequently, the information from these three indices is aggregated with the principal components method which creates a new aggregated index that measures the ease with which a sector could be fragmented and relocated internationally. According to this index, among the sectors easiest to fragment and relocate there are several basic industries linked to metals, such as iron and steel or aluminum; basic industries linked to textiles, such as the repair and spinning of textile fibres, and manufacture of yarns; and basic industries linked to construction, such as the manufacture of cement and concrete products and the related sector of lime balrication, gypsum and gypsum products. The production process of these sectors requires little coordination with suppliers, its realization involves simple tasks, and it is about products with little differentiation.

Among the sectors that are less likely to be fragmented and relocated are some of those that also use metals, but in more sophisticated production processes, such as the manufacture of forged metal products and stamping, the manufacture of metal structures and blacksmithing products, hardware and locks and metal coatings and finishes; some more sophisticated related industries to textiles such as the manufacture of other products of leather, fur and substitute materials, knitted garments or footwear; and industries related to furniture manufacturing, where there is more room for differentiation. Among the sectors least prone to fragmentation and relocation are the manufactures of railway and aerospace equipment, which requires overly complex tasks and coordination with suppliers.

III. Analysis of the loan portfolio to companies in the country

This section describes the credit risk profile and access to finance in the sectors most easily for international relocation. The analysis is conducted with information on firm credit of commercial banks and development banks, from the National Banking and Securities Commission (CNBV) and processed by the Banco de México.⁸ The indicator in the previous section is used

to identify the sectors most prone to fragmentation and international relocation. Development bank credit is considered to be credit granted by those type of banks either directly or through commercial banks, as well as firm loans backed by guarantees from these development institutions. Private bank credit is considered to be the credit granted by this bank without any intervention by development banks.

The results indicate that, in the sectors with a greater propensity to relocate, fewer companies obtain credit from private banks in south-southeast Mexico (Table Table 1). Part of this could be because the companies in those sectors located in the South-Southeast are associated with greater credit risk. In particular, they are more likely to default based upon the regulatory probability of default which increases the amount of reserves banks hold for a given loan amount.⁹ However, it is also observed that development banking is more present in this region (Table 1).¹⁰

This development bank credit is channeled to companies with a lower probability of regulatory default and delinquency (Table 2).^{11 12} Likewise, the average loan amount granted or facilitated by development banks is higher than the loan amount granted by private banks (Table 2). This evidence might indicate that credit from development banks can be relevant for the access to financing of certain borrowers in sectors prone to *nearhsoring*, in the south-southeast of Mexico.

The same conclusion is obtained when the analysis is restricted, within the sectors most prone to nearshoring, only to those in which Mexico is better at exporting, and relocation to this country could be more profitable (sectors with a higher index of revealed comparative advantage).¹³

Table 1
Characteristics of the loan portfolio to companies with more ease to be relocated, by region^{1/}

	Region	
	Rest of the country	South-southeast
Share of firms with bank credit (%)	12.8	9.7
Size (number of employees)	63.0	36.0
Regulatory probability of default (%)	7.1	8.2
Delinquency rate (%)	3.5	3.4
Share of development banks (%)	18.1	27.8

⁸ From the database of credit to companies, manufacturing sectors are considered. In the NAICS classification, the sectors correspond to two digits that include sectors 31, 32 and 33. The name of these sectors is manufacturing industries. The 1% of companies with the highest amount of credit were removed from the sample, thus avoiding that the results are sensitive to credits with extreme values.

⁹ The companies in the sectors most prone to nearshoring are also smaller in the south-southeast although they have a very slightly lower delinquency.

¹⁰ Of the credit granted by development banks to the sectors with the easiest relocation in the south, only 6.6% is granted directly by development banks. 26.82% only with guarantee from development banks. 66.59% is granted on the second floor with some amount of the credit received granted by the development bank.

¹¹ Companies with loans with development banks also have lower rates of delinquency but they are slightly larger.

¹² When the same calculations are made for the north central region (Aguascalientes, Baja California Sur, Colima, Durango, Jalisco, Michoacán, Nayarit, San Luis Potosí, Sinaloa, and Zacatecas) and north (Baja California, Chihuahua, Coahuila, Nuevo León, Sonora and Tamaulipas) of the country, common patterns are observed. Among the sectors most prone to nearshoring in this region, development banks also lend to companies with a lower probability of regulatory default, at a higher loan amount than private banks and with similar delinquency rates.

¹³ To determine whether an industry has an export comparative advantage, the revealed comparative advantage index (VCR) is used. This index is defined as the ratio of the share of the corresponding industry within Mexico's total exports to the share of the same industry within total world exports. The analysis classifies those industries in which the VCR is higher as industries in which Mexico has a comparative advantage.

Figures as of June 2022

Source: Own elaboration with information from Banco de México, CNBV and INEGI 1/ The sectors identified as most prone to nearshoring correspond to the third of the distribution of sectors for which the aggregate principal component index indicates less difficulty of relocation. The south-southeast region includes the states of Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz and Yucatan. Bank credit includes the portfolio granted by commercial banks and development banks. The credit portfolio of development banks includes credit granted by these institutions, either directly or through commercial banks, as well as resources backed by guarantees from these development institutions. The proportion of firms with bank credit is obtained from the information of the 2019 economic census considering the number of companies in each subsector and state that declared receiving some type of financing from commercial banks.

Table 2
Characteristics of the loan portfolio to companies with more ease to be relocated in the south-southeast region, by type of banking and capacity (comparative advantage) of export ^{1/}

	Sectors with more ease to be relocated			
	All		With greater export capacity (comparative advantage)	
	Development Banks	Commercial Banks	Development Banks	Commercial Banks
Size (number of employees)	35.1	38.8	34.6	42.4
Regulatory probability of default (%)	6.1	8.6	5.5	7.5
Delinquency rate (%)	1.3	4.2	1.6	3.9
Credit balance per company (average, mdp)	9.3	7.1	9.3	7.8

Figures as of June 2022

Source: Own elaboration with information from Banco de México, CNBV and INEGI 1/ The sectors identified as most prone to nearshoring correspond to the third of the distribution of sectors for which the aggregate principal component index indicates less difficulty of relocation. The south-southeast region includes the states of Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz and Yucatan. Bank credit includes the portfolio granted by commercial banks and development banks. The credit portfolio of development banks includes credit granted by these institutions, either directly or through commercial banks, as well as resources backed by guarantees from these development institutions. The proportion of companies with bank credit is obtained from the information of the 2019 economic census considering the number of companies in each subsector and state that declared receiving some type of financing from commercial banks. To determine whether an industry has an export comparative advantage, the revealed comparative advantage index (VCR) is used.

IV. Final considerations

The results suggest that, in sectors that are easier to be internationally relocated (and more prone to nearshoring), companies financed by multiple banks have more credit risk in south-southeast Mexico. However, these companies may also be more subject to more credit restrictions. Moreover, development

banks have more participation in that region of the country. The credit that those banks grant or facilitate is aimed at less risky companies. Therefore, with regard to financing, the results suggest that there is room to increase financing in nearshoring prone sectors in south-southeast Mexico.

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Financial sector assessment program (FSAP)

In the period covered by this Report, the International Monetary Fund and the World Bank completed their evaluation to Mexico in the context of the Financial Sector Assessment Program (FSAP).² In the concluding report,³ the organizations recognized the resilience of the Mexican financial system and that the regulatory framework - both micro and macro-prudential - has been strengthened in recent years, which is a sign of the commitment of the authorities to promote financial stability and implement international best practices.

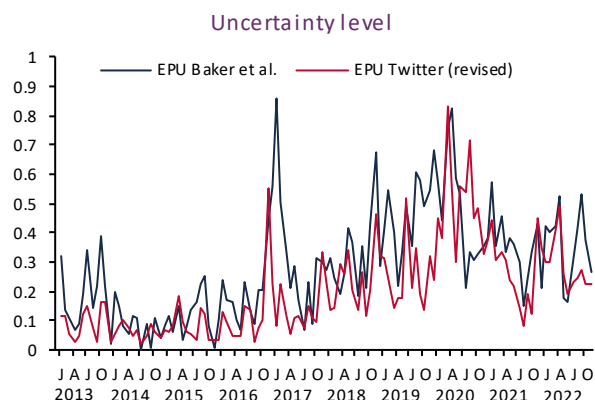
The evaluation found that the financial system as a whole has maintained its strength, even during the COVID-19 pandemic, partly due to the response and policy measures implemented by the authorities. Additionally, the report noted that over several years Mexican banks have maintained ample capital and liquidity reserves. The evaluation also identified space for improvements, mainly with respect to emerging risks from climate change, cybersecurity, and the digitalization of financial services (See Box 4).

Evolution of uncertainty

At the end of the second quarter of 2022, the levels of uncertainty associated with economic policy showed a decrease with respect to the first quarter and are at relatively low levels compared to those observed in the last 3 years, according to the timely index of economic policy uncertainty, elaborated with Twitter information. This index decreased by 54 % between March and June 2022, although during the third quarter it showed an upward trend, positioning itself during the fourth quarter at a level similar to that of May 2022 (Graph 29).

Graph 29

Economic Policy Uncertainty Index ^{1/}



Data as of November 2022

Source: Banco de México

1/ The methodology proposed by Baker et al., 2016, was considered to calculate the Economic Policy Uncertainty index based on tweets. In particular, the aggregated number of tweets including terms related to uncertainty, and policy or economy, is calculated. The series obtained is divided by the total number of tweets in each period and then is rescaled between 0 and 1, based on the January 2008 to November 2022 period. The Twitter accounts used are: @eleconomista, @El_Universal_Mx, @remanegocios, @Milenio, @Reforma, @ElFinanciero_Mx, @lajornadaonline, @elsolde_mexico, @Reporte_Indigo, @LaRazon_mx, @Excelsior, @diario24horas, @sdnnoticias, @LaCronicaDeHoy, @CapitalMexico, @Forbes_Mexico, @elheraldo_mx, and @EFEMexico.

The main topics that have contributed to the level of the index during this period are the conflict between Russia and Ukraine, the persistence of inflation and the interest rates hikes by different central banks, the possibility of a recession in the United States, as well as the uncertainty generated around the energy consultations requested by the United States and Canada in the framework of the USMCA.

² The Financial Sector Assessment Program (FSAP) is a joint program of the International Monetary Fund (IMF) and the World Bank. Established in 1999, the program seeks to support countries in reducing the likelihood of occurrence and severity of a financial sector crisis.

³ The Financial System Stability Assessment (FSSA) is available in the following link.

Box 4: Financial Sector Assessment (FSAP) to Mexico 2022

I. Introduction

The International Monetary Fund (IMF) and the World Bank (WB) jointly carry out the Financial Sector Assessment Program (FSAP), which seeks to support member countries in reducing the likelihood and severity of a financial crisis. Since its implementation began in 1999, more than 157 jurisdictions have been evaluated, some of them in more than one occasion. The IMF and WB participate, as advisors, in a process of discussion and feedback with the financial authorities of the assessed jurisdictions, followed by a report with the results and recommendations of the evaluation.

The FSAP assessment framework focuses on three aspects: (i) the soundness of the financial system in the face of vulnerabilities and risks that could increase the likelihood or severity of a financial sector crisis¹; (ii) a country's development needs in institutional, market or infrastructure terms; and (iii) a country's degree of compliance with internationally established financial sector standards and codes.

The Mexican financial system is considered by the IMF as Systemically Important², so it requires that the evaluations of the FSAP to be carried out on a mandatory basis every 5 years as part of the surveillance agreements of Article IV³. Mexico has been assessed four times since the beginning of the FSAP program, being the most recent this year.⁴ This Box presents the main findings of this evaluation.⁵

II. Main findings of Mexico's FSAP in 2022

The evaluation concluded that Mexico has a robust financial system. Banks have maintained high capital and liquidity levels for several years, even through the COVID-19 pandemic, during which these levels actually increased, in part due to the response and policy measures implemented by national and international authorities.⁶ The assessment also highlighted the flexibility and crisis response capacity of Banco de México to provide liquidity to the financial system during the pandemic.

The assessment highlighted the resilience of the financial system to severe shocks. Under the different stress tests designed by the FSAP, the banking system would maintain adequate solvency levels against hypothetical shocks over a 3-year horizon absorbing credit losses, market losses, corporate sector impacts, contagion, and even stress from emerging risks such as climate change, cybersecurity and the digitalization of financial services.

Regarding the assessed liquidity stress scenarios, the banking sector would maintain adequate liquidity, and would be in a position to support the liquidity needs of other non-banking financial institutions. This was tested with a novel system-wide liquidity approach that considers the financial system as a whole and its interconnections.

The evaluation also recognized that the Mexican regulatory framework has been strengthened in recent years. Among the outstanding advances are the implementation of the Basel standards developed in response to the Great Financial Crisis (GFC); improvements in supervisory techniques and methodologies; greater cybersecurity capacity; and that all commercial banks have recovery and resolution plans.

Regarding the challenges identified by the FSAP, the assessment highlighted that the financial system would face the first sustained tightening of global financial conditions since the GFC, combined with an environment of low growth and high inflation. A disorderly tightening of financial conditions could impact economic activity or lead to episodes of liquidity stress in the financial system. Mexican markets are integrated into global financial markets, therefore, stress episodes resulting from a disorderly adjustment of global liquidity conditions cannot be ruled out as these episodes could impact the national financial system.

In addition, the evaluation identified some challenges for the Mexican financial system. In particular, a low level of financial inclusion and a low level of financing to the real economy compared to peer jurisdictions. Despite the strength of the system as a whole, it was recommended to monitor the contingent credit lines granted by commercial banks, as well as the concentration of funding sources in some sectors. Regarding emerging global risks, which are also relevant to Mexico, the evaluation identified space for improvements to manage the financial risks arising from climate change, cybersecurity and the digitalization of financial services.

III. Recommendations made during the evaluation

Based on the findings and considering the risk environment, the advisory team of the FSAP, made specific recommendations for the Mexican financial system (Graph 1). The recommendations are aimed at improving the monitoring and crisis management framework; mitigating identified vulnerabilities; and addressing challenges posed by emerging risks. It should be noted that the Mexican authorities maintain discretion to implement the

¹The FSAP assessment does not consider in its assessment of the financial system the exposure to operational, legal or fraud risks.

²The IMF assesses financial systems based on criteria that combine risk measures (size and interconnection) and risk tolerance (interconnection thresholds). The IMF currently considers 32 financial systems, including Mexico, as Systemically Important Financial Sectors (SIFI), which require FSAP evaluations every five years.

³Article IV consultations refer to the IMF monitoring and consultation process carried out in compliance with Article IV of the agreements signed by countries

when joining the IMF, agreeing to submit economic and financial policies to the scrutiny of the international community.

⁴The FSAP review team met with members of SHCP, Banxico, CNBV, CNSF, IPAB, as well as representatives of private industry and market participants.

⁵ The *Financial System Stability Assessment (FSSA)* is available at: <https://www.imf.org/en/Publications/CR/Issues/2022/11/04/Mexico-Financial-Sector-Assessment-Program-Financial-System-Stability-Assessment-525439>

⁶See Financial Stability Report for June 2020, December 2020, June 2021 and December 2021.

recommendations, reflecting the possibility of technical disagreements after assessing, among others, the relevance of the recommendations in the national context.

Graph 1

FSAP recommendations to Mexico 2022 by suggested timeframe for implementation



Data from Mexico's FSAP 2022

Source: FSSA of IMF

1/ AML/ CFT: Anti-Money- Laundering and Cutting Financing to Terrorism

2/ FSN: Financial Safety Net

The recommendations of the FSAP are aimed to accomplish:

- improvements to the operational effectiveness and adequacy of resources of the regulatory agencies;
- improvements to ensure greater legal protection for supervisors;
- amendments to ensure an effective consolidated supervision;
- improvements for risk-based supervision;
- reduce the prevailing deficiencies in recovery plans;
- identify and reduce potential impediments to the resolution of institutions;
- consider modifications to the emergency liquidity assistance framework;
- continue efforts to improve the effectiveness of the AML/CFT framework;
- continue to monitor the dynamics of contingent credit lines and concentration;
- continue to improve liquidity stress testing;

- further strengthen the supervision of the SPEI; and
- discuss the macro-prudential strategy in the CESF.

IV. Conclusions

The findings of the FSAP carried out by the IMF and the WB confirm that the Mexican financial system is strong, as a result of the advances in the implementation of micro and macroprudential regulation, which is, in turn, testimony of the commitment of the Mexican financial authorities to continue strengthening the regulatory framework and continue implementing international best practices.

In this context, the Mexican financial authorities consider that the evaluation of the FSAP was positive, in particular regarding the resilience and the regulatory frameworks. The assessment provides an additional perspective to national risk analyses and discussions on the developments in the financial sector.

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

During the period covered by this *Report*, the financial authorities continued to work on the ongoing improvement of the regulatory framework and the adoption of international standards and best practices, in order to maintain a robust and updated regulatory framework. In this context, the financial authorities made regulatory modifications regarding credit and market risks, financial safety net; as well as, fixed income markets and repurchase agreements.

Regulation under the supervision of CNBV

Regarding credit risk, the CNBV modified the calculation of the capital requirements for exposures that commercial banks maintain with clearing houses or central counterparties, both for the operations that they clear and settle as well as for the contributions made to common clearing funds.⁴ The amendments incorporate international best practices in this field, which consider, among others, the quality of the contributed capital to the fund and the loss allocation mechanism in case that one or more of its clearing members default. The amendment entered into force in June 2022.

Also, with respect to credit risk, the CNBV incorporated into the regulatory framework for securitization schemes the new External Ratings-based Approach (*ERBA*), standard method, in order to adequately reflect the credit risk of these exposures.⁵ The implementation of this approach incentivizes credit institutions to continue to develop this type of market and to recognize the performance of the underlying assets and the structural characteristics of the securitization scheme, contributing to maintain a capital framework aligned with international

prudential standards in this area. The aforementioned amendment became effective in June 2022.

Regarding market risk, the CNBV adjusted the requirements for using internal models in determining deposit stability, used for calculating the capital requirements to cover this risk.⁶ The modifications include, among others, analyzing movements in the market interest rate (28-days Cetes), the interest rate spreads, or other indicators of economic activity reflecting structural changes, considering a minimum period of 48 months and a confidence level of at least 95 %, as well as conducting backtesting analysis.

With regard to the strengthening of the financial safety net, beginning in 2023, commercial banks must incorporate in their recovery plans the amendments to Annex 69 of the General Provisions Applicable to Credit Institutions - Single Banking *Circular* (CUB, *its acronym* in Spanish).⁷ These amendments are aimed to enhance the credibility and feasibility of the recovery actions established in the plans by providing greater detail and granularity on the minimum requirements to be included in the recovery plans. The continuous improvement of the recovery plans helps to mitigate the risk of disruptions to the banking system, as it provides clearer and more precise information on how plans should be implemented in case of an adverse shock triggering its activation.

Regulation under the supervision of Banco de México

Likewise, to promote the development of the fixed income market, Banco de México modified the "Rules for the exchange of government securities made by

⁴ [RESOLUTION amending the general provisions applicable to credit institutions](#), published in the Official Gazette of the Federation on 22 June 2022.

⁵ [RESOLUTION amending the general provisions applicable to credit institutions](#), published in the Official Gazette of the Federation on 22 June 2022.

⁶ [RESOLUTION amending the general provisions applicable to credit institutions](#), published in the Official Gazette of the Federation on 13 May 2022.

⁷ [RESOLUTION amending the general provisions applicable to credit institutions](#), published in the Official Gazette of the Federation on 2 September 2022.

Banco de México⁸ to include any debt instruments issued by the Federal Government. This includes those with floating rate, as well as government securities aligned with the environmental, social and corporate governance (ESG) criteria in accordance with *Circular 7/2022*.⁹

In addition, the set of eligible securities for repurchase agreements, fiduciary stock certificates issued by the National Infrastructure Fund (FONADIN, *its acronym* in Spanish), as well as any other series of Fiduciary Stock Certificates that are issued by the aforementioned Trust,¹⁰ were incorporated. The foregoing provides clarity on the use of this type of instruments for repurchase transactions and promotes the development of this market.

Banco de México will continue to closely follow the evolution of the conditions in the Mexican financial markets and the proper functioning of the financial system. If necessary, the central bank, in coordination with other financial authorities, will continue taking timely actions, within its responsibility and in strict compliance with the legal framework.

⁸ [Circular 12/2022](#) of the Banco de México, published on October 7, 2022 and amending Circular 8/2014.

⁹ [Circular 7/2022](#) of the Banco de México, published on April 12, 2022.

¹⁰ [Circular 14/2022](#) of the Banco de México, published on November 8, 2022.

Box 5: Implications of tightening financial conditions on financial stability

I. Introduction

In recent months, the global economic environment has become more complex due to persistently high inflation levels and heightened uncertainty about economic growth associated with the cumulative effects of the pandemic shocks and the geopolitical conflict between Ukraine and Russia. In response to inflationary pressures, most central banks have started adjusting their monetary policy towards more restrictive positions in order to maintain price stability.

In this context, the IMF and the FSB have noted an increased risk to global financial stability stemming from the tightening of financial conditions in an environment of uncertainty about the performance of economic activity. This could increase pre-existing financial vulnerabilities or lead to the emergence of new ones. This Box briefly describes the interactions between monetary, fiscal and macroprudential policies, as well as the implications that such interaction may have for financial stability given the tightening of financial conditions.

II. Interactions among policies and implications of tightening financial conditions on financial stability

Monetary policy seeks to provide an environment of price stability that is favorable for the development of productive activities.¹ The conduct of monetary policy affects the conditions under which the liquidity needs are satisfied in the economy, affecting the aggregate supply and demand through transmission channels that influence the price formation process: i) Interest Rate Channel; ii) Credit Channel; iii) Asset Assets' Price Channel; iv) Exchange Rate Channel, and v) Expectations Channel.²

On the other hand, financial authorities, and sometimes monetary authorities themselves, have financial stability objectives, which are pursued through the implementation of macroprudential policy. This policy seeks to prevent the accumulation of vulnerabilities that could amplify or cause negative shocks in the economy.³

In addition, the fiscal policy is used to determine government's revenue, spending and indebtedness, with the primary objective of achieving a sustained economic growth and could also economic and may have secondary objectives such as maintaining low levels of unemployment or improving income redistribution.⁴

In the long term, the objectives of these three policies are usually aligned, their implementation is complementary and there exist

synergies among them that can contribute to economic growth.⁵ The tools available to the authorities to implement each of these policies could sometimes be deployed to align countercyclical objectives.⁶

For example, during the COVID-19 pandemic crisis, financial authorities in different jurisdictions implemented unprecedented monetary, macroprudential and fiscal policy measures, which complemented each other to mitigate the adverse effects of the pandemic on economic activity and the financial system, in a macroeconomic environment characterized by low inflation, low growth expectations and an extended period of low interest rates.⁷ Monetary policy maintained an expansionary approach, setting its short-term target reference interest rates at historically low levels, and in some advanced economies even close to zero. Similarly, the macroprudential policy stance, focused on the provision of liquidity to markets in order to foster its proper functioning and maintain credit intermediation. Likewise, the macroprudential authorities implemented countercyclical policies and regulatory facilities to avoid an amplification of the shock as a result of the credit and liquidity contraction. In line with these measures, most economies maintained an expansionary fiscal policy, which in some cases, was explicitly coordinated with monetary policy.⁸

However, under certain circumstances, in the short term there may be some conflicts between the objectives of price stability, financial stability, and economic growth.⁹ The potential conflict between different policies can occur on an intertemporal basis, where the effects of a policy, or the absence or delay of its implementation, can negatively affect the future challenges and effects of other policies. During these episodes, the implementation of monetary policy measures, such as interest rate adjustment and the liquidity management in the markets, may have implications for financial stability which, along with macro-financial conditions, may affect the build-up of systemic risk.¹⁰ Similarly, postponing monetary policy adjustments, or implementing smaller adjustments than required, may cause greater negative implications to inflation persistence, economic growth and financial stability.

In the current context, the tightening of financial conditions and the heightened risk of a disorderly tightening could have implications for financial stability, thus; therefore, three areas should be monitored: (i) the macroeconomic environment, so that it does not lead to financial imbalances or leverage in the real sector; (ii) financial institutions, so they maintain a robust and

¹ Banxico (2018)

² Banxico (2016)

³ Banxico (2019)

⁴ Auerbach (2019)

⁵ For example, monetary policy has the advantages as its implementation is faster and massive throughout the markets. While fiscal policy might require longer time processes, but; nonetheless, it has the advantage that its implementation could be targeted to support specific sectors.

⁶ Price and financial stability are necessary, but not sufficient, conditions for fiscal policy to be effective and ultimately to achieve a sustained economic growth. Hodula & Pfeifer (2018)

⁷ FSB (2021).

⁸ English, B. et al., (2021).

⁹ Moenjak (2014)

¹⁰ Martin, A., Mendicino C., Van der Gote, A., (2021)

stable financial position; and (iii) financial markets to ensure they operate in an orderly manner.¹¹

Regarding the macroeconomic environment, an extended period in the tightening cycle could affect economic agent's capacity to renew financing, which depends, among other factors, on their previous indebtedness and leverage level. The government is not exempt from facing tighter financial conditions, pressuring public debt service and, forcing it to maintain sustainable fiscal spending paths.

The IMF warned that the tightening of financial conditions has been particularly severe for the more vulnerable economies, in a context where there are six countries that have defaulted its sovereign debt service and twelve jurisdictions whose debt has registered risk premiums above 1,000 basis points.¹²

An interaction between the various policies was observed in 2010, during the sovereign debt crisis in the European region, when Greece maintained a high level of indebtedness. At the same time, there was a strong relationship between the increase in sovereign risk and the solvency position of the banks located in that jurisdiction, due to their pre-existing position in government bond holdings, which amounted up to 25 % of its GDP.¹³ Fiscal (expenditure consolidation) and macroprudential (increase in the minimum requirement of CAR) measures, consistent with a restrictive stance, negatively impacted the growth perspective for the economy, deteriorating further the banking sector's credit risk.¹⁴ In addition, The European Central Bank (ECB) maintained its short-term interest rate target unchanged and decided to provide liquidity to the European banking system through temporary measures.

With respect to financial institutions, the tightening of financing conditions could ultimately impact their intermediation function. The tighter financial conditions can negatively impact their debt service or their capacity to renew their liabilities, especially, for those financial institutions that maintain a highly leveraged position. In this context, an extended period of tightening of financial conditions could lead to asset-liability imbalances, liquidity problems and reduce credit supply.

For instance, the impact of the combination of pre-existing vulnerabilities and the onset of more tightening financial conditions is illustrated by the significant growth of credit lines provided by financial institutions in the United States during the period of low interest rates, and its relative stickiness observed during the upward cycle.¹⁵ Ultimately, financial institutions could face liquidity problems in meeting these obligations.

Regarding financial markets, the tightening financial conditions can change valuations and lead to sudden price adjustments. The

change in valuations of certain assets, under an increased uncertainty, can generate cycles of volatility in the public and private debt securities market and cause unusual high margin calls. Particularly, the increase in, volatility and a sudden tightening of financial conditions could be amplified when interacting with and amplify pre-existing financial vulnerabilities, contractual rigidities and also those vulnerabilities that have emerged since the pandemic.

Financial institutions and economic agents have not experienced sharp and prolonged interest rate hikes for a long time, and may be used to operating and managing risks in an environment of ample liquidity. Likewise, the previous period of abundant available liquidity may have given rise to the build-up of risks, due to the financing of riskier projects in the *search for yield*.¹⁶ Investors' behavior can exacerbate liquidity conditions by abruptly adjusting their portfolios. In the current environment, the IMF reported a drop in equity and bond prices due to a lack of appetite from investors, which has led to a low return on risky assets. This phenomenon can also be observed through the market liquidity index and the bid-ask spread for the US government bonds, which widened during 2022, reflecting lower liquidity in this market.¹⁷

Another interaction that illustrates the challenges faced regarding policy coordination, took place recently in the United Kingdom. The recent tightening of financial conditions, coupled with the fiscal policy actions announced at the end of September 2022, led to high volatility in government debt markets. The Bank of England (BoE) began the normalization of its monetary policy by increasing the interest rate target and sale of government bonds. On the other hand, in view of the economic stagnation and adverse outlook, the UK government announced a "Growth Plan" that considered cutting taxes to boost economic growth. However, markets reacted adversely, due to the incompatibility between expansionary fiscal policy and restrictive monetary policy, resulting, among other things, in a 40 percent drop in the price of 10-year government bonds within a few days. As a result, the vulnerability of pension funds became evident due to the rigidity of their corporate governance and their liability-driven investment strategy (LDI). The change in the valuation of these bonds increased the leverage level of the funds, a situation that was aggravated by the increase in margin calls and an imbalance between their assets and liabilities, which in turn impacted the solvency of some funds.¹⁸ Attempting to meet liquidity needs by selling long-term bonds exacerbated the situation by further deteriorating the price of these assets. This produced contagion effects in other repo and exchange markets, as well as panic sales that contributed to this spiral. In this context, the BoE announced a long-term purchase strategy of government bonds.¹⁹ Although

¹¹Moenjak, T. (2014)

¹²The IMF identifies six jurisdictions that have defaulted on debt service for various reasons: Belarus, Lebanon, Sri Lanka, Suriname, Russia, and Zambia. Likewise, twelve jurisdictions whose debt has operated with risk premiums above 1,000 basis points in 2022, correspond to: Bahamas, Cameroon, Ghana, El Salvador, Ecuador, Egypt, Ethiopia, Kenya, Pakistan, Tajikistan, Tunisia, and Ukraine. In the case of Ukraine, counterparties agreed to freeze sovereign debt service for 2 years.

¹³Thomsen, T. (2019)

¹⁴Shambaugh, J., Reis, R. and Rey, H. (2012)

¹⁵Acharya, V. Chauhan, R., Rajan, R., & Steffen, S. (2022)

¹⁶In addition, the tightening of financial conditions could reveal other vulnerabilities, which could generate second-order effects such as contagion, bank runs and cross-border effects such as capital flight. An example is the widely documented effect in the literature known as *flight-to-quality*, which refers to the recomposition of portfolios towards assets considered riskless risky (Fernández Amador et al (2013), Lee, J., Ryu, Ay Kutan, A. (2016), Goyenko, R. and Ukhov, A. (2009).

¹⁷Federal Reserve System (2022)

¹⁸Hauser, A. (2022) and BoE (2022b).

¹⁹Bank of England (BoE) press release on September 28th, 2022.

this strategy proved to be successful, its implementation might have been interpreted as a contradiction to the initial objective posed by the BoE, consisting in a more restrictive monetary policy.

III. Conclusions

Central banks have a twofold challenge in pursuing price stability and being in charge of providing liquidity for maintaining the orderly functioning of the markets. Although in the long term both objectives are complementary and have synergies, in the short-term, challenges may arise that hinder the harmonious implementation of these policies. Authorities' policy decision-making occurs in an environment of uncertainty, considering multiple factors and without the possibility of knowing the scenario that would prevail if a given (counterfactual) policy was not implemented. That is why the tightening of financial conditions around the world, including Mexico, represents a major challenge for financial authorities in terms of achieving their objectives of simultaneously maintaining price and financial stability. Banco de México will continue to follow closely the proper functioning of the financial system and the evolution of operating conditions in the financial market. If necessary, it will take all actions within its responsibility, in strict compliance with the legal framework and in coordination with other financial authorities.

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V. Risks of the financial system

V.1. Aggregate risk Indicators

Since the last *Report* until September 2022, in line with the overall macro-financial performance and risks described in the previous sections, the Financial Market Stress Index (*IFMF*, its acronym in Spanish) increased. This was partly due to the uncertainty in the financial markets associated with the persistence of inflation in advanced economies and consequently due to the expectation of higher interest rate increases for longer periods, as well as a greater probability of global recession and an escalation of geopolitical risks (Graph 30). These factors could have an impact on market volatility resulting in an increase of the index. However, the *IFMF* has decreased since October, mainly due to a lower volatility observed in the variables associated with country risk and the foreign exchange market.

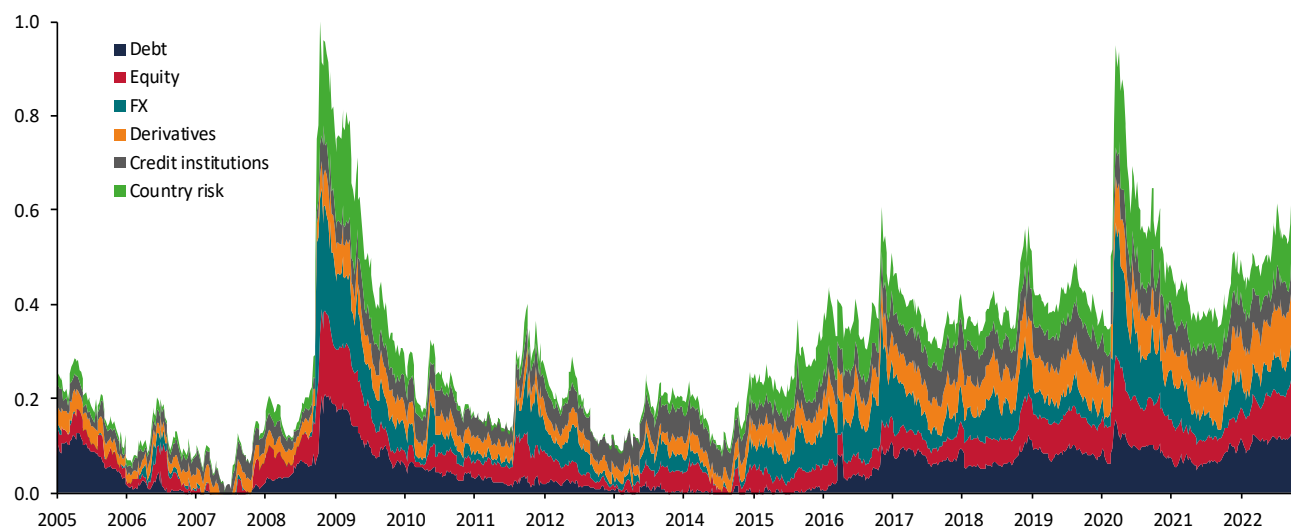
The Financial Conditions Index (*ICF*, its acronym in Spanish) showed a tightening from December 2021 to October 2022 (Graph 31). This behavior is also reflected in the financial conditions indices in other countries, and is mainly explained by a persistent tightening of debt market variables, country risk, and macroeconomic variables. However, during November, the *ICF* showed a reduction associated with more relaxed conditions in country risk and debt market variables. It should be noted that, despite the fact that the *ICF* ended up slightly below the level observed in the last *Report*, it remains in the area of tight financial conditions.

Regarding the Systemic Risk Perception Survey, institutions identified higher-than-expected inflation as the main financial risk, both internal and external.

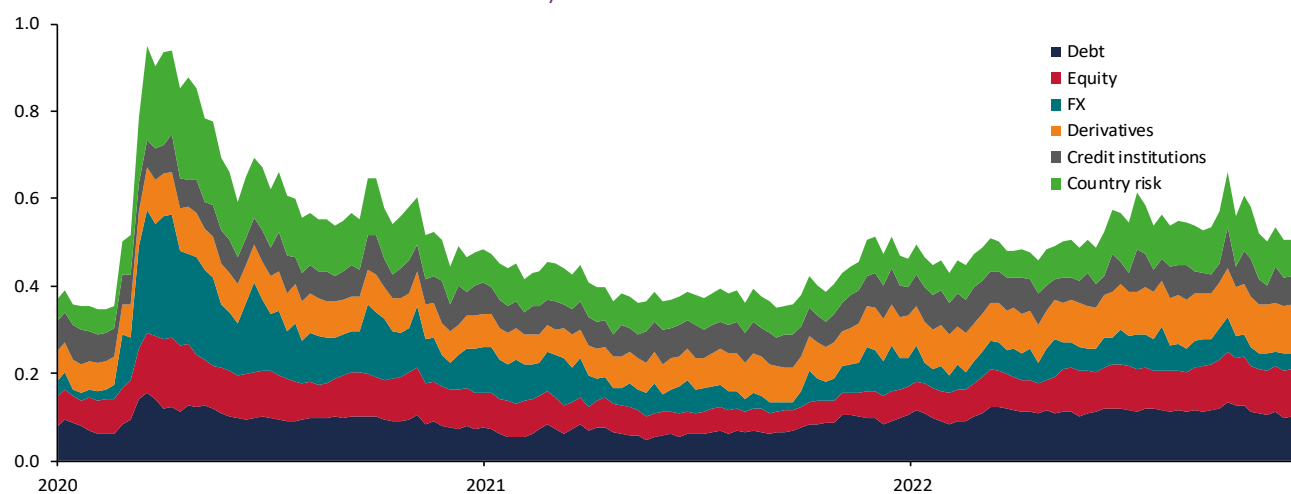
As for non-financial risks, the most mentioned are political, geopolitical, and social risks. It should be noted that institutions expect credit risk to continue increasing over the next six months.

The aggregate risk of the financial system, illustrated through the heat map, decreased compared to the risk observed in the first quarter of 2022 and remained at moderate levels during the third quarter of 2022 (Graph 32). Market exposure risks decreased as oil prices declined and volatility indicators increased in September. Meanwhile, financial sector leverage risks decreased as a result of a lower concentration of the loan portfolio. Nonfinancial sector leverage risks continue at a low level, despite an increase driven by a higher household indebtedness-to-total-savings ratio. Lastly, macroeconomic risks remain at a relatively high level due to the environment of high inflation and the increase in Mexico's and Pemex's Credit Default Swaps (CDS) prices in September. However, CDS prices have declined during the fourth quarter of 2022.

Graph 30
Financial Markets Stress Index (IEMF) ^{1/}
 a) Stress level 2005-2022



b) Stress level 2020-2022

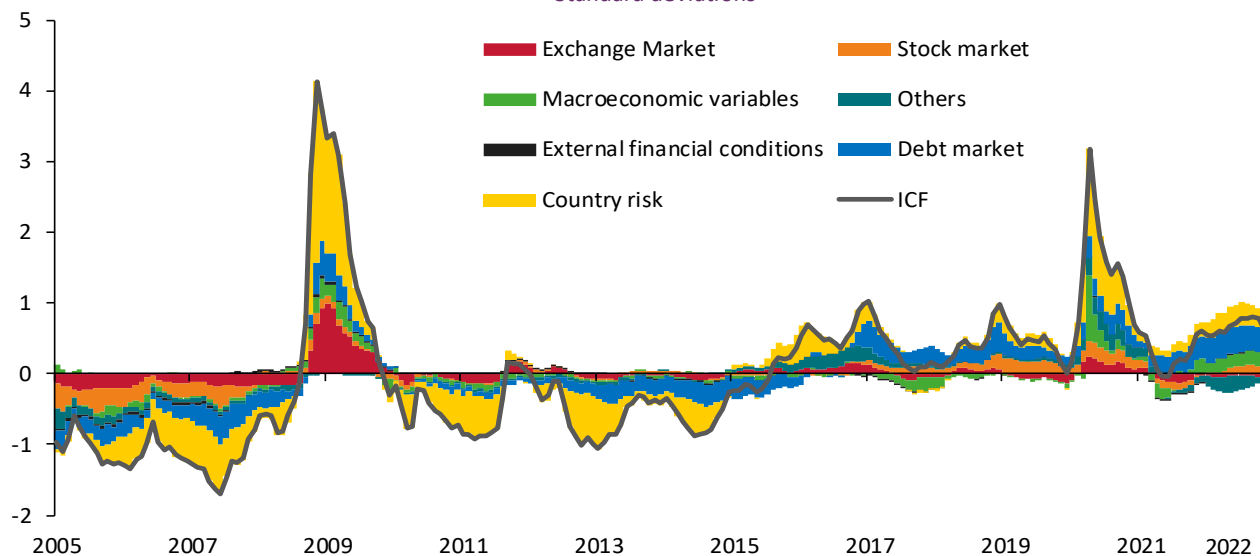


Data as of December 2nd, 2022

Source: Banco de México

1/ The index was calculated using the main components methodology with 36 standardized variables of the Mexican financial markets grouped into six categories (debt market, stock market, exchange market, derivatives market, credit institutions and country risk). The sum of the components results in the IEMF scaled to interval [0,1]. A great index level represents a greater financial stress.

Graph 31
Financial Conditions Index^{1/2/}
 Standard deviations



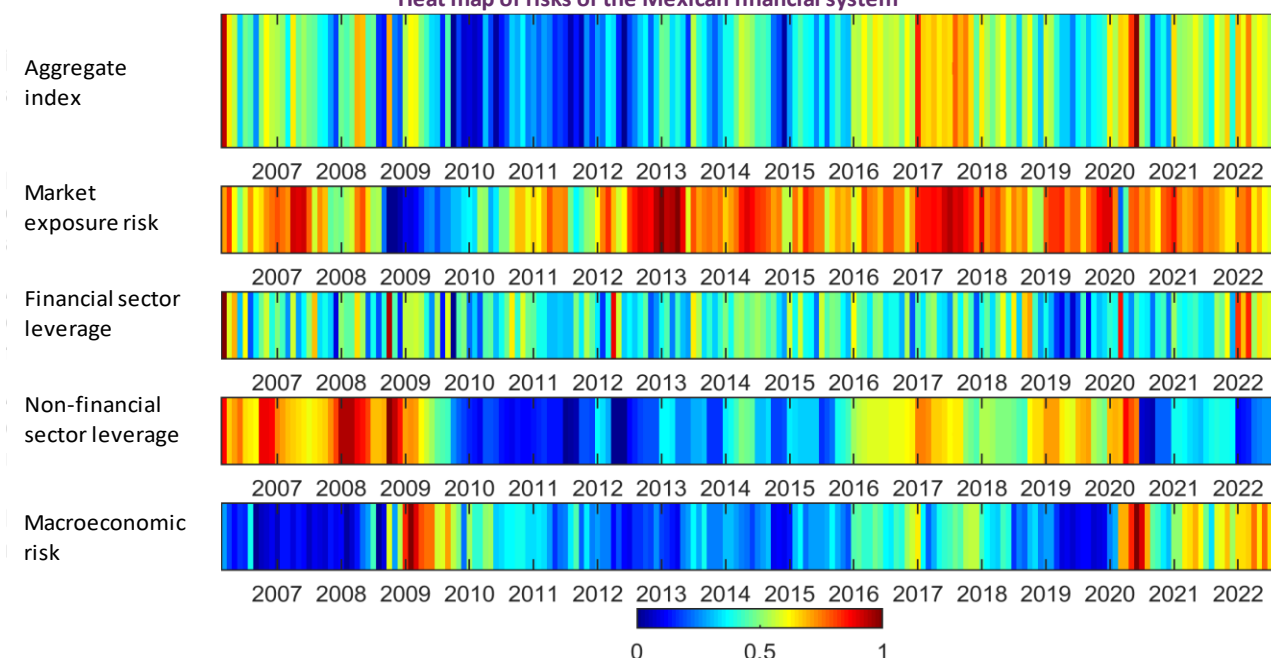
Data as of November 2022

Source: Banco de México

1/ Refer to Table 2 for a description of the methodology: Financial Conditions and Growth in Risk, Financial Stability Report December 2019.

2/ The contributions of each ICF variable are estimated using a Kalman filter.

Graph 32

Heat map of risks of the Mexican financial system ^{1/2/}

Data as of September 2022

Source: Banco de México

1/ Refer to Table 3 for a description of the methodology: Heat Maps of Risks of the Mexican Financial System, Financial System Report 2018. The Market Exposure Risk category relates to the Risk Appetite of the *Financial System Report* 2018.

2/ The disaggregated map is provided in Annex 1.

The details of the Semiannual Survey on Systemic Risk Perception conducted by Banco de México among the risk management directors of different financial institutions^{11,12} emphasizes that in this edition of the survey, the risk of higher-than-expected inflation is the most frequently mentioned, both for internal and external financial risks. Another noteworthy aspect to highlight is that fewer institutions expect an increase in the different types of risks for the next 6 months, with exception of credit and liquidity risks (funding).

With regard to the main sources of risk reported by financial institutions the following stand- out (Table 1):

- Regarding foreign financial risks, the first risk mentioned was the higher-than-expected

inflation. Second, the deterioration in the global economic growth outlook, followed by disorderly changes in foreign interest rates. Finally, deterioration of foreign market conditions is listed fourth, and volatility in commodity prices as the fifth.

- As for domestic financial risks, the most commonly cited risk is that of higher-than-expected inflation, followed by the deterioration in the growth outlook for the country's economy. The deterioration in public finances and sovereign credit rating downgrade are ranked as the third and fourth most frequently mentioned risks, respectively. Finally, fiscal, financial and economic policies are the next most-mentioned risks.
- The three main sources of non-financial risks in this survey edition are, once more, political, geopolitical and social risks, cybersecurity and

¹¹ This semester's survey was conducted from October 28 to November 18. For further information, please refer to Box 6, Semiannual Survey on Systemic Risk Perception, *Financial Stability Report December 2019*, Banco de México, pages 94-95.

¹² The survey includes questions grouped in four sections: i) main sources of financial risks (domestic and foreign) and non-financial risks; ii) perceptions regarding high-impact events that could affect the financial

system over different time periods; iii) institutions' expectations regarding the main idiosyncratic risks encountered; and iv) aspects related to their risk management. The survey was sent to 126 financial institutions (retirement fund managers, insurance companies, commercial banks, development banks, broker-dealers and investment funds).

technology risks, followed by risks of insecurity and violence. The deterioration of the rule of law and impunity ranked as the fourth most-mentioned risk and, finally, the risk associated with COVID-19 came fifth and was reported by only 45 % of the banking institutions.

Table 1

Main sources of risk for the financial system		
Percent of total of institutions		
	November 2022 ^{1/}	May 2022 ^{2/}
External Financial risks		
Inflation higher than expected	81	60
Deterioration of global economic growth outlook	75	69
Disorderly changes in foreign interest rates	65	70
Deterioration of foreign market conditions*	64	59
Volatility in commodity prices	54	62
Domestic Financial risks		
Inflation higher than expected	76	54
Deterioration of the domestic economic growth outlook	72	68
Deterioration of public finances	60	59
Downgrade of sovereign risk rating	54	57
Fiscal, financial and economic policies	50	54
Non-financial risks		
Political, geopolitical and social risks	87	89
Cybernetic and technological risks	83	84
Insecurity and violence	66	71
Deterioration of the rule of law and impunity	54	56
COVID-19 (new wave)	45	65

1/ 109 institutions participated in the survey.

2/ In the previous survey 112 institutions participated.

* Exchange rate volatility, depreciation and lack of liquidity.

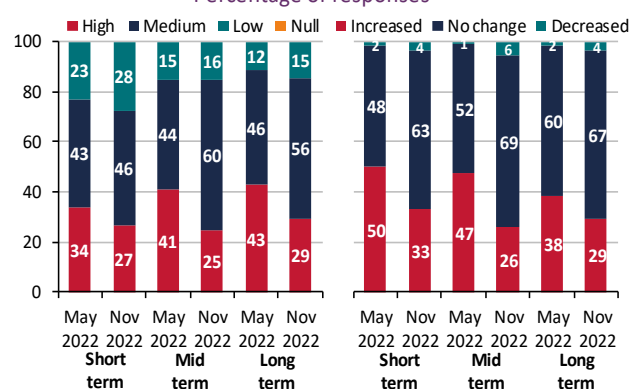
Concerning expected events that could affect the stability of the financial system in the short, medium and long-term (0 to 6 months, 6 to 12 months, 1 year or more, respectively)¹³ (Graph 33), the following should be highlighted:

- Institutions that expect a high likelihood of the event occurring decreased in the short, medium and long terms compared to the previous semester.
- For all the time horizons considered, there was a decrease in the percentage of institutions that perceive a heightened probability of a systemic event occurring.

Graph 33

Probability of a systemic event occurring within the financial system

Percentage of responses ^{1/}



Source: Banco de México

1/ Some figures may not add up to 100% due to rounding up.

Lastly, as regards institutions' perceptions of the main risks encountered, the following is highlighted (Graph 34):¹⁴

- Increased credit and liquidity (funding) risks were reported as compared to the previous survey.
- As for market risks (equity), market (currencies), liquidity (funding) and market (fixed income), expectations decreased compared to the previous six-month period.

Although credit risk indicators are at relatively low levels, the survey findings are forward-looking, and given the expected more complex environment, this could lead to an increase in credit risk.

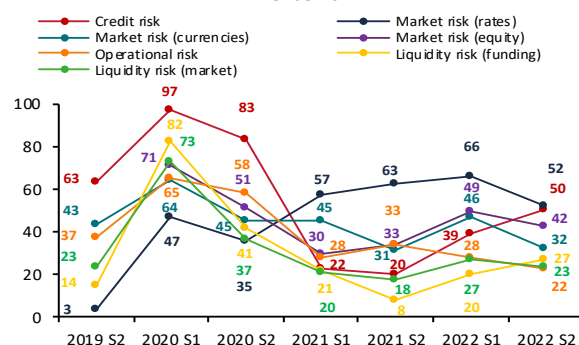
¹³ Institutions were asked whether the probability of occurrence was high, medium, low or zero for each term.

¹⁴ A diffusion index is estimated as the difference between the number of institutions that expect the risk to increase and the number of institutions

that expect it to decrease. A higher index level is interpreted as a higher risk expectation.

Graph 34

Expectations regarding the evolution of risks in the following six months ^{1/}
Percent



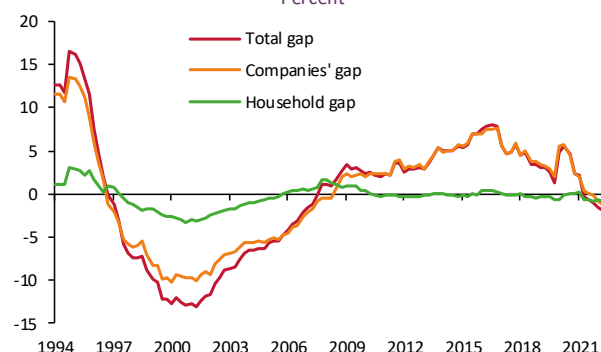
Data as of November 2022

Source: Banco de México

^{1/} The graph shows the difference between the percentage of institutions that expect risk to increase and the percentage of institutions that expect it to decrease.

b) Financing gap ^{1/}

Percent



Data as of September 2022

Source: Banco de México

^{1/} Refers to the difference between financing and its long-term trend.

Total financing to the Mexican economy declined in real annual terms during Q3 2022 (

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

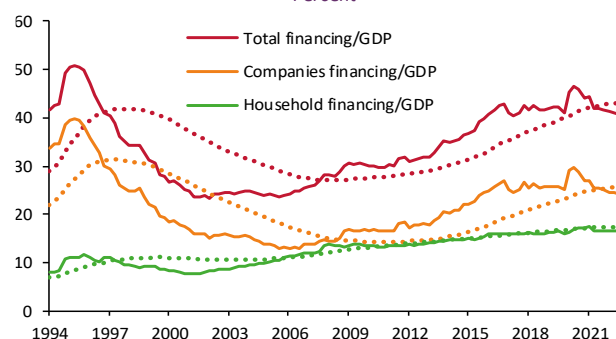
Total financing, in nominal terms, has experienced 7 consecutive quarterly growth periods; however, as a share of GDP, it continues to decline and has not recovered to pre-pandemic levels. The funding gap has been negative for six quarters with a downward trend. Although in absolute terms credit to companies has deviated the most from its long-term trend, household loans, in terms of their share, have moved away the fastest from their long-term trend, as shown in Graph 35a and Graph 35b.

Graph 35

Total financing to non-financial sectors of the Mexican economy ^{1/}

a) Proportion of GDP

Percent



Data as of September 2022

Source: Banco de México

^{1/} The dotted lines represent the long-term trend.

Table 2). While non-financial private sector funding contracted slightly, public sector funding increased its shrinking rate. Both sectors, the reduction in financing was due to a decline in securities issuance

and foreign direct loan balances. Funding for household spending recorded positive growth, whereas mortgage loans showed a slight decrease (Graph 36)

Table 2

Total financing to non-financial sectors of the Mexican economy

a) Data as of September 2022

	Billions of pesos	Sector %	GDP %	Real annual change in % [Annual change in dollar balance in %]				Percentage of peso-denominated funding
				3Q22 vs 3Q21	3Q21 vs 3Q20			
Public sector 1/	14,214	100	49.8	-2.6		-1.5		69.0
Securities	12,574	88.5	44.1	-1.7		0.5		73.8
Issued in Mexico	9,275	65.2	32.5	4.0		7.0		100.0
Issued abroad	3,299	23.2	11.6	-14.7	[-5.1]	-11.9	[0.5]	0.0
Bank loans	395	2.8	1.4	-9.5		-9.9		14.1
Commercial banks	91	0.6	0.3	-18.3		5.5		61
Foreign banks	303	2.1	1.1	-6.4	[4.1]	-14.2	[-2.1]	0.0
Other 2/	1,246	8.8	4.4	-9.0		-14.7		38.8
Private sector	11,099		38.9	-2.1		-7.0		74.3
Non-financial companies	6,452	100	22.6	-4.0		-11.2		55.7
Securities	2,210	34.3	7.7	-11.7		-9.3		26.7
Issued in Mexico	569	8.8	2.0	-6.4		-2.7		97.7
Issued abroad	1,641	25.4	5.7	-13.4	[-3.7]	-11.2	[1.4]	2.1
Bank loans	4,054	62.8	14.2	0.5		-12.5		75.5
Commercial banks 3/	2,933	45.5	10.3	3.2		-11.7		77.7
Development banks	464	7.2	1.6	-3.8		-9.1		61.8
Foreign credit 4/	657	10.2	2.3	-7.4	[3]	-17.9	[-6.3]	0.0
Other 5/	188	2.9	0.7	3.2		-4.9		98
Households	4,647	100	16.3	0.7		-0.3		100
Consumer	1,441	31.0	5.0	4.7		-4.3		100
Commercial banks 3/	1,184	25.5	4.2	5.8		-5.0		100
Development banks	45	1.0	0.2	-11.1		-6.5		100
Other 5/	212	4.6	0.7	2.6		-0.1		100
Housing	3,206	69.0	11.2	-1.1		1.6		100
Commercial banks	1,211	26.1	4.2	2.4		3.5		100
Development banks	12	0.3	0.0	-7.4		-9.8		100
Other 6/	1,983	42.7	6.9	-3.0		0.6		100
Memo: Non-regulated entities that grant financing by destination sector 7/	1,574	100	5.5	-5.9		-2.3		89.0
Non-financial companies	1,224	77.8	4.3	-3.9		2.0		88.0
Consumer	312	19.8	1.1	-9.4		-12.3		99.6
Housing	10	0.6	0.0	-11.2		7.3		100.0
Public sector	28	1.8	0.1	-35.5		-27.8		13.8
TOTAL	26,887		94.2	-2.6		-3.9		72.4

Data as of September 2022

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

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

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

3/ Includes the portfolios of sofomes regulated 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, sofomes regulated because they issue debt, deposit companies 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).

Financial Stability Report																
December 2022																
Overall funding to the Mexican economy's non-financial sectors																
b) Historical data: real annual variation in percentage																
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Public sector 1/																
Securities																
Issued in Mexico																
Issued abroad																
Bank loans																
Commercial banking																
Foreign banking																
Other 2/																
Private sector																
Non-financial companies																
Securities																
Issued in Mexico																
Issued abroad																
Bank loans																
Commercial Banking 3/																
Development banking																
External loans 4/																
Other 5/																
Households																
Consumption																
Commercial Banking 3/																
Development banking																
Other 5/																
Housing																
Commercial banking																
Development banking																
Other 6/																
Memo: Non-regulated entities providing funding by target sector. 7/																
Non-financial companies																
Consumption																
Housing																
Public sector																
TOTAL																
GDP																

Data as of September 2022

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

Note: The heat map shows the distribution percentiles of the real annual changes in the financing growth rate. Higher percentiles are shown in green, while lower percentiles are shown in red. Each indicator or line color is based on the historic data for each series, from Jan-07 to Sep-22, with the exception of gray lines, for which historical information is not available.

1/ It includes the public sector gross debt balance, using the SHCP methodology. It includes financing from the Federal Government, agencies and companies, and development banks.

2/ This includes financing granted by international financial institutions, Pidiregas, SAR savings fund, Issste, Pemex and CFE obligations, among others.

3/ This includes the sofomes portfolio regulated for having an equity link with banking institutions.

4/ It does not include financing from foreign suppliers.

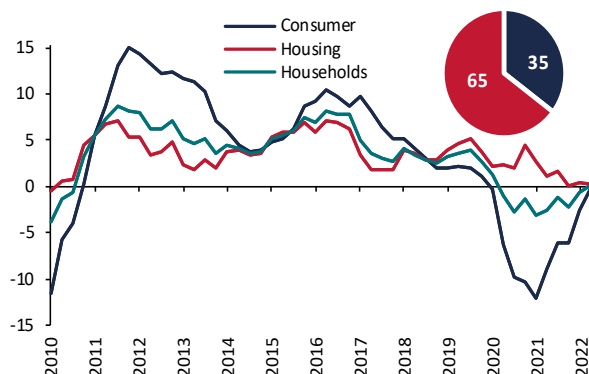
5/ This includes financing granted by Infonacot, regulated non-bank financial institutions such as socaps, sofipos, sofomes regulated for issuing debt, bonded warehouses and credit unions.

6/ This includes financing granted by Infonavit, Fovissste, and regulated non-bank entities.

7/ This includes financing granted by unregulated sofomes, debt issuers engaged in lending (e.g., automotive), loans granted by listed department stores to their customers and, for private non-financial companies, supplier financing (listed companies only).

Graph 36

Total financing to households^{1/}
Real annual change in percent



Data as of September 2022

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 foot of Table 2 (Memo); therefore, they differ from those registered in the upper part of the same table.

1/ Considers credit from the country's bank, regulated sofomes with links to banks, socaps, sofipos and credit unions, as well as non-current financial entities such as sofoles, leasing and factoring companies. Mortgage credit also includes credit granted by the Infonavit and Fovissste, whereas the consumer credit figures also include credit granted by the Infonacot. Also included is the financing granted by non-regulated entities, such as non-regulated sofomes and credit granted by specialized financial credit or lease companies that issue debt but are not deemed to be financial entities under Mexican law, as well as credit granted by listed department stores to their customers. The growth series is adjusted to consider the availability index of the the financing figures for the non-regulated entities and the sofomes regulated to issue debt in the period shown in the sample (2015-2016).

V.2.1. Households

As of September 2022, household financial position has continued to decline. This is due to the fact that the growth of indebtedness was faster than that of savings, and also because GDP growth was higher.

Borrowers' total outstanding debt balances,¹⁵ calculated at steady prices, have remained unchanged between 2019 and September 2022 (Graph 37a), while leverage, measured as the share of monthly income allocated to debt repayment, has remained at the same levels in September 2022

¹⁵ This includes both bank and non-bank loans.

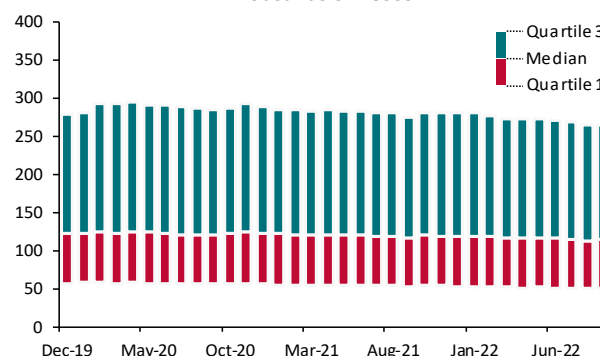
¹⁶ Income is obtained from regulatory reports. To segregate higher-income borrowers from lower-income borrowers, a 20,000 pesos threshold was used, which is close to the average monthly income of the sampled files.

¹⁷ Balances and leverage were estimated with a panel sample of the total files registered with the Credit Bureau with at least one bank loan, with

compared to those prevailing one year earlier, with higher leverage being observed in lower-income borrowers^{16,17} (Graph 37b).

Graph 37

Distribution of leverage of a sample of households
a) Monthly incomes of borrowers with
at least one bank loan^{1/2/}
Thousands of Pesos



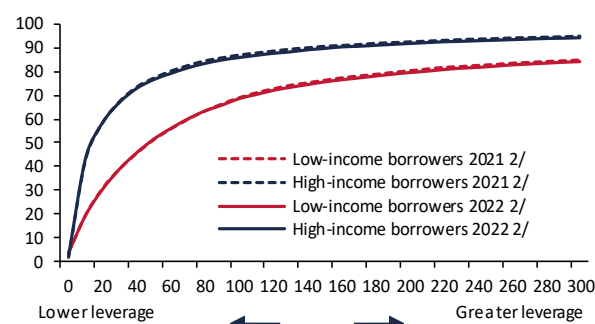
Data as of September 2022

Source: Credit Bureau

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

2/ Constant prices (September 2022 base).

b) Monthly payments between the monthly incomes of
borrowers with at least one bank loan^{1/}
Vertical axis: percent of number of borrowers
Horizontal axis: monthly payments as a percentage of
income reported



Data as of September 2022

Source: Credit Bureau

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

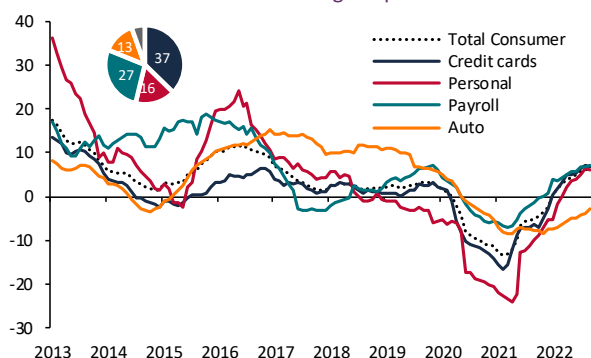
2/ "Low-income borrowers" and "high-income borrowers" are considered as those whose income is lower than the median income and greater than median income, respectively.

historical information on all loans contracted by the person associated with the sampled file; the information includes changes in balances and payments due with sample sizes close to 5,000, 16,000, and 19,000 observations for loans associated with mortgages, auto loans, personal loans and credit cards, respectively. 96 % of private loans are granted by banks reporting to the Credit Bureau.

Consumer credit

During the second and third quarters of 2022, consumer credit granted by banks and their multi-purpose financial institutions (*sofomes*, its acronym in Spanish) continued to recover as in the previous semester, reporting positive annual growth rates of the system's aggregate balance in practically all its segments. Auto credit is the only portfolio segment whose origination has yet to recover, a fact that can be primarily explained by the disruptions in the sector's supply chains, and by the increase in new vehicle prices (Graph 38).

Graph 38
Consumption portfolio of the banking system
Real annual change in percent



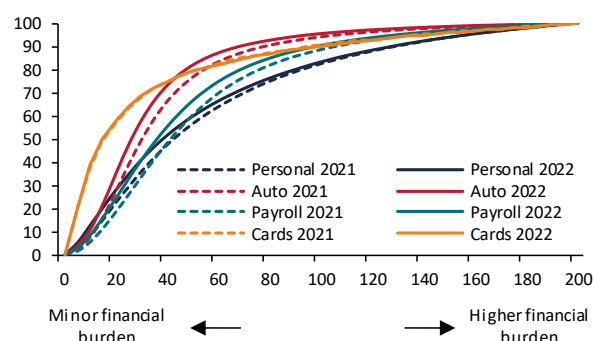
Data as of September 2022
Source: CNBV

Bank credit card portfolio growth is mainly explained by increased card use by existing cardholders and, to a lesser extent, by new cardholders. There has been a decrease in the number of full-paying cardholders over the last year, thus reverting the upward trend in cardholders seen in recent years, which together with increased card usage, could imply a potential increase in these borrowers' leverage. For this reason, it will be important to follow up on the evolution of this portfolio's risk indicators.

The household leverage ratio of commercial banks' borrowers with consumer loans,¹⁸ from August 2021 to August 2022, recorded a shift towards lower levels in its main segments, whereas, credit card borrowers'

leverage ratio has remained unchanged during the same period (Graph 39).

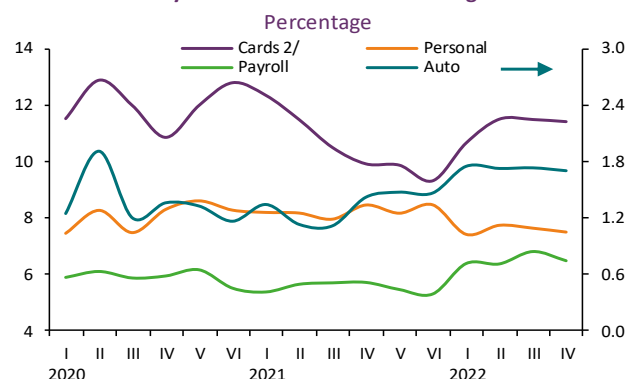
Graph 39
Household leverage ratio by type of consumer bank credit
Vertical axis: Percent of cumulative portfolio
Horizontal axis: Household leverage ratio as a percentage of income reported



Data as of August 2022
Source: Banco de México

In recent months, the increase in new personal, payroll and auto loans were coupled with increased placement among customers with a higher relative risk profile. Risk from these new borrowers, as assessed by their Probability of Default (PD), has recorded higher levels in 2022 compared to the ones observed in 2021, particularly for auto and payroll credit portfolios (Graph 40).

Graph 40
Probability of default in consumer loans granted ^{1/}



Data as of the fourth bimester of 2022

Source: Banco de México

1/ Includes bank and related *sofomes* loans.

2/ Outstanding loans at the end of the period.

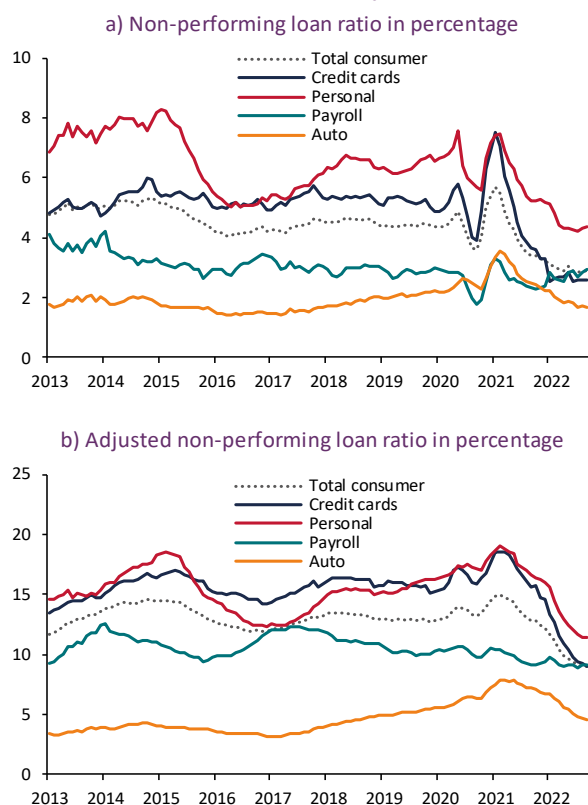
¹⁸ Household leverage ratio is measured as a proportion of income allocated to cover the repayments required of all loans registered to an individual in the credit information companies. This analysis is

conducted based on information on income available in the regulatory reports of both revolving and non-revolving consumer bank loans.

Although the total consumer portfolio non-performing loan ratio of banks and their related *sofomes* has shown little variability during the second and third quarter of 2022, for some of its portfolio segments, this ratio has increased. For payroll credit portfolio, its non-performing loan ratio continued to grow during the period, and for the credit card and personal loan portfolios, this indicator grew in the last quarter, although the adjusted non-performing loan ratios in these last two portfolios have not recovered due to lower losses in the period compared to previous ones (Graph 41a and Graph 41b).

Graph 41

Non-performing loan ratio and adjusted non-performing loan ratio of consumer loan portfolio ^{1/}



Data as of September 2022

Source: CNBV

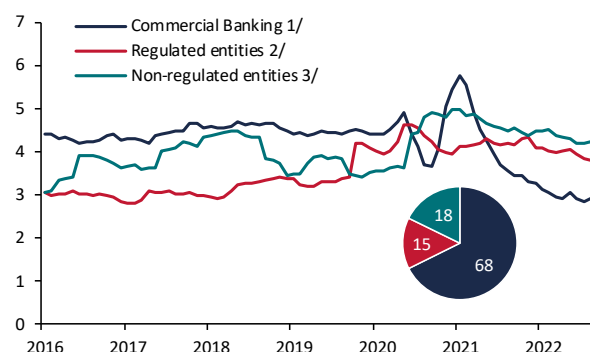
1/ Includes *sofomes* regulated for having equity links with a bank.

Non-performing loans granted by non-banking entities and Infonacot have decreased since the last *Report* (Graph 42). By type of entity, all entities but popular finance corporations (*sofipos*, its acronym in Spanish) recorded decreased non-performing loan

ratios in their portfolios, despite the fact that loans granted by this sector dropped in real annual terms, mainly those granted by non-regulated entities, excluding loans granted by department stores.

Graph 42

Default index of consumer loans by type of granting entity
Percent



Data as of September 2022

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

1/ Includes the *SOFOMES* credit portfolios on 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 entities, such as *socaps*, *sofipos* and *sofomes* regulated to issue debt, and the Infonacot.

3/ Includes credit portfolio of non-regulated *sofomes*, financial companies that grant credit preponderantly as part of their business activity, such as financial branches of auto manufacturers, and the total balance of non-banking credit cards, the information comes from the consolidated balance sheets of department stores that report to the BMV. The Credit Bureau is the information source of the default indexes of non-banking cards. The decrease observed in June 2018 is due to that a *sofom* changed from a regulated entity (on issuing debt) to an unregulated entity.

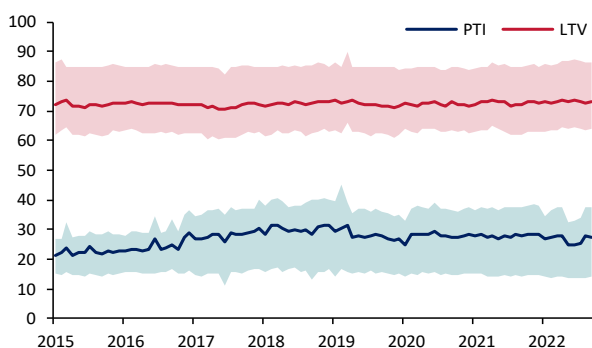
Mortgage loans

As of September 2022, total mortgage loans showed a decrease in real terms compared to the previous year. By type of grantor, the commercial banks portfolio and its related *sofomes* maintained their growth rate during 2022, although it has slowed down relative to previous years. Meanwhile, mortgage loans granted by the National Fund for Worker's Housing (*Infonavit*, its acronym in Spanish) and Housing Fund of the Institute of Security and Social Services of the Governmental Workers (*Fovissste*, its acronym in Spanish) -the main grantors of this type of portfolio- both continued to reduce in September compared to the last *Report* (Table 2).

As for mortgage loans granted by commercial banks, during the second and third quarters of 2022, the

proportion of income allocated to monthly payment (Payment-To-Income or PTI) of mortgage loans showed a marginal decrease during the first months of that period. This trend reversed to reach similar levels to the ones prevailing at the beginning of the period, which is explained by changes in the reported income of borrowers in some banks, while the ratio of the amount of the loan to the value of the property (Loan-To-Value or LTV) in general remained steady (Graph 43).

Graph 43
Loan-To-Value (LTV) and Payment-To-Income (PTI) of Mortgage Loans^{1/2/}
Percent



Preliminary data as of September 2022

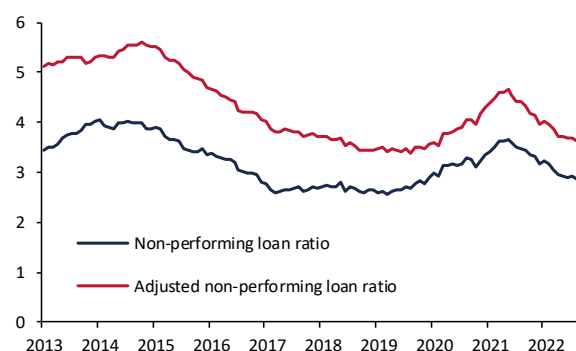
Source: CNBV

1/ Recently- granted commercial bank mortgage loans.

2/ The shaded area represents the interquartile range of the respective metric.

The non-performing loans ratio on bank mortgage loans has declined since June 2021, due to increased current loan portfolio and, to a lesser extent, the decrease in its past-due portfolio (Graph 44). This decrease is partially explained by the improved performance of the most recent yields (Graph).

Graph 44
Non-performing loan ratio and adjusted non-performing loan ratio on bank mortgage loans^{1/}
Percent

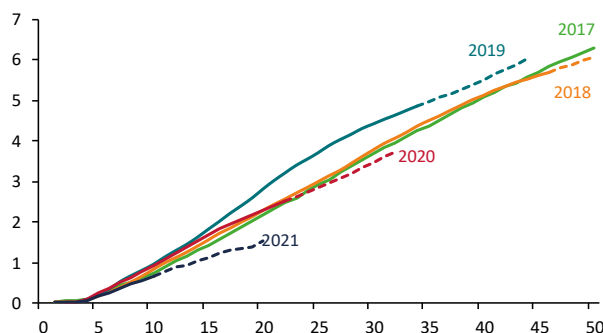


Data as of September 2022

Source: CNBV

1/ Total commercial bank mortgage loans.

Graph 45
Mortgage credit vintage^{1/2/}
Vertical axis: Cumulative default rate in percent
Horizontal axis: Months elapsed



Preliminary data as of September 2022

Fuente: CNBV

1/ Commercial bank mortgage loans.

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

The non-performing loan ratio in the *Infonavit* mortgage portfolio has increased since the last *Report*, and as of September 2022 stood at one of its highest levels since records began in 2007 (Graph 46).¹⁹ However, the portfolio under special repayment systems, which includes outstanding loans from the riskiest borrowers -the unemployed and whose loan repayment must be covered by the borrower- continues to shrink in real terms since August 2021. The Institute's ordinary portfolio

¹⁹ In December 2019, *Infonavit* reclassified loans in the current portfolio to past-due portfolio in a significant amount, and raised the non-performing loan ratio without making the retroactive correction over

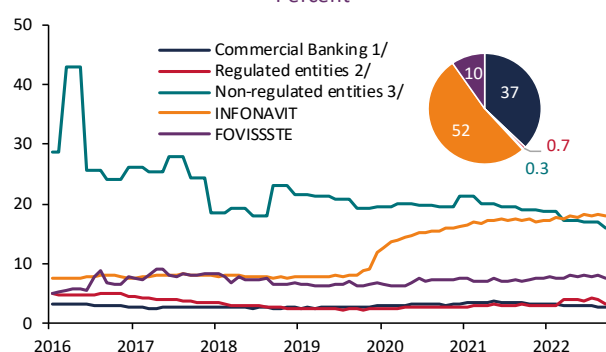
time. Therefore, the levels of the non-performing loan ratio that would be consistent with this classification for the period previous to December 2019 is unknown.

balance, whose repayment is withheld by the employer, began to contract as of June 2022 (see *Infonavit* section).

On the other hand, the non-performing loan ratio of the *Fovissste* mortgage portfolio decreased in September 2022 compared to previous months, when the ratio had increased. This situation was associated with increased mortgage portfolio balance under the special repayment system and belongs to employee loans not collected through payroll (since they are no longer government employees), and depends on their willingness to pay.

Graph 46

Non-performing loan ratio of mortgage portfolio
Percent



Data as of September 2022

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

1/ Includes regulated SOFOMES credit portfolios for 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 entities, such as socaps, sofipos and sofomes regulated for issuing debt.

3/ Includes credit portfolio of non-regulated sofomes.

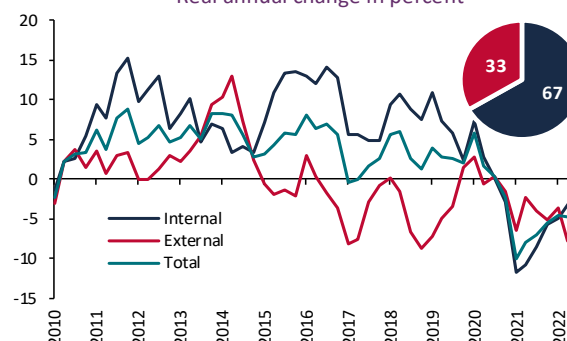
V.2.2. Private non-financial companies

Total financing to the private non-financial companies in the country continues to decline in both foreign and domestic real terms. Both financing sources have been decreasing for eight straight quarters (Graph 47). However, the domestic funding contraction rate has been lower in recent months, while foreign funding has increased, mainly as a

result of lower bond issuance in international markets.

Graph 47

Total financing to non-financial companies^{1/}
Real annual change in percent



Data as of September 2022

Sources: Banco de México, BMV and SHCP

Note: The percentages shown consider the data relating to non-regulated entities that grant financing and that are included at the bottom of Table 2 (Memo); therefore, they differ from those registered in the upper part of the same table.

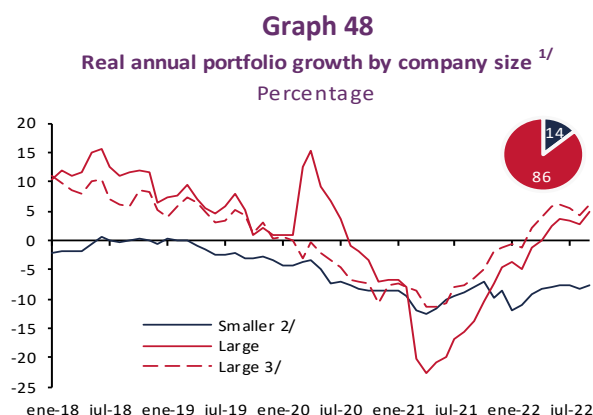
1/ Includes the loan portfolio of commercial banks and regulated non-bank entities such as regulated sofomes, socaps, sofipos, and credit unions, as well as non-bank, non-regulated entities such as non-regulated sofomes

and debt issuing financial companies such as financial leasing companies or financial arms of auto companies. Includes also debt from suppliers for listed companies. The growth series is adjusted to consider the start of available financing data for non-regulated entities (2015 - 2016). The external financing data are adjusted for FX effects.

The cost of issuing international debt increased significantly during 2022, driven by both of the rise in U.S. Treasury bond yields and the increase in the risk premiums paid on these issuances. As a result, access to funding has been partially restricted and issuances by these companies have been hampered. Looking ahead, the tightening of financial conditions could impact corporate rollovers for companies with upcoming maturities of international debt in the coming months; however, there will only be a few companies in this situation in the next two years.

The country's banking sector is the main financing source for companies, and in the second quarter of 2022 this portfolio recorded positive annual real growth rates for the first time, which had not been recorded since the second half of 2020 (Graph 48). When analyzing the real annual growth in September 2022, this can be explained by the increase in the portfolio of large companies, mainly as a result of a more intensive use of credit by existing borrowers. In

contrast, smaller company portfolios continue to show a reduction, explained by the decrease in the existing borrower balances.



Data as of September 2022

Source: CNBV

1/ The pie chart shows overall portfolio percentage for each segment.

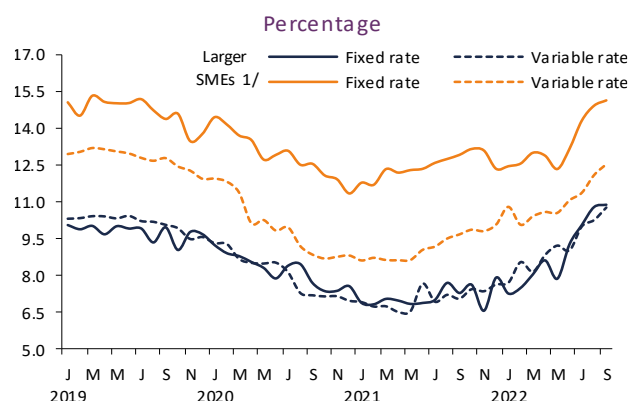
2/ Non-financial private companies not listed on the Mexican Stock Exchange with historical maximum loans below 100

3/ Large companies excluding companies that had a higher-than-15% monthly increase in their balance in Mar-20, accounting for 30% of the balance and 16% of large companies' borrowers as of the last date.

Nonfinancial private companies which have secured new loans from commercial banks suggest that these intermediaries have maintained a careful risk choice and that the funding conditions granted encourage repayment in a tightening financial environment, both at a global and domestic level. Although an increase in interest rates on new loans granted by banks to private non-financial companies was seen during part of the second and third quarters of 2022 (Graph 49), this increase includes a lower risk premium than that recorded in mid-2020, particularly for SMEs (Graph 50). This lower risk premium translates both into a lower uncertainty derived from COVID-19, and the portfolio's risk profile. Thus, new loan rates have decreased their differential relative to aggregate financing costs, such as the 28-day Interbank Equilibrium Interest Rate (*TIE*, its acronym in Spanish).

Graph 49

Interest rate on loans in local currency granted to companies



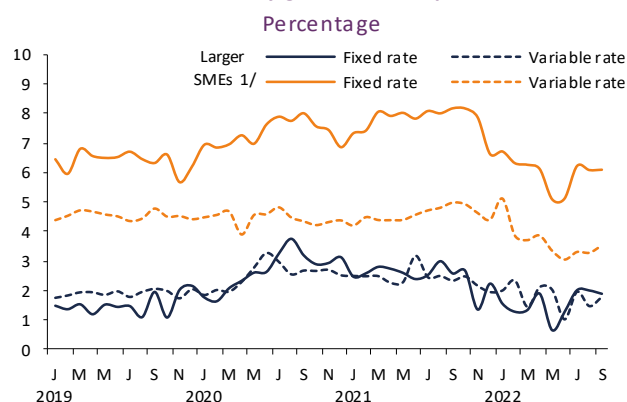
Data as of September 2022

Source: CNBV

1/ Companies with loans up to 50 million pesos.

Graph 50

Spread over the 28-day TIE of the interest rate on loans in local currency granted to companies.



Data as of September 2022

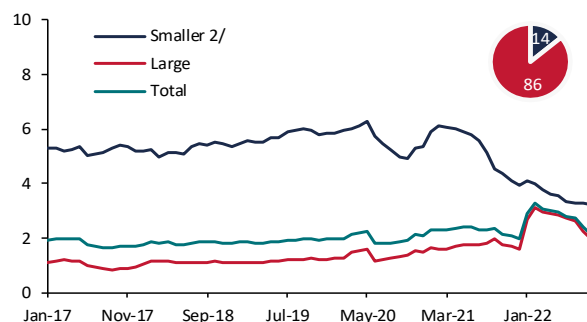
Source: CNBV

1/ Companies with loans up to 50 million pesos.

Non-performing loan ratios granted by commercial banks to companies continued to decline during the last half of the year. Particularly for large companies' portfolios, this performance is mainly explained by decreased past-due portfolio, and, to a lesser extent, by the recent growth of the performing loan portfolios (Graph 51).

Graph 51

Non-performing ratio by company size ^{1/}
Percent



Data as of September 2022

Source: CNBV

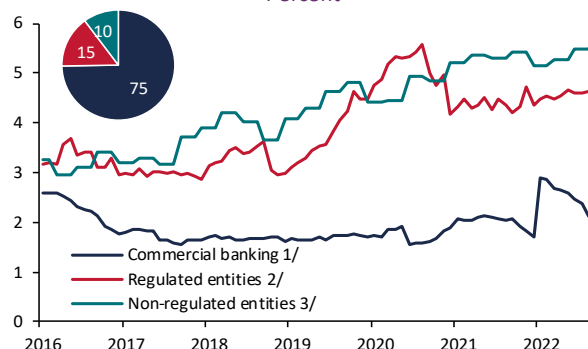
1/ The pie chart shows the total percentage of the portfolio for each segment.

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

Non-performing loan ratios of the corporate loan portfolio granted by non-banking financial intermediaries showed a change in trend for non-regulated entities, increasing at the margin and reaching historically high levels (Graph 52).²⁰

Graph 52

Non-performing ratio of corporate loans portfolio by type of lending institution
Percent



Data as of September 2022

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

1/ Includes the SOFOMES credit portfolios on having an equity linked with a bank, whether subsidiaries of the latter or not.

2/ This includes regulated financial institutions' loan portfolio such as socaps, sofipos, credit unions, sofomes regulated to issue debt and development trusts (FIRA, FND, FOVI and FIFOMI).

3/ Includes the portfolios of non-regulated sofomes and of financial companies that mostly grant credit as part of their business activity, such as financial lessors or financial branches of auto manufacturers.

Listed private non-financial companies²¹

After showing significant dynamism as of June 2021, generation of operating flows (*EBITDA*, earnings before interest, taxes, depreciation, and amortization) of listed private non-financial companies slowed down as of Q2 of this year (Graph 53). This impact has been heterogeneous across economic sectors, mainly hitting the industrial and mining sectors. On the other hand, while financing to listed companies decreased significantly during the third quarter, debt service on interest payments increased slightly. Regarding liquidity of the listed private non-financial companies, their cash and cash equivalents reserves decreased as compared to the previous *Report*, and have been used to pay down

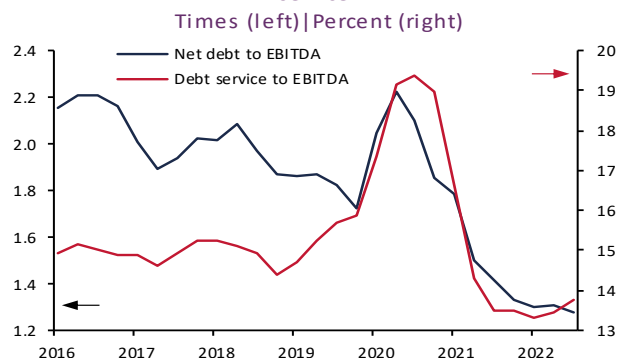
²⁰ Regulated *sofomes* implemented IFRS9 new international accounting standards during 2022, which had an impact on their non-performing loan ratios.

²¹ This includes information on companies listed on the Mexican Stock Exchange (*BMV*, its acronym in Spanish) and Institutional Securities Exchange (*BIVA*, its acronym in Spanish).

debt, while investment spending continues at low levels.

Graph 53

Non-financial listed companies' indebtedness and debt service^{1/}



Data as of September 2022

Source: BMV and BIVA

1/ EBITDA refers to earnings before interest, taxes, depreciation, and amortization.

On the other hand, the international debt maturity profile for the next two years seems manageable for most of the listed Mexican companies, as very few have upcoming maturities. Almost three quarters of the listed companies' debt is fixed-rate debt, while companies have financial hedges for interest rates, although these may be limited, for variable coupon debt. Finally, one risk to contemplate is the possibility of a more complex global economic and geopolitical environment, which could increase peso/dollar volatility and impact the financial statements of companies with foreign exchange risk exposure.

V.2.3. Public sector

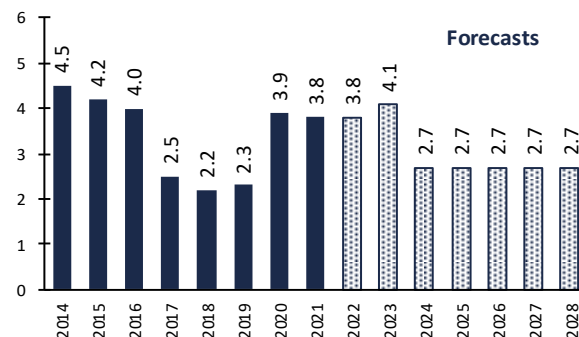
V.2.3.1. Federal government

From January to September 2022, the public balance recorded a lower deficit compared to the one forecasted in the 2022 Economic Package. This balance sheet showed that the Public Sector revenue and expenditure budgets were higher than foreseen in the 2022 Federal Income Law (*LIF*, its acronym in Spanish) and the 2022 Federal Expenditure Budget (*PEF*, its acronym in Spanish), respectively. Therefore,

the Public Sector Financial Requirements (*RFSP*, its acronym in Spanish) recorded a 492.3 billion Mexican pesos deficit and the Historical Public Sector Financial Requirement Balance (*SHRFSP*, its acronym in Spanish) was 13.5 trillion Mexican pesos (Graph 54 and Graph 55).²²

Graph 54

Public sector financial requirements (*RFSP*)^{1/}
Percent of GDP



Data as of September 2022

Source: SHCP

1/ Corresponds to the RSFP without the Banco de Mexico operating surplus. Positive (+) figures represent a deficit and negative (-) figures represent a surplus. The data observed for 2014-2021 and the estimate at the end of 2022 are taken from the Q3 2022 Report on the Economic Situation, Public Finances and Public Debt and, for the other years, the estimates from the 2023 General Economic Policy Criteria.

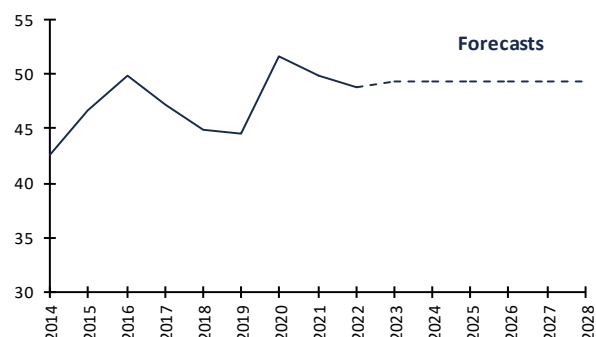
²² At the end of October, the public sector balance was -456.3 billion Mexican pesos. Budgetary income amounted to \$5,391.3 billion pesos, and total net expenditure was \$5,817.1 billion Mexican pesos. Meanwhile, PSBRs were -596.3 billion pesos, while PSBRHBS were 13,497.6

billion Mexican pesos. See "Public Finance and Public Debt Information, January - October 2022".

<https://www.finanzaspublicas.hacienda.gob.mx/work/models/FinanzasPublicas/docs/congreso/fp/202210.pdf>

Graph 55

Historical balance of public sector financing requirements ^{1/}
Percent of GDP



Data as of September 2022

Fuente: SHCP

1/ Corresponds to the historical balance of the RFSP without the Banco de México operating surplus. The data observed for 2014-2021 and the closing estimate for 2022 are taken from the Q3 Report on the Economic Situation, Public Finances and Public Debt and, for the other years, the estimates from the 2023 General Economic Policy Criteria.

By the end of 2022, the public balance deficit is estimated at 3.1 % of GDP, with budget revenue and expenditures 313.7 billion Mexican pesos higher than expected in the 2022 *LIF* and the 2022 *PEF*, respectively. The *RFSPS* and *SHRFPS* are estimated at 3.8 % and 48.9 % of GDP by the end of 2022, respectively.

For 2023, a public balance deficit of 3.6 % of GDP is expected, with 644.3 billion Mexican pesos more in budget revenues than expected in the 2022 *LIF*, and 859.4 billion Mexican pesos more in budget expenditures than established in the 2022 *PEF*. Therefore, the *RFSP* and *SHRFSP* are expected to be 4.1 % and 49.4 % of GDP, respectively (Graph and Graph 55).

V.2.3.2. State-owned companies

Pemex

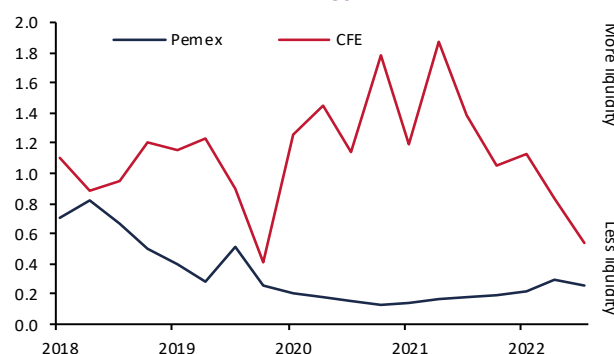
At the end of the third quarter of 2022, Pemex reported a lower quarterly loss compared to the same quarter last year. Pemex's revenue growth from higher oil prices did not offset increased sales costs,

²³ The liquidity indicator is calculated by dividing cash and short-term accounts receivable by the sum of liabilities with suppliers and financial debt maturing in the next 12 months.

investment expenses and financial expenses. On the other hand, Pemex's total debt balances dropped 1% compared to the previous quarter, mostly due to a lower debt balance with suppliers, domestic and foreign banks. Debt maturing in the next twelve months increased slightly with respect to the previous quarter, whereas the liquidity indicator dropped at the margin.²³ However, this indicator had improved in the previous quarter, resulting from Pemex's refinancing transaction with suppliers at the end of May (Graph 56).²⁴

Graph 56

Pemex and CFE's Liquidity Position ^{1/}
Times



Data as of September 2022

Source: BMV

1/ This is defined as the result of dividing cash and short-term accounts receivable by the sum of liabilities with suppliers at 12 months and financial debt at 12 months.

Furthermore, a credit rating agency downgraded the company's global scale rating on July 11 following a similar action observed for the sovereign debt, further emphasizing the company's high liquidity risk, coupled with a high reliance on Federal Government support.²⁵ The company has been repaying its debt with its own sources since April, driven by the positive oil price environment.²⁶

During the third quarter, Pemex's five-year Credit Default Swap (CDS) remained high and similar to levels

²⁴ On May 31st, Pemex swapped invoices with suppliers for US\$1,985 in exchange for granting the suppliers a dollar bond maturing in 2029. See October 2022 investor [presentation](#), page 19.

²⁵ See Moody's [press release](#) dated July 11th, 2022.

²⁶ See November investors [presentation](#), page 34.

observed at the end of the previous quarter; however, it has decreased at the margin.

Commercial banks' exposure to Pemex remains limited. In particular, between March and September 2022, the direct exposure from commercial banks to Pemex decreased, although exposures to Pemex suppliers increased.

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

As of the end of September 2022, *CFE* reported a higher quarterly loss compared to the same quarter last year. This is explained by increased oil prices associated with the war between Russia and Ukraine, used for power generation, as well as increased investment spending. Moreover, liquidity indicators in its balance sheet have deteriorated. The company's debt balance increased by 4.7 % with respect to the previous quarter, mainly explained by increased foreign bank leases and loans. Finally, the short-term component of its debt increased compared to the previous quarter, explained by a greater use of short-term banking facilities. On November 18, *CFE* issued local debt with a social and green orientation for 10 billion Mexican pesos, which does not represent an increase in indebtedness since it will be used to pay short-term debt.²⁷

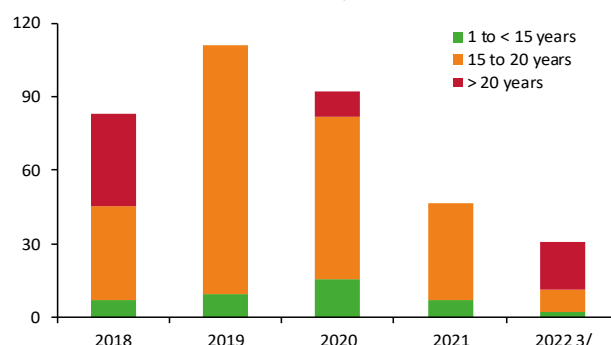
In July 2022, two rating agencies downgraded the company's individual credit profile by one notch.²⁸ This was driven by weakened cash generation due to higher production costs resulting from higher natural gas prices, as well as high capital spending requiring debt financing, which will pressure the company's leverage. The company's overall rating equals the sovereign rating and remains at investment grade level.

As of the third quarter of 2022, both commercial banks' direct exposures to *CFE* and to *CFE*'s suppliers increased relative to the levels observed in March 2022.

V.2.3.3. States

During the first nine months of 2022, sub-national governments maintained a financing structure with a mainly long-term profile. Therefore, as of the third quarter of 2022, long-term bank loans accounted for nearly 98 % of total loans to these governments, which reduces any potential refinancing or debt maturity risks. Specifically, debt with maturities greater than one year showed an upward trend (Graph 57). Although commercial banks continue to be the main government lenders, development banks increased their share of financing granted to sub-national governments (Graph 58).

Graph 57
Cumulative long-term loans granted to subnational governments ^{1/2/}
Billions of pesos



Data as of third quarter 2022

Source: Prepared from published information from state government.

1/ The States' and Municipalities' Financial Discipline Law establishes that, for the sustainable management of public finances, the state entities must conduct competitive processes for the bidding of public debt and once the related legal instruments have been signed, the public entity must publish the results of such instruments on its official website.

2/ Information issued as of November 10th, 2022 by state governments.

3/ Cumulative January-September.

²⁷ See *CFE* [press release](#) on November 19th.

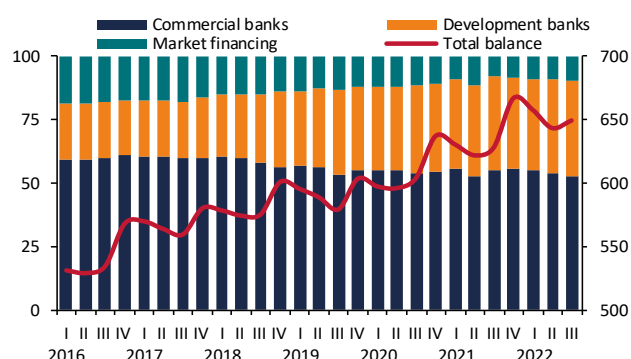
²⁸ See Moody's [press release](#) dated July 12th, 2022 and Fitch's [press release](#) dated July 18th, 2022.

Graph 58

Financing of subnational governments

Right axis: Balances in billions of pesos

Left axis: Percent



Data as of third quarter 2022

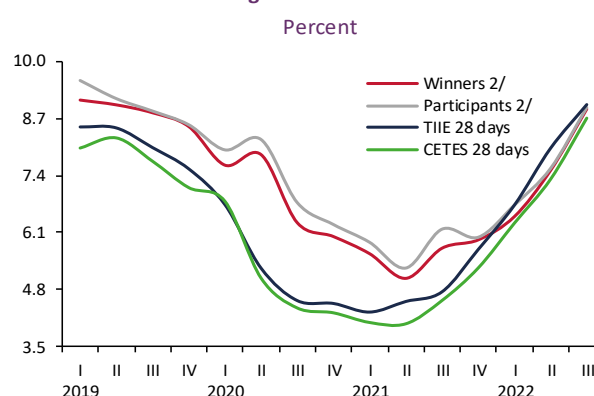
Source: SHCP

Against this background, as of the third quarter of 2022, state government financing conditions were advantageous as a result of the competitive scheme to raise funds, which has been reflected, in some cases, in financing costs comparatively lower than the 28-day TIIE. Consequently, these entities have been able to access new loans with better relative costs, thereby reducing any potential pressures resulting from more costly financing (Graph 59).

Graph 59

Weighted average rate of bank credit offers to state governments^{1/}

Percent



Data as of third quarter 2022

Source: Prepared from published information from state governments.

1/ The States' and Municipalities' Financial Discipline Law establishes that, for the sustainable management of public finances, the state entities must conduct competitive processes for the bidding of public debt and once the related legal instruments have been signed, the public entity must publish the results of such instruments on its official website.

2/ Information issued as of November 10th, 2022 by state governments.

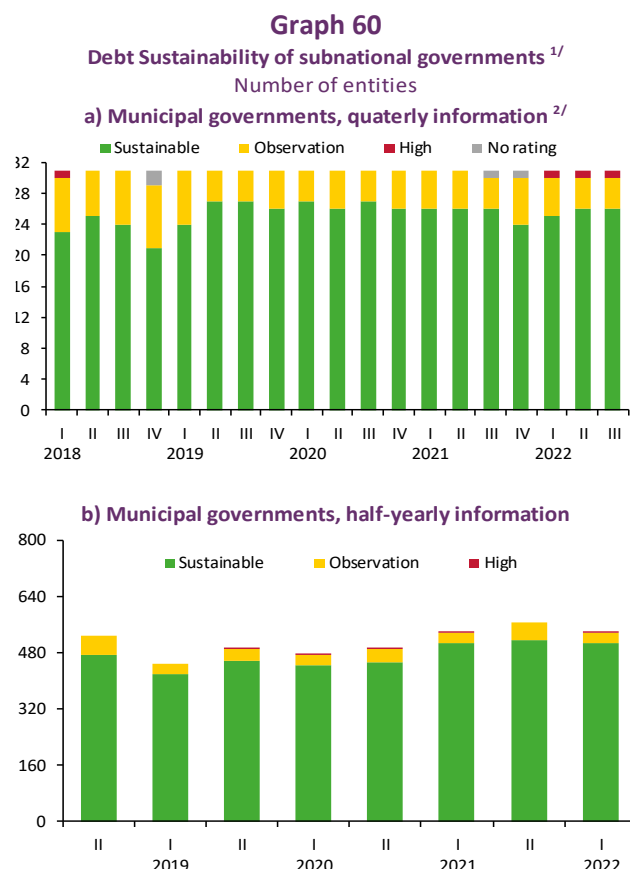
Between March and September 2022, rating agencies maintained a stable credit risk perception of subnational governments. This reflects the outlook for stable debt levels, the gradual reduction of short-term debt and an effective containment of operating expenses, among other aspects, according to the rating agencies. In this regard, only two states experienced rating changes during the period, one upward and one downward, while one state continues with the lowest credit rating as a result of recurrent defaults in short-term debt.²⁹

In turn, according to the Ministry of Finance and Public Credit's (SHCP) state government indebtedness alerts system, as of the third quarter of 2022, the total sub-national governments with sustainable debt levels remained unchanged compared to the same quarter of 2021, while only the state government of Durango recorded high debt levels (Graph 60a and Figure 1a). Regarding municipal governments, indebtedness alerts system data for the first half of

²⁹ Regarding the state government rating upgrade see: S&P Global Ratings Press Release "S&P Global Ratings raised Campeche state rating to 'mxA+' from 'mxA' for continuity in prudent fiscal policies; outlook is stable" April 27, 2022. Regarding the downward rating change of a state government, see: Fitch Rating Action Commentary "Fitch Downgrades to 'BB(mex)' the

Rating of the State of Colima; Stable Outlook" August 17, 2022. Regarding the subnational government with the lowest rating see: Fitch Rating Action Commentary "Fitch Ratifies the Rating of the State of Durango at 'RD(mex)'" July 27, 2022.

2022 showed that most of these entities have sustainable debt levels, and only two municipalities in Durango had a high debt level (Graph 60b and Figure 1b). Accordingly, state and municipal governments debt levels remain in sustainable conditions according to these indicators.



Data as of September 2022 for state governments, and as of June 2022 for municipal governments.

Source: SHCP

1/ In some periods of the alert system, the states and municipalities did not provide information, did not provide sufficient information to measure or were not qualified. Only municipalities reported by the SHCP alert system are considered.

2/ The State of Tlaxcala has no financing and obligations from January 2018 to June 2022.

Figure 1
Debt sustainability of subnational governments
a) State governments, quarterly information

2021-3	2022-3
SUSTAINABLE DEBT	
26 entities ^{1/2/}	26 entities ^{1/}
DEBT UNDER OBSERVATION	
Coahuila, Chihuahua, Nuevo León and Quintana Roo	Coahuila, Colima, Chihuahua, and Quintana Roo
HIGH INDEBTEDNESS	
No entity	Durango

b) Municipal governments, semiannual information

2021-1	2022-1
SUSTAINABLE INDEBTEDNESS	
506 municipalities ^{3/}	508 municipalities ^{3/}
DEBT UNDER OBSERVATION	
31 municipalities	27 municipalities
Baja California Sur, Coahuila, Durango, Jalisco (3), México (3), Michoacán, Morelos (4), Nuevo León, Puebla (3), Quintana Roo (3), San Luis Potosí, Sonora (5), Veracruz (3), Yucatán	Baja California Sur, Coahuila (3), Durango (3), Guerrero, Jalisco (3), México (3), Michoacán, Morelos (3), Nayarit, Puebla, Quintana Roo, San Luis Potosí, Sonora (2), Veracruz (3)
HIGH INDEBTEDNESS	
1 municipality	2 municipalities
Agua Prieta (Sonora)	Mapimí, Tlahualilo (Durango)

Data as of third quarter 2022 for state governments, and as of second half of 2022 for municipal governments

Source: Based on SHCP data

1/ The state of Tlaxcala does not show financing and obligations for 2021 and 2022.

2/ The state of Durango did not submit information.

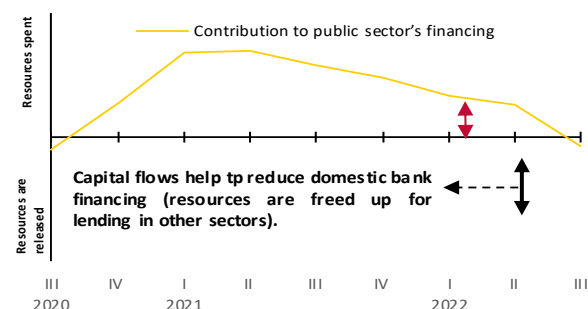
3/ As of the first half of 2021, 239 municipalities did not submit information and 11 entities had not been rated, while as of the first half of 2022, 232 municipalities did not submit information and 19 entities were not qualified.

V.2.4. Foreign sector and capital flows

Capital flows help sectors with access to foreign funding, such as the public sector, to use it to reduce their domestic bank credit needs and free up resources for other economic sectors. During the period covered in this Report, capital inflows to Mexico maintained the upward trend shown since the beginning of 2022, despite the outflows reported

in Q2 of this year. Therefore, for the first time since Q3 2020, capital flows enabled the public sector to reduce domestic bank loan usage and free up resources to provide funding to other economic sectors (Graph 61).

Graph 61
Contribution of net capital flows to public sector's domestic financing real growth ^{1/}
Percentage points



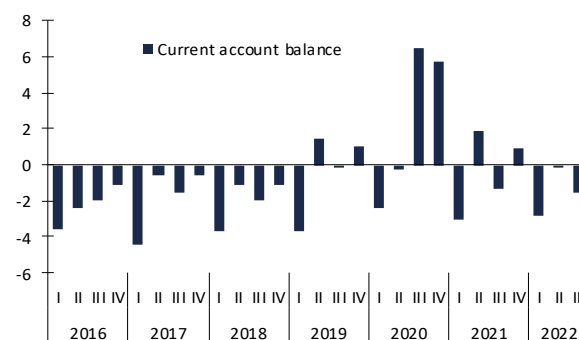
Data as of Q3 2022

Source: Banco de México and CNBV

1/ The capital flow contribution to financing is obtained as the difference between the annual real financing growth rate and the one that would have been observed without these flows. The latter rate is determined by assuming, in a vector autoregressive model (VAR), 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 2022 and a 31-quarter rolling window. Capital flows are defined as the total of net direct, portfolio, and other investment flows.

The current account recorded deficits of 0.1 % and 1.6 % of GDP in Q2 2022 and Q3 2022, respectively (Graph 62a). This account showed a surplus in the commercial non-oil trade balance in Q2 2022 and a deficit in Q3 2022. The oil trade balance decreased in both quarters (Graph 62b). As regards the financial account, there were net indebtedness balances in Q2 and Q3 2022. Q2 net indebtedness was highlighted by the negative variation in reserve assets, while Q3 net indebtedness was highlighted by capital inflows in direct and portfolio investment, other investment and derivatives.

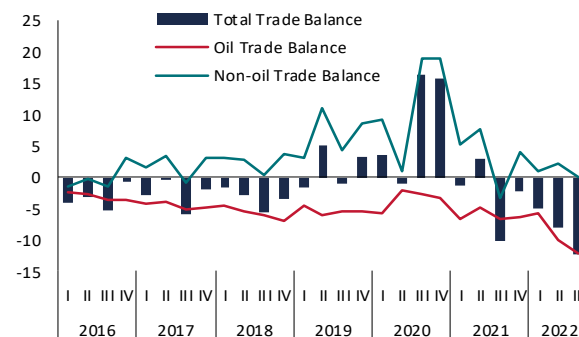
Graph 62
Current account and trade balance:
a) Current account
GDP %



Data as of Q3 2022

Source: Banco de México and INEGI

b) Balance of trade
Billions of dollars



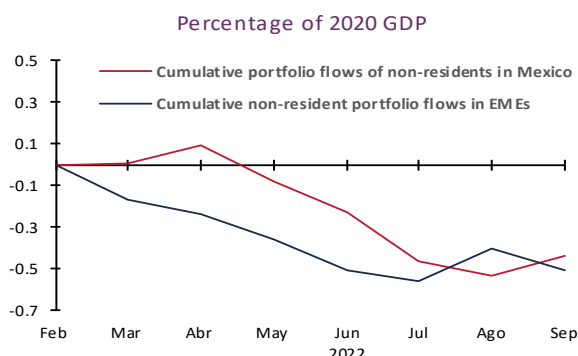
Data as of Q3 2022

Source: Banco de México and INEGI

Regarding non-resident portfolio flows, timely information from the Institute of International Finance (IIF) shows outflows for emerging economies (EMEs) in the months after the start of the conflict between Russia and Ukraine, as opposed to Mexican inflows in March and April. This also is in contrast to the outflows which, overall, have been seen in both economies since that time (Graph 63).

Graph 63

Cumulative non-resident portfolio flows to Mexico and EMES^{1/}



Data as of September 2022

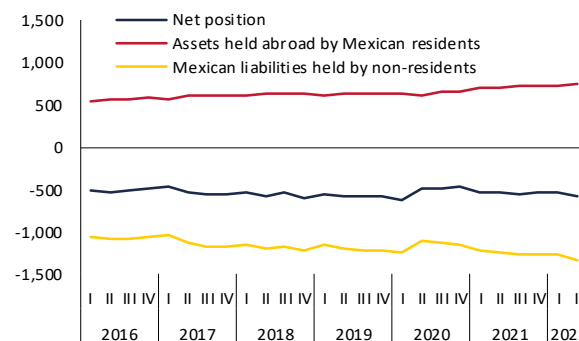
Source: Institute of International Finance (IIF)

1/ The portfolio flows measure for emerging economies included countries considered in the monetary policy and international financial markets section of the Quarterly Report January-March 2021 for which information was available in the IIF. This metric was obtained by adding up the flows of all these economies and dividing by the total 2020 GDP of these economies. Flows accrued since February 2022. The information goes up to September 2022 as it is the most updated information available that allows a sufficiently large number of these countries to be included.

Mexico's international investment (net debt) position increased in Q2 2022 versus the same quarter of the previous year. In terms of foreign assets, investments by residents in Mexico increased by 6.1 % and, in terms of liabilities, foreign investments increased by 7.3 % (Graph 64).

Graph 64

International investment position^{1/}
Billions of dollars



Data as of Q2 2022

Source: Banco de México

1/ It refers to the international investment position at the end of the period. The net international investment position is estimated by subtracting liabilities from assets 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 measured in the international investment position statistics of the balance of payments to obtain the calculation of the country's net creditor position.

During this reporting period, tightening global financial conditions led to EME outflows. Amid this challenging global environment, Mexico reported further outflows, albeit to a lesser extent than in previous periods. However, the international environment continues to impose risks going forward, including the rate hike cycle in the main AEs. Therefore, Mexico must keep its macro-financial fundamentals sound to preserve investor confidence and mitigate any potential decline in the foreign financing market.

V.3. Institutions

Table 3 shows a breakdown of the financial intermediaries in the Mexican financial system, their total asset share and growth, as well as the concentration of the main participants in each sector. It is noteworthy that the total assets shrunk for almost all financial intermediaries, with the exception of the institutions that can take in deposits.

Table 3

Financial Stability Report					
December 2022					
Institutions that are part of the Mexican financial system					
	Number of entities ^{2/}	Share of total assets in		Annual real asset growth rate	Five largest entities ^{3/}
		in the financial system	in the GDP		
	No unit	Percentage	Percentage	Percentage	Percentage
Commercial banking ^{4/}	50	45.9	43.9	3.8	67.5
Siefors (afores) ^{5/6/}	118 (10)	18.0	17.2	-10.5	75.6
Investment funds (companies) ^{7/}	620 (30)	10.5	10.0	-5.0	66.1
Development institutions ^{8/}	10	10.0	9.5	-1.0	87.9
Insurance and bonding	114	7.6	7.3	-3.1	42.8
Broker dealers	36	3.6	3.4	-14.9	57.5
Regulated Sofomes ^{9/}	27	1.0	1.0	3.1	70.2
Non-regulated Sofomes ^{10/}	1288	2.1	2.0	-4.3	21.5
Savings and loan cooperatives (socaps)	154	0.8	0.8	2.1	53.9
Popular finance companies (sofipos)	37	0.1	0.1	1.5	65.9
Credit unions	76	0.2	0.2	-6.3	50.7
General bonded warehouses	16	0.1	0.1	-3.6	93.3
<i>Memo: Infonavit, Fovissste & Infonacot</i>	3	8.4	8.0	-0.2	<i>n.a.</i>

Data as of September 2022

CNBV, CNSF, Consar y Condusef

1/ This table includes direct funding granted by financial institutions listed here, and therefore does not necessarily match the direct and induced funding reported in the Development Banking

2/ This refers to the total entities currently operating and may vary from the number of entities licensed to operate.

3/ The five entities with the highest asset concentration per sector are:

Banca comercial: BBVA, Santander, Banorte, Citibanamex & HSBC.

Afores: XXI Banorte, Profuturo, Citibanamex, SURA & Coppel.

Mutual fund operators: BBVA Bancomer Gestión, Impulsora de Fondos Banamex, Sam Asset Management, Operadora de Fondos Banorte and Operadora Actinver.

Development institutions: Banobras, Nafin, Bancomext, FIRA and Banjercito.

Insurance and bonding: Pensiones Banorte, Grupo Nacional Provincial, Seguros BBVA Bancomer, Metlife México and Citibanamex Seguros.

Broker dealers: Banorte-Ixe, Goldman Sachs, Finamex, Invex and Inversora Bursátil.

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

Non-regulated Sofomes: Crédito Real, ATC Latin America, Marverde Infraestructura, Caterpillar Crédito and BMW Financial Services Mexico.

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

Sofipos: Libertad Servicios Financieros, Consejo de Asistencia al Microemprendedor (CAME), Financiera sustentable, Crediclub and Te Creemos.

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

General bonded warehouses: Afirme, Mercader, Sur, Accel and Argo Almacenadora.

4/ Total commercial bank assets include regulated sofomes consolidated with the respective bank in the case of subsidiaries.

5/ The total number of retirement funds managed by the 10 afores amounts to 118 Siefors.

6/ As of January 2020, more Siefors will be seen due to the transition to the new Siefors Investment Regime based on Generational Funds, pursuant to the regulatory amendments issued on December 13th, 2019 by Consar.

7/ Mutual fund operators (30) manage a total of 616 mutual funds.

8/ It includes development banks, FND and development trusts (FIRA, FOVI and FIFOMI).

9/ They include regulated sofomes having an equity link with a bank, but they are not subsidiaries of the latter and therefore do not consolidate their assets. Some belong to a financial group. Sofomes regulated because they issue debt on the BMV are also included.

10/ Figures on unregulated sofomes are taken from the Commissions Registry - RECO (Condusef). The asset figures refer to the total loan portfolio granted by these entities reported to Condusef. The asset figures refer to the total loan portfolio granted by these entities reported to Condusef. The loan portfolios held by unregulated sofomes providing loans only to related entities or subsidiaries are not taken into account, since they are not credit intermediaries per se.

V.3.1. Commercial banks

The first nine months of 2022 witnessed a recovery in commercial bank assets, which to a large extent presented the latest developments in its loan portfolio and derivatives position.

However, increased assets have not been translated into a significant asset density increase, which in fact decreased between January and September 2022. As a result, capital requirements have not increased at the same rate as assets have.³⁰

Similarly, in line with increased commercial bank assets, their liabilities also rose, particularly their demand deposits, which tend to pay lower interest rates than term deposits and are readily available to depositors (see Box 6).

Meanwhile, given the increased funding costs of commercial banks, the risk of lower net income has been reduced by higher loan placement and interest income. Although interest expenditure has increased, it has been offset by higher interest income.

In 2022, loan-loss preventive reserves for commercial banks decreased, even though such reserves still maintain a relatively high ratio as compared to overall portfolio versus 2019. This is because the additional loan reserves, which commercial banks generated for precautionary reasons in response to an unpredictable economic slowdown in 2020, have been reduced, insofar as institutions have greater information on the potential impacts on their portfolios or, where appropriate, have used them to address such risks.

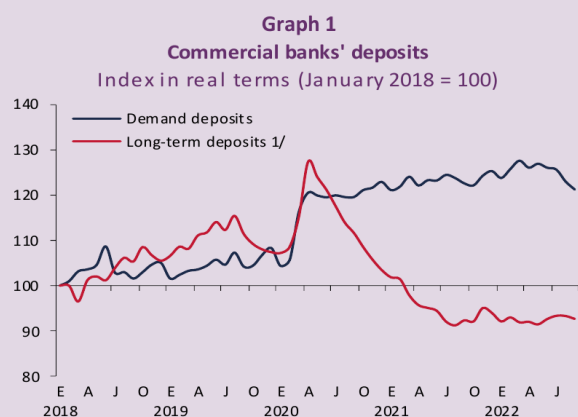
³⁰ Asset density is defined as the risk-weighted assets to total assets ratio.

Box 6: Recent structural changes in commercial bank funding

I. Introduction

The COVID-19 pandemic significantly disrupted the economic and financial behavior patterns among market players, consumers, producers and also financial system stakeholders. With reduced COVID-19 cases, and the gradual economic upturn, consumption and production patterns have returned to normal and the economic uncertainty associated with the pandemic has decreased, without regard to the effects of geopolitical conflicts.

In this environment, given the economic uncertainty prevailing when the pandemic began in Mexico, there was a change in commercial bank depositors' behavior as of March 2020, while there were increased borrowings by corporations in order to have additional liquidity in such an environment. Specifically, depositors chose to have resources with greater availability and thus increased liquidity, which led to increased demand deposits, at the expense of investments in instruments which, although yielding higher returns, had a fixed term in which to draw on those resources. As a result, in March and April 2020 there were increased demand deposits, which cannot be withdrawn for a specific term, while at the same time there was a gradual decrease in term deposits, which cannot be withdrawn until the maturity date for which the deposit instrument was agreed (Graph 1). Consequently, this Box shows evidence that this change in commercial bank depositors' behavior was a structural rather than a temporary event.



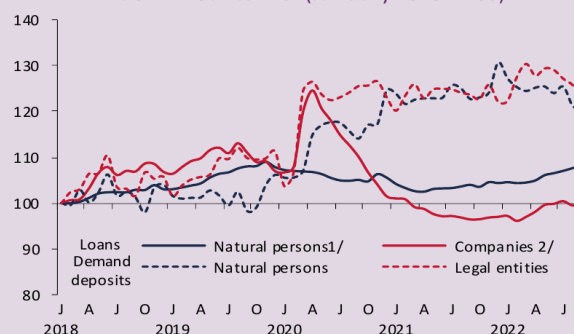
II. Deposits by individuals and legal entities

Although the economic situation derived from the health crisis had a cross-cutting effect on individual and corporate deposit annual variation rates, increased levels were mainly due to corporate savings and investment decisions. Indeed, in the early days of the pandemic, the lockdown to fight the spread of the pandemic, and the resulting reduced economic activity, led companies to seek more bank loans to obtain additional liquidity

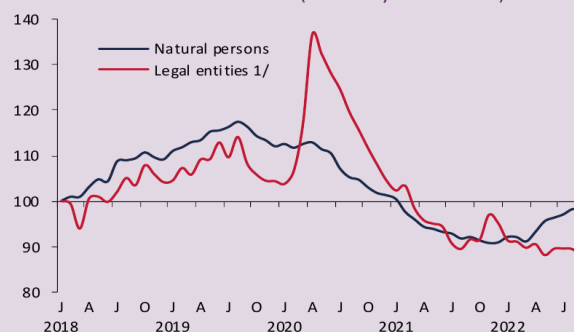
due to the uncertainty about the potential impact and duration associated with this and other pandemic control efforts (Graph 2). Subsequently, companies began to reduce their positions in fund-raising instruments with a fixed investment term (Graph 3).

On the other hand, reduced household consumption allowed households to increase their savings, which encouraged increased deposits, although the increases in their demand deposits were initially smaller in size compared to those observed in corporate deposits (Graph 2 and Graph 3).

Graph 2
Demand deposits and commercial bank loans
Index in real terms (January 2018 = 100)



Graph 3
Commercial banks' long-term deposits
Index in real terms (January 2018 = 100)



While term deposits began to show some recovery as of 2021, particularly investments by individuals, the growing trend in demand deposits continued for a longer period, and only as of Q3 2022 did they show reduced levels.

Given this persistent behavior, this Box discusses the likelihood that a structural change in the decisions made by commercial

bank depositors may have taken place as a result of the COVID-19 pandemic.

III. Structural change in deposits

In order to determine whether there has been a structural change in commercial bank deposits in Mexico, a time-series econometric model was estimated, considering that the variables are explained by their own lags. In this regard, an Autoregressive Model (AR) of order 12 was initially used for both demand and term deposits, since monthly series are used. The model can be depicted as follows:¹

$$d(c_t) = a + \sum_{i=1}^{12} B_i d(c_{t-i}) + \varepsilon_t,$$

where c_t is the logarithm of demand or term deposits in real terms, as the case may be, d is the monthly difference of the corresponding variable, a is the constant and B is a vector of parameters to be estimated and ε is the residual.

For this purpose, the model is specified using the general-to-specific approach (Campos et al. 2005), and iteratively, lags that are not significant at the 95% confidence level are progressively eliminated. The constant a is considered in all estimations of the model.

For the model estimation, demand and term deposit balances of commercial banks between January 2015 and September 2022 are used. The results obtained for the different deposits are shown in Table 1, which shows the different lags that were significant at 95%.

Table 1

a) Demand deposits: estimations		
	Lag coefficient	P-statistic
B_1	-0.39	0.0113
B_2	-0.44	0.0004

b) Long-term deposits: estimations ^{1/}		
	Lag coefficient	P-statistic
B_5	-0.25	0.0190
B_8	0.22	0.0463

c) Average fund-raising balance in real terms		
Billions of pesos as of January 2018		
	Jan-18/Apr-20	May-20/Sep-22
Demand deposits	3,296	3,859

	Jan-18/ Oct-20	Nov-20/Sep-22
Long-term deposits ^{1/}	2,534	2,202

1/ Includes transactions with financial institutions.

Once a parsimonious explanatory model of demand and term deposits has been developed, the next step is to determine whether there is a structural change in the behavior of these series. For this purpose, a Quandt-Andrews test was performed,

using the Chow test as a baseline. The latter examines whether the relationship between the different variables included in the model remains constant between two time periods; i.e., it seeks to determine whether both time periods can be explained by the same model since the estimated coefficients are the same. The Chow test assumes that the point in time at which the structural change occurs is known, while the Quandt-Andrews test assumes that the break point is unknown and therefore seeks to find it within a time window.²

The Quandt-Andrews test result suggests a structural change in April 2020 in the case of demand deposits and in October 2020 in the case of term deposits (Table 2).

Table 2
Quandt-Andrews statistic

	Statistic F Max	P-statistic	Structural change date
Demand deposits	4.0806	0.0482	April 2020
Long-term deposits	3.3163	0.0852	October 2020

Note: 58 different breakpoints were compared.

This result suggests that the estimated AR coefficients are statistically different before and after the dates when a structural change was identified. In this regard, average demand deposits between May 2020 and September 2022, in real terms, showed a 17% increase versus the average between January 2018 and April 2020, while average term deposits in real terms between November 2020 and September 2022 showed a 13% drop versus the January 2018-October 2020 period.

IV. Final considerations

Since the COVID-19 pandemic began, there have been certain effects on the savings-investment decisions made by commercial bank depositors. Demand deposits and term deposits, in particular, show signs of changes in their trend. The econometric study confirms the existence of a structural change in both demand and term deposits. Although this behavioral change in demand and time depositors implies that financial institutions must have sufficient liquidity to face the possible withdrawal of demand deposits, the liquidity levels of the Mexican financial system suggest that there is no significant risk to it.

References

Campos, J., Ericsson, N., y Hendry, D. (2005) "General-to-specific Modeling: An Overview and Selected Bibliography", Board of Governors of the Federal Reserve System, International Finance Discussion Papers No. 838, August 2005.

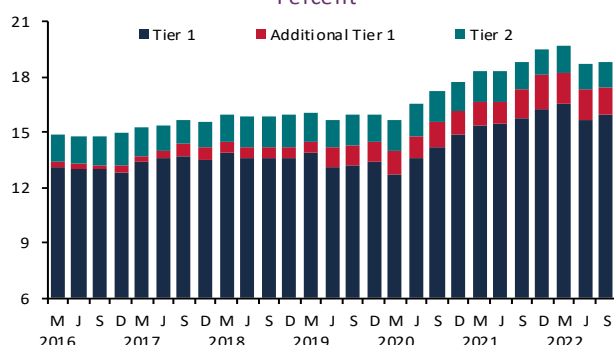
¹ The scope of this Box is limited to examining whether there has been a structural change in commercial bank deposits, so the purpose of the model specified is to serve as a basis for such analysis. Thus, determining potential relationships of the deposits with other economic, monetary and financial variables is not contemplated. However, a preliminary assessment using a long-term estimation of the relationship between Banco de México's target rate and demand and term deposits of commercial banks suggests that the current monetary policy cycle may have had a positive effect on deposit levels.

² The Quandt-Andrew test splits the sample used to estimate the original equation and estimates whether the coefficients in both subsamples are equal. Formally: $y_1 = \alpha_1 + \beta_1 x_1 + u_1$ for the first T1 observations, and $y_2 = \alpha_2 + \beta_2 x_2 + u_2$ for the remaining T-T1 observations, where T is the total number of observations. Under the null hypothesis ($H_0: \alpha_1 = \alpha_2$ and $\beta_1 = \beta_2$).

Solvency

Commercial banks maintained appropriate capitalization levels, which allowed them to cope with potential risks arising from the economic situation. However, between March and September 2022, the capital adequacy ratio (CAR) decreased, which showed both a reduction in net capital, largely due to a reduction in core capital as a result of the payment of dividends by some institutions, and an increase in risk assets (Graph 65). Specifically, increased total assets exposed to risk were mainly due to increased credit risk, driven by the recovery in loans granted (Graph).

Graph 65
Structure of banks' Capital Adequacy Ratio (CAR) ^{1/}
Percent



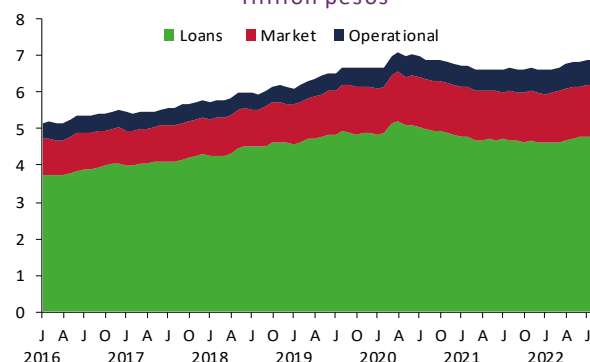
Data as of September, 2022

Source: Banco de México

1/ The Capital Adequacy Ratio (CAR) is calculated by dividing net capital by risk weighted assets. Net capital is the regulatory capital that includes the Tier 1, Additional Tier 1, and the Tier 2 capital. Tier 1 capital includes earned capital and shareholders contributions, and has the greatest capacity to absorb potential losses. Additional Tier 1 capital includes subordinated perpetual bonds and surplus reserves, and therefore has a lower capacity to absorb possible losses, while Tier 2 capital includes subordinated bond with fixed terms, and therefore has a lower capacity to absorb possible losses.

Graph 66

Risk-weighted assets ^{1/}
Trillion pesos



Data as of September 2022

Source: Banco de México

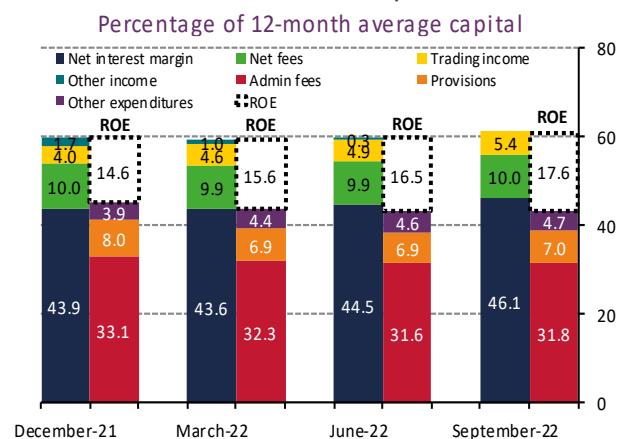
1/ Credit risk-weighted assets reflect the risks associated with the loan portfolio. Market risk-weighted assets measure the risk that a banking institution holds due to market factors to which its assets are exposed, while operational risk-weighted assets measure the risks associated with possible losses due to inadequacies or failures in internal processes, personnel and internal systems or due to external events.

During Q3 2022, Citibanamex maintained the sale process of its consumer and retail banking segment. Citibanamex is expected to reveal the outcome of the sale by the end of this year or early next year. As mentioned in previous Banco de México reports, this sale is subject to various terms and conditions, including applicable regulatory approvals in both the U.S. and Mexico. Moreover, given that the Mexican banking system is highly capitalized, with manageable delinquency levels and a recovery in lending, selling the aforementioned lines of business by this entity is not expected to have a material impact on the Mexican banking system's overall stability, as it will remain a participant therein. While Citi would leave Citibanamex's consumer and corporate banking businesses, the company plans to operate its institutional client business under a local banking license. Also, although Citibanamex's share in the Mexican retail segment is considerable, it has declined in recent years.

Bank profitability, assessed by the twelve-month return on stockholders' equity (ROE) ratio, has seen a recovery for the system as a whole (Graph 67). This recovery is associated with a higher net interest margin, as well as a gradual release of additional

reserves accumulated during 2020 and 2021. However, the indicator has been consistently in negative values for some small banks.

Graph 67
Commercial banks profitability components (12-month cumulative flows)



Data as of September 2022

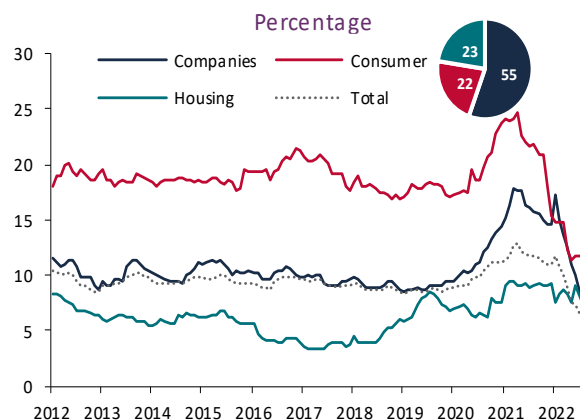
Source: CNBV

Credit risk

Banks' credit risk, measured by the conditional value at risk (CVAR) as a ratio of the credit portfolio, decreased significantly during Q2 and Q3 2022, from 9.9 % in March 2022 to 6.0 % in September 2022 (Graph 68a).^{31,32} This behavior is mainly explained by significant decreases in their default correlations, and to a lesser extent, by decreased default probabilities (Graph 68b).³³

Graph 68

a) Conditional value at risk (CVAR) of credit by type of portfolio

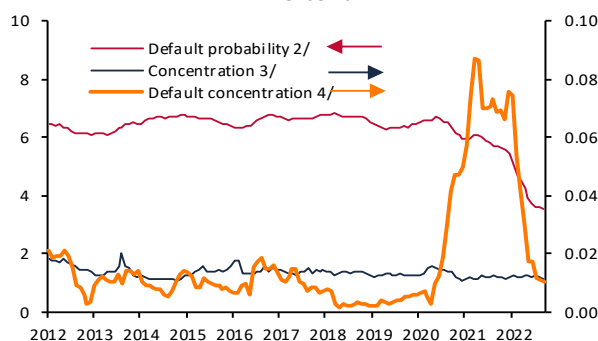


Data as of September 2022

Source: CNBV

1/ Using a one-year time horizon and a 99.9% confidence level. The pie chart shows overall portfolio percentage for each segment.

b) Portfolio concentration, probabilities and correlation of default^{1/}



Data as of September, 2022

FuenteSource

1/ Components used as main inputs to estimate the portfolio's CVAR.

2/ Average probability of default for the portfolio over an annual horizon.

3/ Concentration of the loan portfolio as measured by the Herfindahl-Hirschman Index.

4/ Portfolio average default correlation over an annual horizon.

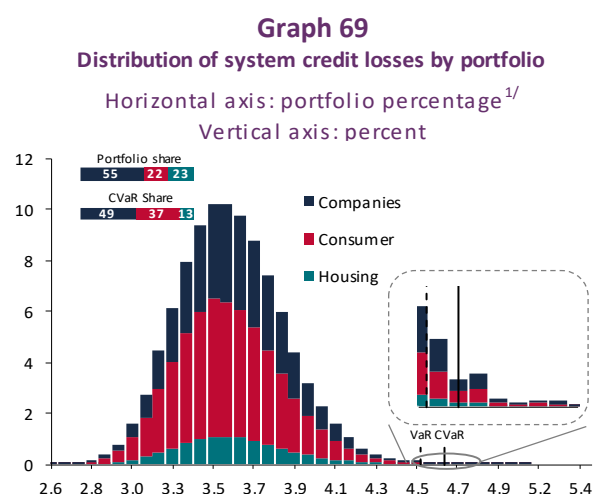
³¹ The conditional value at risk (CVAR) allows to assess the losses in the tail of the distribution, given that it represents the expected loss value when greater than the VAR, which, in turn, represents the percentile that corresponds to a given confidence level in a loss probability distribution of a portfolio of credit risk assets.

³² Credit VaR is estimated using the "Capitalization and Credit Risk (CYRCE its acronym in Spanish)" model. The main components of this model are each loan's probability of default, the potential default variance and

covariance structure, and the portfolio's loan structure and concentration level. The model is explained in Banco de México, 2006 *Financial System Report* (May 2007), pages 64-67 and in Javier Márquez Díez-Canedo, A New Vision of Credit Risk, Limusa (2006).

³³ The default probabilities and correlations used in the model are estimated through the observed historical default rates of loans, whose reference can be found in Banco de México, 2006 *Financial System Report* (May 2007), Box 10.

Based on all commercial bank loan portfolio exposures, a potential credit loss distribution is produced in order to estimate different credit risk metrics (Graph 69). Although consumer portfolio is more fragmented, it has a relatively high likelihood of default, which makes its contribution to CVAR significantly higher than its share of the total portfolio balance (37 % vs. 22 %).



Data as of September 2022

Source: CNBV

1/ Each portfolio's loss percentage is relative to the total loss within each range. VaR and CVaR levels are 99.9%.

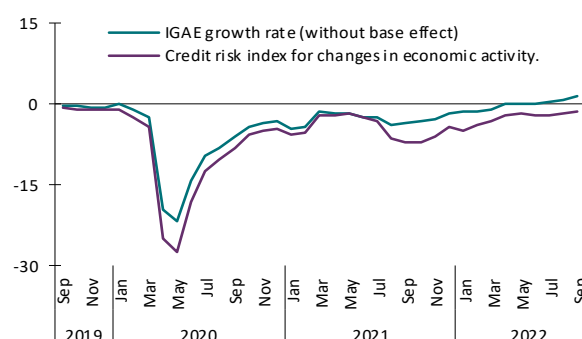
Banks' exposure to changes in both formal employment and economic activity

Reviewing how economic growth and formal employment trends may impact credit risk, the following Indicators are introduced, with data from corporate, payroll, mortgage, and automotive loan portfolios.

Regarding the corporate portfolio, the indicator points to risk when the Global Indicator of Economic Activity (IGAE, its acronym in Spanish) either falls in the aggregate and/or when economic activity falls in the sectors with the largest share of the loan

portfolio.³⁴ Since the last *Report*, the indicator has shown lower risk levels for each month under review. For the overall period, the decrease in credit risk was commensurately lower than IGAE recovery, since growth during this period was slightly focused on sectors with a greater share in production versus portfolio (Graph 70).

Graph 70
Corporate portfolio credit risk due to changes in economic activity^{1/}
Percent change



Data as of September 2022

Source: Own compilation with Banco de México and INEGI data.

1/ As of March 2021, the IGAE year-over-year growth rate considers the base effect. Therefore, the year-on-year growth rate in each month is determined as the sum of the year-on-year variation in the month of February 2021 and the monthly variation in the same month.

For payroll, mortgage and auto loans, indicators point to risk when formal employment either falls in the aggregate and/or when it falls in labor markets with more credit share.³⁵ Since the last *report*, the payroll credit portfolio indicator has steadily improved, showing a lower credit risk. This was a substantial decrease because this employment increase was focused on labor markets with a high payroll credit portfolio share, including higher-wage employment (Graph 71). For the housing and auto portfolios, the indicator has also improved. The improvement in housing was even greater, helped by employment

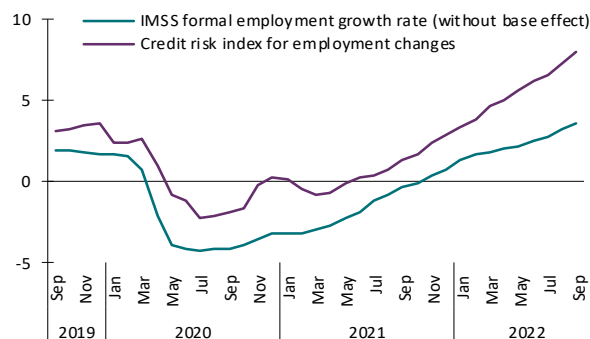
³⁴ The indicator is built as an aggregate of economic growth in the different sectors. Each sector's growth weight in this aggregate equals its share of the corporate loan portfolio. Therefore, the indicator incorporates the aggregate change risk and sectoral changes in economic growth.

³⁵ For payroll, mortgage and auto loans, the indicators are built as the weighted sum of the growth in formal employment in Mexico's different

labor markets. In this aggregate, the weight received by the labor market for a state, gender, and high or low wage level equals its share of the payroll credit. The borrowers' observed historical wage distribution is used to determine the threshold for high-wage formal employment. High wages, in particular, include wages that are above the distribution's average.

performance in the most populated states with the highest mortgage loans, such as Mexico City, Nuevo León and the State of Mexico. In addition, growth in mortgage loans was also stronger than that of auto loans.

Graph 71
Payroll portfolio credit risk due to changes in formal employment^{1/}
Percent change



Data as of September 2022

Source: Own compilation with Banco de México, INEGI and IMSS data.

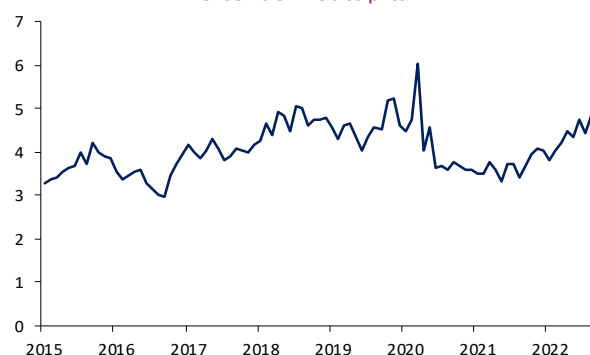
1/ As of March 2021, the year-over-year growth rate of formal employment considers the base effect. Therefore, the year-on-year growth rate in each month is determined as the sum of the year-on-year variation in the month of February 2021 and the monthly variation in the same month.

Market risk

Bank market risk, as measured by market *CVAR* as a share of net capital, has increased since April 2022, rising from 4.45 % to 5.11 % as of September 2022. This year's trend is mainly due to adjustments in banking institutions' holdings of debt instruments susceptible to interest rate increases (Graph 72).

Graph 72

Conditional Value at Risk (*CVAR*) at 99.9% for commercial banking market risks
Percent of net capital



Data as of September 2022

Source: Banco de México, CNBV, BMV, Bloomberg and Valmer.

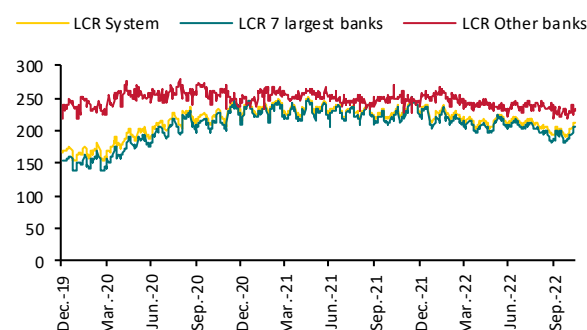
Liquidity risk

During the second half of 2022, the aggregate liquidity position of the Mexican banking system remained ample and, overall, no liquidity stress is expected for the system.

Commercial banks remain highly liquid (Graph 73), including their foreign currency position (Graph 74), with indicators that remain at levels above both regulatory thresholds and pre-pandemic levels.

Graph 73

Daily LCR of the banking system and group of banks
Percent



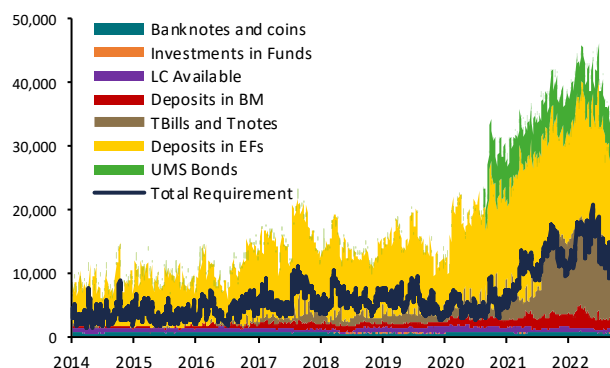
Data as of November 15th, 2022

Source: Banco de México

Graph 74

Liquidity requirement in foreign currency and liquid assets

Millions of dollars



Data as of November 15th, 2022

Source: Banco de México

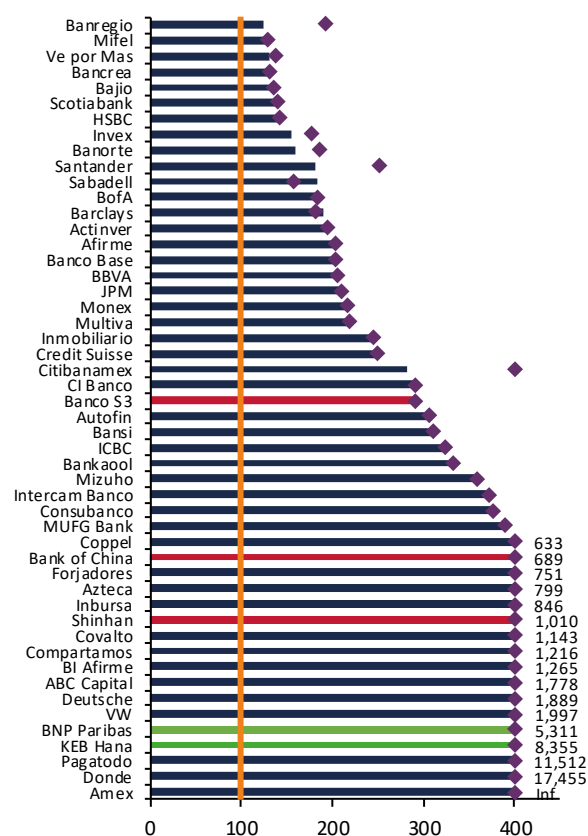
High liquidity levels are explained by the growth of traditional funding sources since 2020. Both demand and term deposits kept growing during the second half of 2022, and although such growth rate slowed compared to previous months, it still outpaced the lending growth rate.

Assessing individual commercial banks, all of them maintained an average Liquidity Coverage Ratio (LCR) above 100 % during the third quarter of 2022 (Graph 75).

Graph 75

LCR of commercial banking institutions ^{1/}

Percent



Data as of September 2022

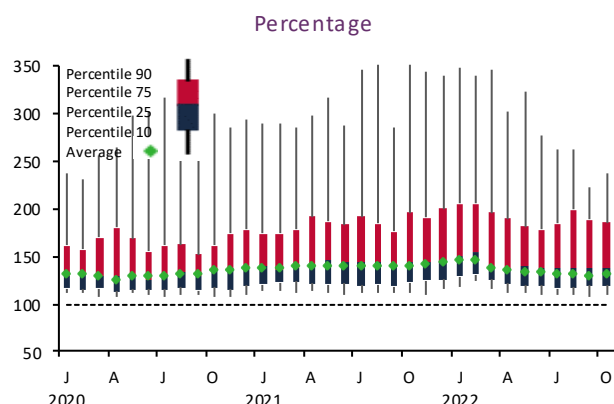
Source: Banco de México and CNBV

1/ The graph shows the quarterly LCR average from July to September 2022 for each bank. Pursuant to current regulations, consolidated CCL in bars and individual CCL with rhombus are shown. Banks in dark blue must meet a minimum 100% CCL, banks in red a minimum of 90%, banks in green a minimum of 80%, and banks in orange a minimum of 70%, banks in yellow a minimum of 60%, and banks in turquoise with a regulatory minimum of 0%.

The Net Stable Funding Ratio (NSFR) has remained steady, with marginal changes relative to its pre-pandemic levels (Graph 76). The indicator assesses structural liquidity and became a regulatory requirement as of March 2022. Ever since, all institutions have maintained a NSFR equal to or higher than the 100 % set by regulation (Graph 77). It is noteworthy, that on average, there has been a slight NSFR decline since March 2022, but this decline is not

attributable to banks' deterioration in structural liquidity, but rather to changes in the way this ratio is calculated since its implementation.

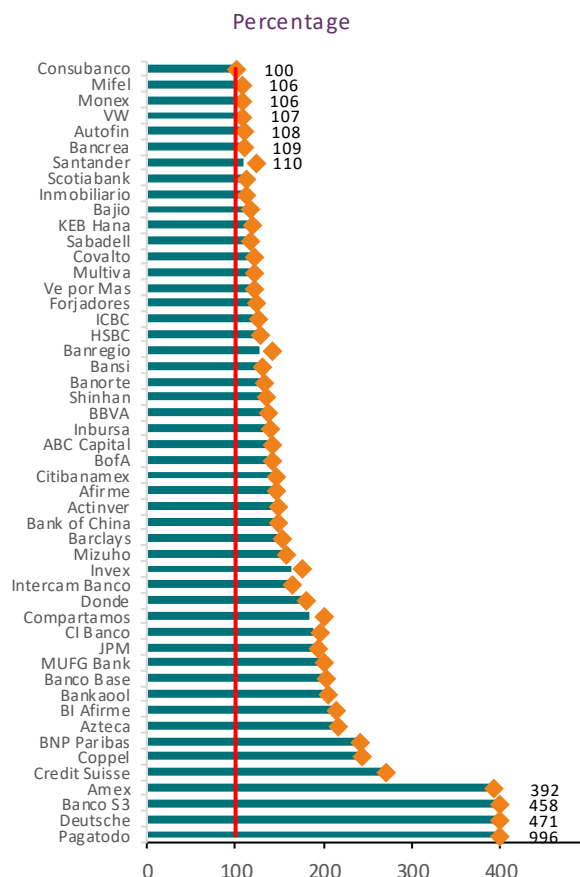
Graph 76
NSFR distribution



Data as of October 2022

Source: Banco de México

Graph 77
NSFR of commercial banks ^{1/}



Data as of September 2022

Source: Banco de México and CNBV

^{1/} The graph shows the quarterly NSFR average from July to September 2022 for each bank. Pursuant to current regulations, consolidated NSFR in bars and individual NSFR with rhombus are shown.

Despite the abundant liquidity in the banking system, some medium and small banks remain exposed to a higher liquidity risk than their peers due to the heavily concentration of their funding sources in few wholesale counterparties. This is a risk to be addressed by these institutions, since those funding sources are usually less stable than retail funding sources (Graph 78). To this end, these institutions should encourage long-term fundraising, diversifying counterparties and maturities, and try to increase their retail fundraising.

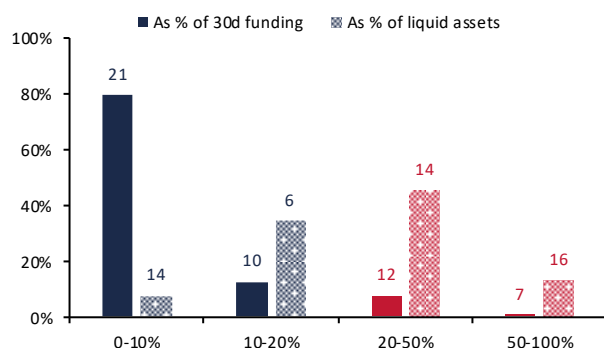
Graph 78

Funding concentration of the 10 largest counterparts that fall due within 30 days 1/2/

Vertical axis: Total System Assets ratio

Horizontal axis: percentage that the 10 largest funding counterparts as a proportion of liquid assets and 30 days funding

Label: number of banks



Figures at the end of October 2022

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.

Interbank loans

Repurchase financing in the interbank market remains high and with relatively low interest rates, as compared to the historical median and the pre-pandemic level. On the other hand, unsecured loans have decreased. This could suggest that uncertainty has not yet subsided, as evidenced by a slight preference towards repurchase agreements.³⁶

Since the last quarter of 2021, repurchase agreement loans of non-domestic systemically important banks, have increased 24 %, and since the end of the first half of 2022, stands over 400 billion pesos (MXN) (Graph 79). Meanwhile, domestic systemically important banks (D-SIBs) have remained slightly above their historical median, estimated since January 2008 (731 billion MXN). However, the spread between the reference rate and the funding rate of the latter has increased progressively, suggesting that

the D-SIBs have been funding at a historically low rate versus the reference rate (Graph 80).

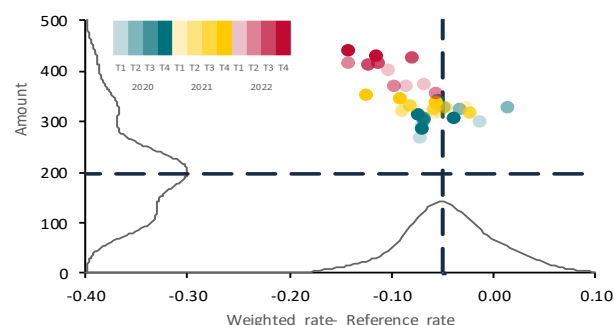
Graph 79

Repo market^{1/}

Other banks^{2/}

X- axis: Basis points

Y- axis: Billions of pesos



Data as of November 2022

Source: Banco de México

1/ Data include all authorized counterparties and all types of securities.

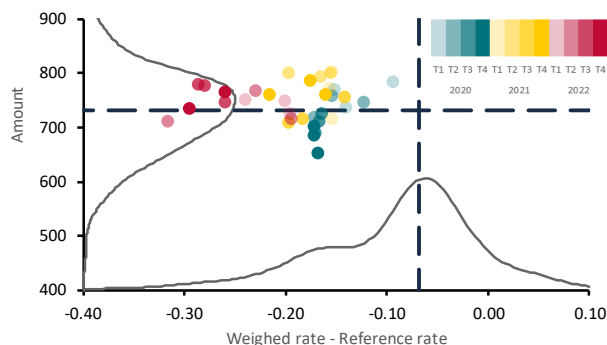
2/ The gray curves depict each variable's historical distributions since 2008, while the dotted lines depict the distribution's medians. The markers match the observations for the quarters from 2020 to 2022, showing a color associated with each year, and different color intensities per quarter. Regarding the horizontal axis, a negative range marker means that the average bank funding rate is lower than the reference rate.

³⁶ Monthly data as of January 2008.

Graph 80
Repo market^{1/}
BISL^{2/}

X-axis: Basis points

Y. Axis: Billions of pesos



Data as of November 2022

Source: Banco de México

1/ Data include all authorized counterparties and all types of securities.

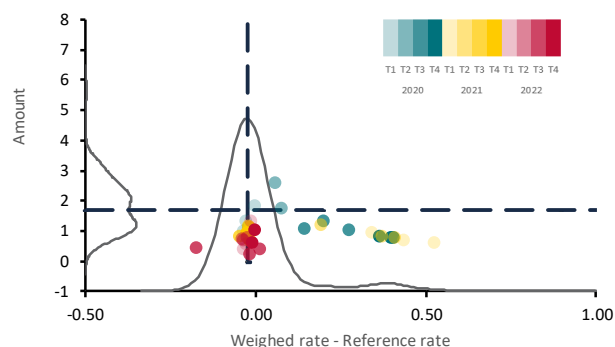
2/ The gray curves depict each variable's historical distributions since 2008, while the dotted lines depict the distribution's medians. The markers match the observations for the quarters from 2020 to 2022, showing a color associated with each year and different color intensities per quarter. Regarding the horizontal axis, a negative range marker means that the median bank funding rate is lower than the reference rate.

Conversely, unsecured loans decreased since Q2 2020 for the system as a whole. By the end of November 2022, the D-SIBs had a funding amount of 10.13 billion MXN and of 1.04 billion MXN for the remaining banks. These amounts differ from their historical medians as measured since 2008 (26 billion MXN and 1.7 billion MXN, respectively) (Graph 81 and Graph 82).

Graph 81
Unsecured market
Other banks^{1/}

X-axis: Basis points

Y- axis: Billions of pesos



Data as of November 2022

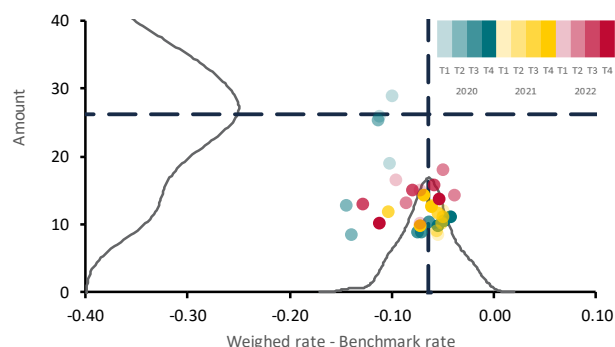
Source: Banco de México

1/ The gray curves depict each variable's historical distributions since 2008, while the dotted lines depict the distribution's medians. The markers match the observations for the quarters from 2020 to 2022, showing a color associated with each year and different color intensities per quarter. Regarding the horizontal axis, a negative range marker means that the median bank funding rate is lower than the reference rate.

Graph 82
Unsecured market
BISL^{1/}

X- axis: Basis points

Y- axis: Billions of pesos



Data as of November 2022

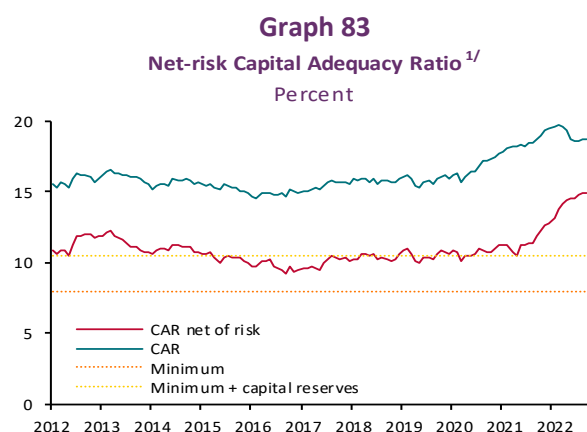
Source: Banco de México

1/ The gray curves depict each variable's historical distributions since 2008, while the dotted lines depict the distribution's medians. The markers match the observations for the quarters from 2020 to 2022, showing a color associated with each year and different color intensities per quarter. Regarding the horizontal axis, a negative range marker means that the average bank funding rate is lower than the reference rate.

Capital Adequacy Ratio (CAR) and liquidity at risk

When assessing the net-risk Capital Adequacy Ratio (CAR) and the Liquidity Coverage Ratio (LCR) at risk, most banks have sufficient liquid resources and capital to withstand stressful conditions. No institution would simultaneously fall below the regulatory threshold for both requirements under stress scenarios.

On the one hand, the net risk capitalization ratio, estimated as the resulting capitalization ratio against portfolio losses equal to the 99.9 % conditional value at risk (*CVAR*), increased during Q2 & Q3 2022, from 14.14 % in March 2022 to 14.93 % in September 2022 (Graph 83). This was the result of reduced loan portfolio *CVAR*. The banking system's ratio levels remain well above the regulatory threshold, thus highlighting the banks' ability to mitigate unexpected losses arising from past-due portfolio in their portfolios.^{37,38,39}



Data as of September, 2022

Source: CNBV

1/ Estimated as the CAR resulting from reducing *CVaR* to a 99.9% confidence level if both net capital and risk-weighted assets. This indicator presumes that the loan portfolio incurs losses for 99.9% of the *CVaR*, which the bank directly bears, reflecting the loss in capital without impacting its reserves and that the portfolio is weighted to determine the capital requirement at 100%.

³⁷ Assuming that such losses are directly covered by the banks' capital without impacting their reserves and that such portfolio has a 100 % weighting to determine its capital requirement.

³⁸ This indicator can be used to assess whether a bank's capitalization levels are appropriate to cover unanticipated loan portfolio losses.

³⁹ As these estimates are based on historical conditions to date, this indicator is a benchmark rather than a forecast of the potential losses that could be observed in the current situation.

On the other hand, based on liquidity-at-risk results at the end of September, the banking institutions have a sound liquidity position. Even under scenarios of extreme cash outflows, most banking institutions maintain a liquidity coverage ratio above the 100 % minimum regulatory threshold. These institutions account for about 95 % of the system's total assets (Table 4).⁴⁰

Table 4
Groups of banks by liquidity at risk^{1/}

Group	Criteria	Assets of the banks in the group as a proportion of the commercial banks' total assets
1	$LCR \leq 65$	1.9%
2	$65 < LCR \leq 100$	2.7%
3	$LCR > 100$	95.4%

Data at the end of September 2022

Source: Banco de México

1/ Total assets data for commercial banks refer to those released by the CNBV at the end of September 2022.

Similarly, the same exercise performed at the system level suggests that, in the aggregate, the banking system has enough cash resources to cope with stress episodes associated with cash outflow factors related to the 95 % *CVAR* of the system's historical distribution of deposits. This finding suggests that, in the event of stress scenarios where some banks may experience liquidity strains due to idiosyncratic conditions, liquidity is maintained within the system, constituting a funding source via the interbank market.

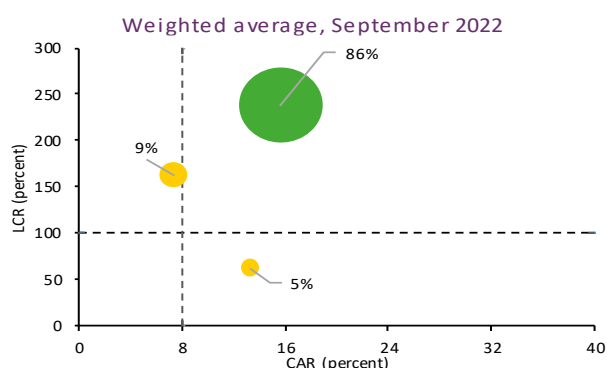
Therefore, the joint evaluation of the results of the liquidity-at-risk and the net risk capitalization ratio exercises for commercial banks, allows us to identify those institutions which might be more vulnerable in

⁴⁰ The liquidity at risk exercise aims to assess whether commercial banks have sufficient liquid assets (cash and high-quality debt securities) to meet their cash outflows net of cash inflows in a 30-day stress period. For this purpose, the cash outflow factors are estimated based on historical information of each bank's deposits (95 % *CVAR*). The potential impact on the value of liquid assets under three historical and three macroeconomic scenarios is also considered. For more details on this methodology, see the December 2020 Financial Stability Report.

stress periods, by not having the required solvency or liquidity. Both exercises suggest that most banks are compliant with both requirements and have sufficient cash resources and capital to cope with periods of stress. At the end of September, no institution was, simultaneously, below the regulatory threshold for both requirements under the stress scenarios (Graph 84).

Graph 84

Liquidity and solvency at risk of commercial banks ^{1/}



Data as of September, 2022

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 yellow and green colors denote those institutions that: fail to comply with one of the two requirements; and comply with both requirements.

Contagion risk

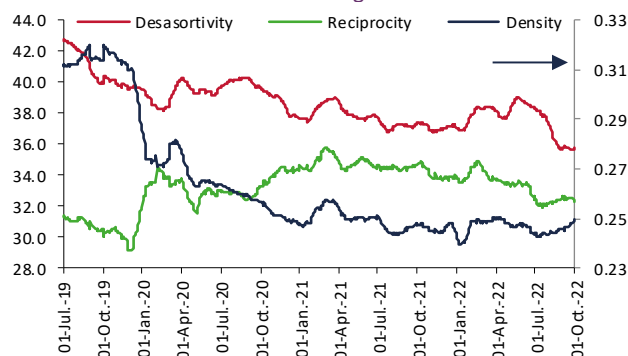
This section includes the results of the contagion risk⁴¹ assessment using the exposures network between financial institutions in the interbank market. Using the Mexican financial system's network grid, this approach enables to explore the mechanisms through which certain risks and

vulnerabilities can be spread to the financial system as a whole. To do so, information on all daily exposures within the domestic financial system, as well as among foreign financial institutions, is used.⁴²

Since the pandemic broke out, the inter-fund exposure network has been found to have undergone some structural changes. The most lasting impact has been the network being less interconnected, displaying low density levels (Graph 85). Similarly, since the previous *Report* was released, interconnections were initially concentrated in large intermediaries, and were then shared among more similar intermediaries (growth and subsequent fall in disassortativity levels⁴³), as well as a slight fall in reciprocity. This led some systemic risk measures, such as worst-case contagion chain losses, to be lower at the beginning and to increase in recent months. The reason for this is that the influence of larger and better-capitalized intermediaries, who tend to serve as a buffer when contagion chains occur, has changed.

Graph 85

Interfinancial exposure network measurements ^{1/}



Data as of September 30th, 2022

Source: Banco de México

1/ The series plotted correspond to the 21-day simple moving average of the original series.

Losses in the worst contagion chains remain lower than at the beginning of the pandemic, but have increased on some days in the last six months of the

⁴¹ Interbank contagion risk means the potential for problems faced by one bank in meeting its financial commitments to be directly or indirectly passed on to other banks.

⁴² It includes exposure information in the interbank network, arising from (i) securities purchases and sales; (ii) deposits and loans; (iii) market transactions, such as derivatives and repurchases; and (iv) foreign currency purchase and sale transactions.

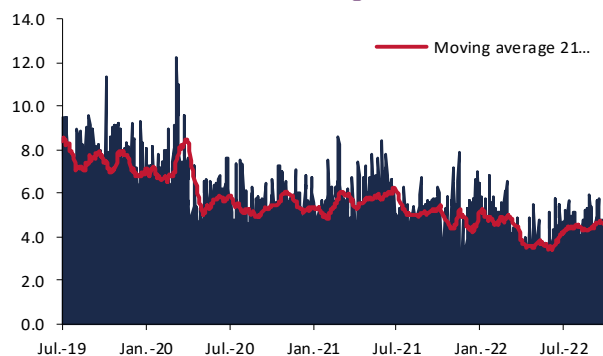
⁴³ Disassortativity means a greater likelihood that intermediaries, which in general are not very interconnected, will seek greater relationships with highly interconnected intermediaries, thus discontinuing interrelationships with other intermediaries which are not very interconnected.

year (Graph 86). The severity of losses sustained by the affected intermediaries has also increased in recent months (Graph 87).

In fact, more intermediaries would end the counterfactual year with capitalization levels below the regulatory threshold than a few months ago, and close to pre-pandemic levels. These changes are consistent with recent developments in the network structure, as some indicators have already returned to levels closer to their pre-pandemic levels (Graph 86).

Graph 86

Bank and broker dealers' assets involved in the worst chains of contagion
Percentage

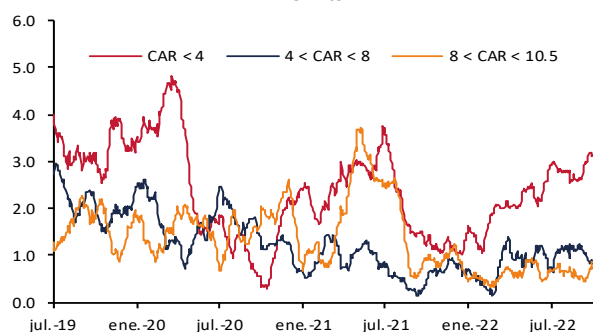


Data as of September 30th, 2022

Source: Banco de México

Graph 87

Number of banks involved in the worst chains of contagion by final CAR levels ^{1/}
Units



Data as of September 30, 2022

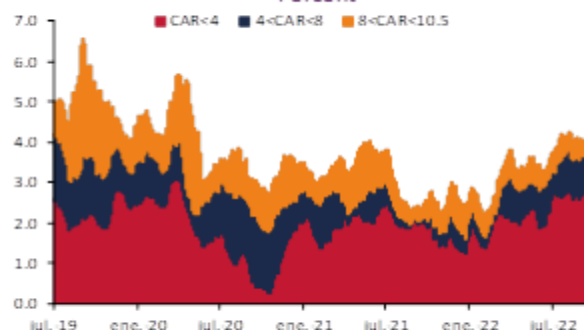
Source: Banco de México

1/ The series plotted correspond to the 21-day simple moving average of the original series.

⁴⁴ For example, in Q3 2020 and Q3 2021, 12% and 9.5%, respectively, of the losses in all contagion chains were greater than 3.5% of the system's

Graph 88

Mean bank assets lost in the worst chains of contagion by CAR levels ^{1/}
Percent



Data as of September 30th, 2022

Source: Banco de México

1/ The series plotted correspond to the 21-day simple moving average of the original series.

Lastly, the severity of losses sustained by impacted intermediaries has increased slightly in recent months (Graph 87), showing higher losses as a proportion of assets for this group of intermediaries (Graph 88).

On the other hand, loss sharing across all contagion chains remains at lower levels than in 2020 and 2021, but in the last quarter, it has shifted to higher levels.⁴⁴ In fact, by the end of Q3 2022, 2.3% of the chains would be incurring losses, versus 2.4% in Q3 2020 (Graph 89).Graph

Repurchasing is among the most commonly used transactions by commercial banks, development banks and broker-dealers to secure short-term funding. Despite being a relatively low-risk financial operation, both because of prevalence and because the counterparties are often other financial intermediaries, monitoring the repurchases exposure network is advisable.

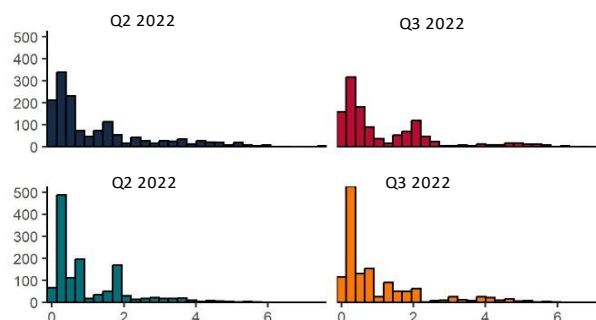
For instance, at the end of September 2022, more than 400,000 repurchase transactions were conducted with government securities as underlying, involving close to 700 counterparties⁴⁵ (Graph 90).

assets; while in the last two quarters, only 4% and 8% exceeded the 3.5% level.

⁴⁵ The gross amount traded was close to 3.5 trillion pesos.

Graph 89

Distribution of asset losses by quarter
x-axis: Percentage; y-axis: Frequency



Data as of September 30th, 2022
Source: Banco de México

The most common⁴⁶ repurchase transactions are conducted with commercial banks, investment companies or funds, or mutual investment fund operating companies; and non-financial legal entities (Graph 91).

Although repurchase is a short-term funding instrument, 38 % of transactions were made using securities with a remaining maturity of more than 3 years as the underlying asset (Graph 92).

Graph 90

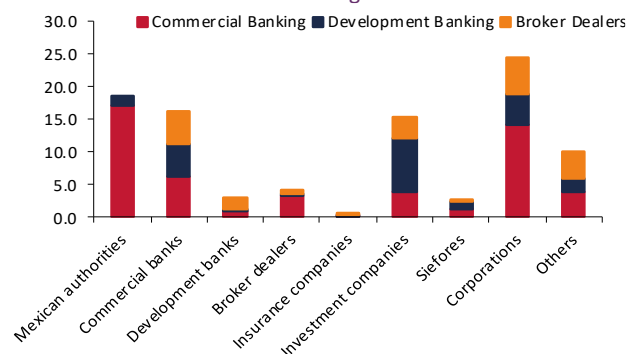
Network of repo exposures^{1/}



Data as of September 30th, 2022
Source: Banco de México
1/ The diameter of the points is proportional to the importance in the network.

Graph 91

Percentage of repo transactions per counterparty^{1/}
Percentage

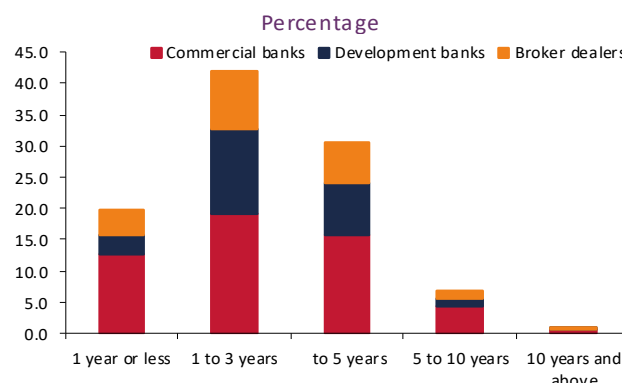


Data as of September 30th, 2022
Source: Banco de México

1/ Percentage of the amount of repo transactions by reporting institution and counterparty

Graph 92

Percentage of repo transactions per remaining security term



Data as of September 30th, 2022
Source: Banco de México

V.3.2. Development banks and other development financial institutions

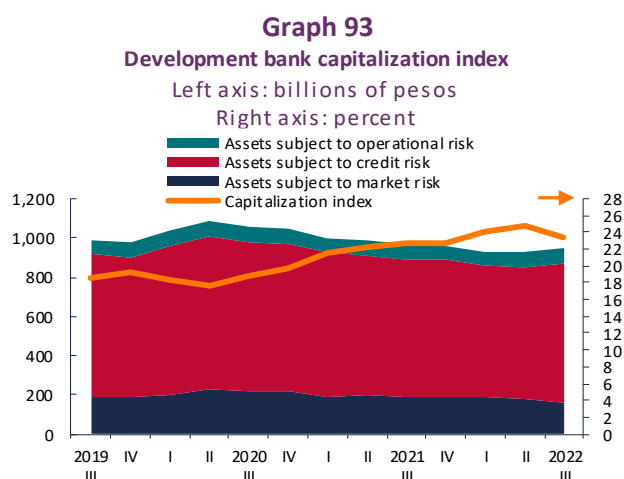
As of September 2022, development banks and other public development financial institutions (development banking system)⁴⁷ are in a sound financial position. Despite a downward trend in the financing balance and higher preventive reserves, the system shows a positive trend in the main Financial Statement items, including a positive net profit and a growing capitalization ratio.⁴⁸

⁴⁶ This includes many of them conducted as open market transactions.

⁴⁷ This concerns the 6 development banks, FIRA and FND.

⁴⁸ However, FND's situation is noteworthy, as it exhibits poor levels in some of its financial indicators.

As of September 2022, development banking institutions as a whole recorded a 23.38% Capitalization ratio (CAR), 73 bps higher than in September 2021. This can be explained by a 1.3% net capital increase and a 2.8% decrease in total risk assets. Notably, credit risk assets increased during Q3 due to a peak in some institutions' placements; however, this was offset by a decline in market risk assets (Graph 93).



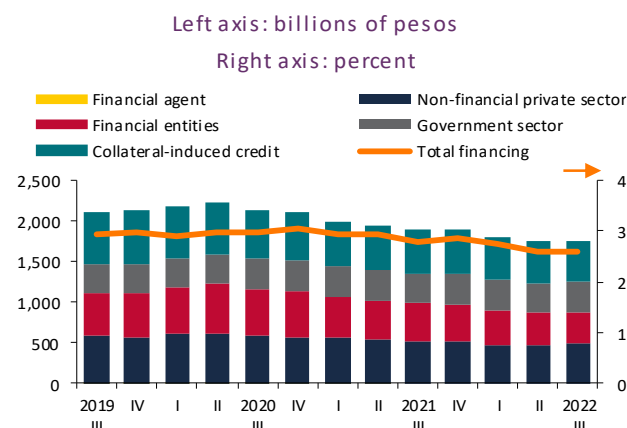
Data as of September 2022
Source: CNBV

As of September 2022, the development banking system recorded⁴⁹ a 1,762 billion MXN direct and induced financing balance, thereby maintaining the downward trend begun in Q3 2020; the year-on-year decline was 7.1% in real terms. This balance represents 26.1% of the banking sector's total funding and 5.89% of GDP (Graph 94). As of the same date, 71% of total financing granted by development banks and other financial institutions consisted of direct loans and 29% of net induced loans. Financing to the private sector accounted for 76.0% of the overall amount (Figure 2).

⁴⁹ Development banks and other financial institutions fulfill their mission by: a) granting funding through first and second tier credits, "direct lending", and providing collateral, "induced lending", which means the

Graph 94

Evolution of loan balances and induced balances of development banks and development institutions

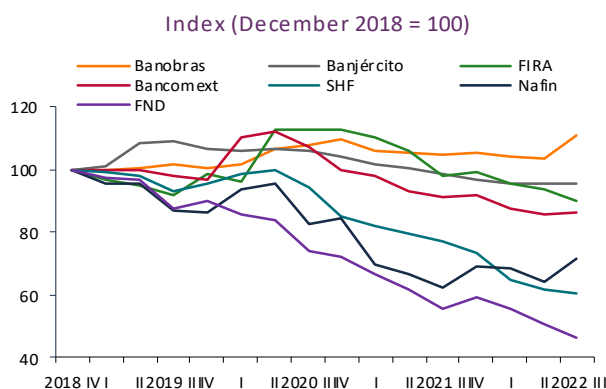


Data as of September 2022
Source: CNBV

Second-tier credit shrank by 14.4% in real terms in the last year, while first-tier loans declined by 4.5% in real terms. The total loan balance showed a mixed performance among institutions (Graph 95). The increase in Nafin and Banobras was mainly due to loans related to state-owned companies.

Graph 95

Growth in loan portfolio balance by institution



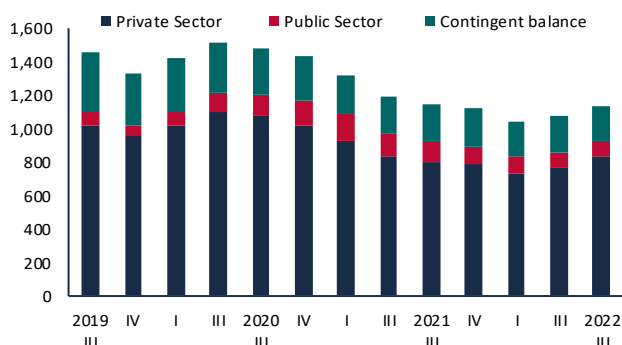
Data as of September 2022
Source: CNBV and Banco de México

Loan and security placements as of September 2022, defined as the amount disbursed in the last 12 months, showed a 1.2% real annual decrease (Graph 96). The drop in FIRA and FND placements was offset by an

final loan amount with a percentage of collateral coverage; b) operating special development programs; c) technical assistance; and d) operations as a financial agent.

increase in Bancomext (National Foreign Trade Bank), and Nafin.

Graph 96
Loan and collateral placement flows from development banks and development institutions (12M)
Billions of pesos



Data as of September 2022

Source: CNBV and Banco de México

The development banks' and other public development financial institutions' loan portfolio are concentrated in a small number of borrowers (HHI<100); however, due to their terms, some of the institutions are concentrated in specific sectors. Furthermore, while a migration towards higher risk ratings has been seen in the corporate portfolio, around 75% remains focused on the highest regulatory credit ratings (A1/A2 CNBV scale).

As of September 2022, the stage 3 portfolio stood at 40.24 billion MXN. Starting in Q4 2021, increased delinquencies were primarily associated with a telecommunications project funded by several development banks.⁵⁰ During Q3 2022, the stage 3 portfolio decreased 22% in real terms versus September 2021, primarily as a result of one Bancomext borrower leaving, while one NBFi defaulted during the quarter.

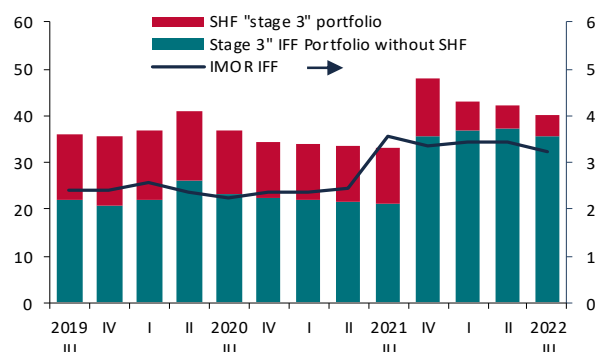
The development banking system recorded a non-performing loan rate (IMOR, its acronym in Spanish) of 3.22%, 78 bps higher than in September 2021 (Graph 97); as reference, the commercial banks' portfolio

IMOR reached 1.63%.⁵¹ The IMOR increase is explained by two factors: the increase in the stage three portfolio and the fall in the loan balance. The IMOR levels were highest in FND and Federal Mortgage Society (SHF, its acronym in Spanish), with 23.16% and 8.29%, respectively.

Graph 97
Evolution of the "Stage 3" portfolio of development banks and development institutions

Left axis: billions of pesos

Right axis: percent



Data as of September 2022

Source: CNBV and Banco de México

As of September 2022, credit induced by collateral accounts for 2.6 times the contingent balance, i.e., coverage is 37.9 % on average; such induced credit maintains a downward trend and recorded a 5.3 % real decrease in the last year. Among the factors associated with this outcome are the lower risk tolerance by private financial intermediaries and a lower demand for collateral products.

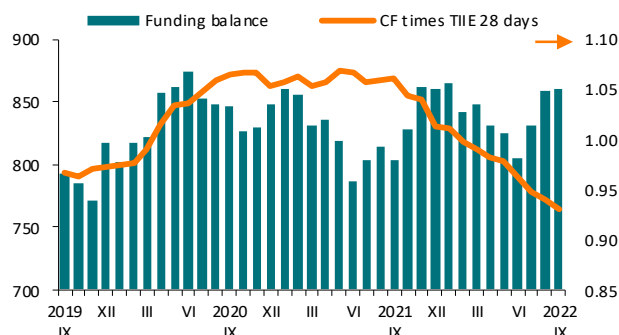
The main funding sources for the sector are promissory note with interest payable at maturity (PRLV, its acronym in Spanish) and securities issued, which accounted for 65 % and 28 % of the total, respectively, as of September 2022. As of Q1 2022, the funding cost returned to levels below the 28-day TIE. During the first three quarters of the year, the surcharges on issuance by some development banks were lower than in 2020 and 2021 (Graph 98).

⁵⁰ In October 2022, the business was restructured. Creditors entered into the bankruptcy agreement suggested by the borrower. This includes a payment plan that allows for principal recovery and the borrower's operating continuity.

⁵¹ Commercial banks also include the loan portfolio of sofomes regulated as having an equity relationship with a bank, whether or not they are its subsidiaries.

Regarding market risk, three institutions hold substantial amounts of securities, which are mainly reported with institutional clients. These institutions have appropriate risk management and reasonable investment structures in line with their liabilities.

Graph 98
Development bank funding evolution
Left axis: billions of pesos
Right axis: times



Data in current prices

Source: Banco de México

CF: Cost of funding in times TIE 28 days (weighted average)

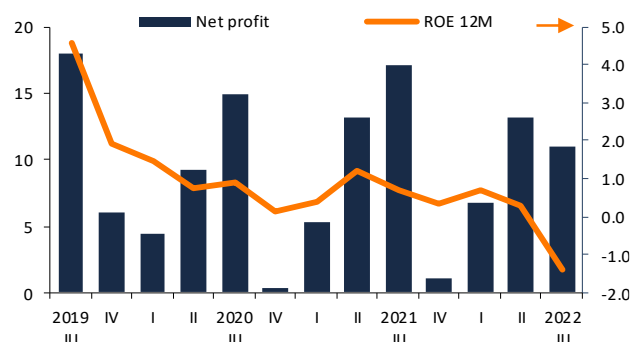
As of September 2022, liquidity conditions in development banks and other financial institutions have remained stable.

As of September 2022, the development institutions reported a net income of \$10,923 million MXN, 36 % lower year-on-year. This is primarily attributable to extraordinary leverages of 11,000 million MXN at the end of Q3. The annualized ROE stands at -1.4 %, which is explained by leverages made in December 2021 and during 2022 beyond the standard period (Graph 99).

Graph 99
Net income and ROE (12M) of development banks and development institutions

Left axis: billions of pesos

Right axis: percent



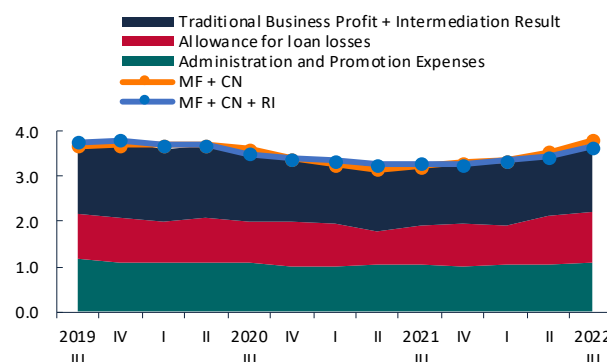
Data as of September 2022

Source: CNBV and Banco de México

As of September 2022, the financial margin was 8.9 % higher year-on-year, mainly driven by higher benchmark interest rates. Interest income increased 36 % and interest expense increased 50 %; however, higher interest income was enough to offset higher expenses and loan loss provisions (Graph 100).

Graph 100
Performance Indicators (with respect to Net Productive Assets)

Percentage



Data as of September 2022

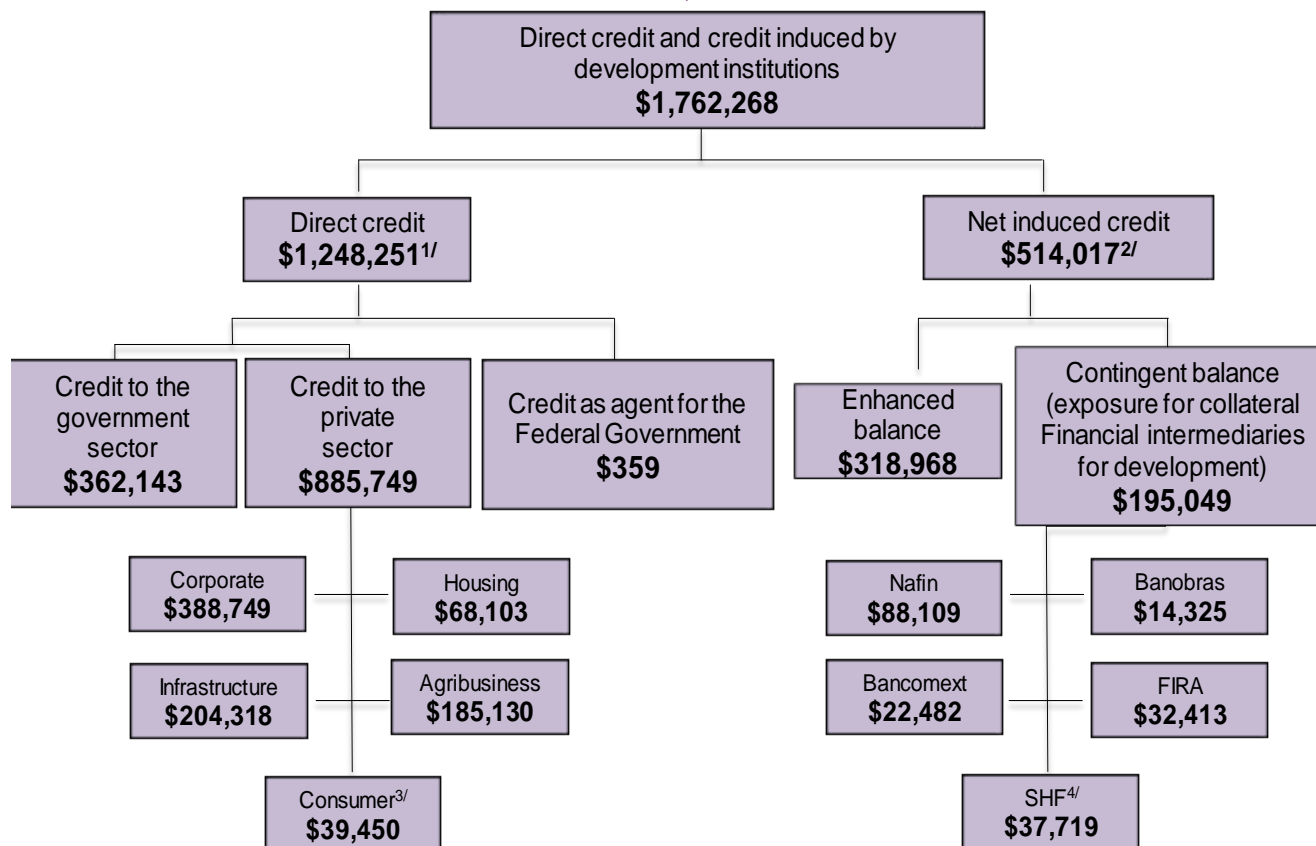
Source: CNBV and Banco de México

Cumulative figures for the last 12 months

FND's financial situation is especially relevant, with the highest non-performing loan indicators in the system, and past-due portfolio coverage by reserves lower than one unit.

Figure 2

Direct credit and credit generated by guarantees granted by development banks and development institutions
Million pesos



Data as of September 2022

Source: Banco de México

1/ Credit amount on financial development institutions' balance sheet.

2/ Net induced credit means the aggregate credit balance granted by several private financial intermediaries, which is partially collateralized by development banks, FIRA and the FND, and which is not funded by development institutions.

3/ Consumer credit includes loans to the Mexican military, which are covered by Banjercito, payroll loans granted by Banco del Bienestar, and development bank loans to employees related to labor benefits.

4/ It includes SHF's Housing Loan Insurance (SCV for its acronym in Spanish) insurance guarantees.

V.3.2.1. Infonavit and Fovissste

Infonavit

Infonavit is the main grantor of housing loans in the country. However, Infonavit's housing portfolio has steadily declined in recent months. While new loans granted have been declining on an annual basis since year-end 2021, the average loan amount has increased because higher-income affiliated individuals are getting the loans. Infonavit borrowers are especially vulnerable to employment shocks, and since most of them belong to low-income deciles, they are also vulnerable to a deterioration in their

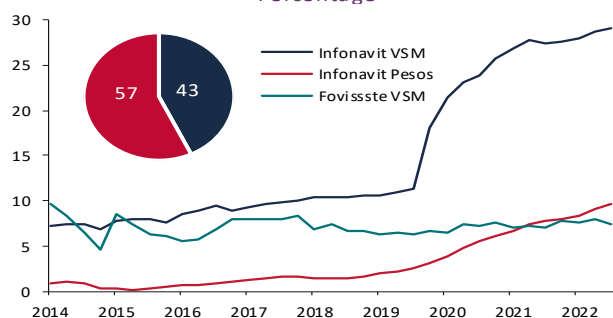
disposable income in real terms. An employment shock involving termination of a formal labor relationship for an affiliated individual with outstanding Infonavit credit increases Infonavit's portfolio credit risk, since monthly loan repayments from affiliated borrowers are made through direct payroll discounts. However, Infonavit has acted to

increase the rate at which mortgage loans are granted.⁵²

At the end of September 2022, Infonavit's housing portfolio non-performing loans ratio was at a historically high level of 18.0 %. On the one hand, such deterioration is associated with the persistent decline of loans origination, and at the same time, it is related to the deterioration of the portfolio itself. Infonavit's housing portfolio includes loans indexed in minimum wage multiples (vsm *its acronym in Spanish*) and in pesos.⁵³ 43 % of the portfolio balance is expressed in vsm and the remainder in pesos. The vsm portfolio accounts for 69 % of the non-performing loan portfolio, and its non-performing loans ratio as of September 2022 was 29.0 %, while the peso portfolio had a non-performing loans ratio of 9.6 % (Graph 101).

Graph 101

Infonavit and Fovissste housing non-performing loans ratio ^{1/}
Percentage ^{2/}



Data as of September 2022

Source: Infonavit and Fovissste

1/ The non-performing loan ratio is defined as the ratio of non-performing loans divided by the total portfolio.

2/ In the case of Fovissste, 100% of its portfolio is granted in times the minimum wage (VSM).

The portfolio originated in vsm has continuously deteriorated, and the loan repayment amount is annually updated.⁵⁴ Infonavit recently announced a program to convert vsm-expressed loans into pesos. Although these programs have been designed to mitigate non-performing and delinquent loans originated in vsm, the borrower is required to apply for the change.⁵⁵ The overall impact on this indicator will depend on whether the borrowers can sustain their payments and on the potential agreements reached with them.

On the other hand, Infonavit's housing portfolio is broken down into two systems according to the borrower's employment status. The housing portfolio under the special repayment system (REA, its acronym in Spanish)⁵⁶ i.e., loans granted to affiliated individuals who are not currently employed - has been shrinking since August 2021 and at the end of September 2022 accounted for 30.3% of Infonavit's total housing portfolio.⁵⁷ On the other hand, the housing portfolio under the standard system -i.e. loans granted to claimants who are actively employed and whose payments are deducted from their payroll- shows relatively low delinquency levels. This fact supports that a factor that impacts Infonavit's affiliated individuals' credit risk is unemployment. Therefore, the ability to make employing companies accountable in order to ensure that they withhold loan repayments via payroll is a mitigating factor of the credit risk faced by Infonavit. The economic recovery process, specifically concerning the labor market, has been positive for an

⁵² See Infonavit's Strategic and Financial Plan (2022-2026).

⁵³ Since 2014, new loans have been granted in pesos.

⁵⁴ Since the portfolio is in VSM, and its annual restatement is linked to the UMA, which is based on annual inflation, this means higher outstanding loan balances for the borrower and thus increased credit risk. In connection with this, Infonavit, by decision of its Board of Directors and in support of its borrowers, adjusted exceptionally the increase in VSM -denominated loans by 4.99 % for 2022, instead of the 7.3 % for the impact of accumulated inflation in 2021. It also has a program to restructure these loans from VSM to pesos so that borrowers can have fixed monthly payments for the remaining loan term (58 thousand loans have been converted since May 2022, when the program was launched, as of August).

⁵⁵ In the current version of the VSM peso conversion program, Infonavit removed the eligibility criteria that applied in previous versions of the program. In addition, Infonavit has facilitated the request for such restructuring, as borrowers can complete the process through Infonavit's website (My Infonavit Account). Depending on monthly income, a fixed interest rate between 1 % and 10.45 % is available, and a discount on the debt can be earned.

⁵⁶ This situation means that the loan payment is not made through direct payroll withholding, and therefore the monthly payment must be made directly by the borrower, thus increasing Infonavit's credit risk.

⁵⁷ 3.8% of the portfolio falls into the Extension category because the Infonavit Law grants the Institute's creditors the right to have access to a payment extension on their repayments upon termination of their employment relationship.

improvement in Infonavit's credit risk portfolio outlook, and hence, for its borrowers.

Although Infonavit's financial indicators show some deterioration, the Institution has enough reserves and equity to address non-performing loan losses. The reform to Infonavit's Law passed in December 2020 has provided opportunities around portfolio origination, collection and recovery. This poses a challenge in terms of housing loans origination, including home improvement and land purchase loans, as well as loans to eligible affiliated individuals without formal employment. These changes must be orderly implemented so that Infonavit may remain in compliance with its constitutional social purpose - to foster access to mortgage loans for its claimants - and so that its balance sheet's financial health may be enhanced, given that it must also provide sufficient yields to the affiliated individuals' savings fund.⁵⁸

Fovissste

Fovissste is the third largest housing loan grantor in the country. After stagnating at the beginning of 2022, its housing portfolio origination has grown in recent months. As of September 2022, Fovissste's portfolio non-performing loans ratio decreased at the margin, relative to levels seen at the end of the last *Report* (figures as of March 2022); nonetheless, there were slight increases during the period (Graph 101).

Regarding loan granting, Fovissste is working on designing new loan products, as well as on a pilot peso-denominated loan system. On the other hand, Fovissste is also challenged to collect payments from agencies or institutions that withhold payments from borrowers, since sometimes, even when monthly payments are withheld from borrowers, they have not been transferred by their employers to Fovissste.

This situation also has an impact on housing portfolio delinquency.⁵⁹

Fovissste affiliated individuals' employment stability has been, over time, a strong factor in its financial situation. Around 88% of the portfolio on its balance sheet is under the standard system, i.e. collected via direct payroll discounts; the remainder depends on the borrower's willingness to pay. A low percentage of its portfolio is overdue compared to the overall portfolio. In addition, workers' contributions to the housing fund have been recovering. Finally, Fovissste has significant loan reserves to cope with its non-performing loan portfolio losses.⁶⁰

V.3.3. Siefores and Investment funds

V.3.3.1. Siefores

Siefores remain the country's main institutional investors. However, between March and September 2022, there was a decrease in their managed resources derived from investment losses during that period. This in turn was mainly due to foreign equity instruments' performance (Graph 102).

⁵⁸ As of September 2022, the past-due portfolio amounted to 300 billion pesos (15 % of the Institute's total assets), of which 69 % is from a portfolio originated in VSM. The Institute's credit reserves accounted for 12.3 % of its assets and it had investments in securities totaling 26 % of its assets, of which 55 % is government debt. Finally, the Institute's equity accounted for 12 % of its assets.

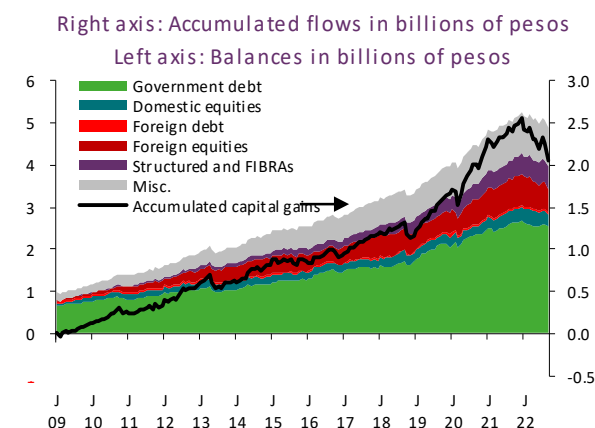
⁵⁹ There are non-payments by state entities and agencies or other decentralized organizations to Fovissste, which result in non-compliance

by the claimants with their loans and even cause default interest. Fovissste is negotiating to receive these payments.

⁶⁰ As of September 2022, the past-due portfolio amounted to 23 billion pesos (8.7 % of the Fund's total assets). In turn, the Fund's credit reserves accounted for 40 % of its assets and had investments in securities for 11.7 % of its assets, of which 99 % are in repurchase. Finally, Fovissste is a decentralized agency under ISSSTE and, therefore, does not own its own assets.

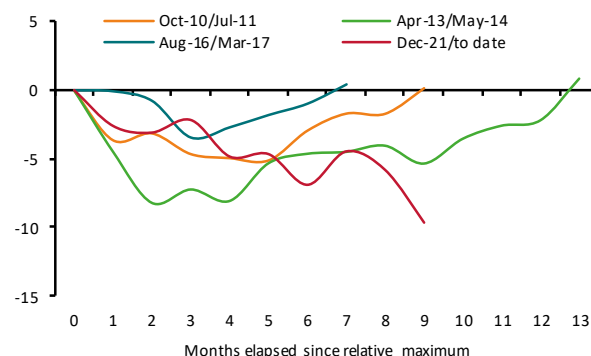
Graph 102

Portfolio composition and accumulated capital gains of siefores



Despite the fact that siefores have reported other losses in their investment portfolios, such as in 2010, 2013 and 2016, historical capital gains have remained positive. Downward fluctuations in siefores' investment portfolios have tended to dissipate as the market shocks fade away and the markets recover their price levels. This is the result of short-term shocks in financial asset prices. However, the duration and magnitude of the losses in the current episode have been greater than in previous periods, which means that the time required to recover the losses recorded is likely to be longer than in previous episodes (Graph 103). Furthermore, these losses do not necessarily translate into employees' losses as long as the employees do not withdraw, either due to unemployment or retirement. From April to September 2022, close to 1 million workers withdrew from their accounts due to unemployment, which accounts for 1.4 % of the overall accounts managed by Afores.

Graph 103

Changes in accumulated capital gains: Selected periods ^{1/}
% of the assets

Data as of September 2022

Source: Consar

1/ Capital gains are expressed in relation to the net asset value recorded at the beginning of the accrual period.

Importantly, despite the losses seen in 2022, the investment system applicable to siefores is intended to reduce investment portfolio risk as workers get closer to their expected retirement date. In fact, the pensions siefore, which considers workers closer to retirement, in September 2022, around 84% of the portfolio was invested in government securities, a figure that compares with 45% in the initial siefore, which includes workers who are beginning their working lives. Thus, system-wide, investments in government securities and foreign securities account for the largest share of the portfolio.

Although unemployment withdrawals remain high compared to previous years as per September 2022 figures, the outflow risks remain limited, since they account for about 5% of the contributions received by the Afores as of the fourth two-month period of 2022.

V.3.3.2. Investment funds

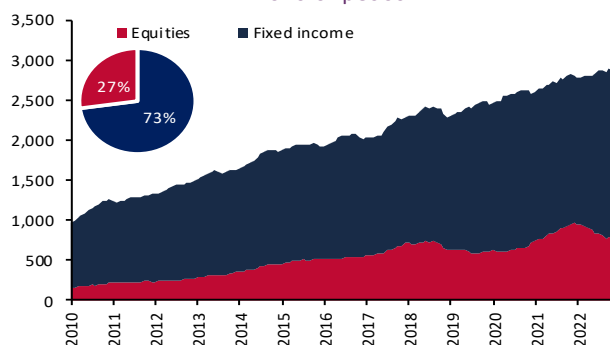
Fixed income investment funds have been growing their assets under management, as a result of valuation gains and inflows. On the other hand, equity investment funds have continued to decrease their assets under management, due to both capital losses and outflows. However, there are no liquidity constraints in the sector, despite reduced liquidity in equity funds.

The investment funds sector includes 248 fixed-income funds and 373 equity funds. Total assets under management by these investment funds amounted to 2,880 billion pesos (MXN), a 2.4 % increase in nominal terms versus the end of June 2022 (Graph 104). Performance in the investment funds sector has been irregular. While fixed income funds showed a 5.7 % nominal increase in assets over June 2022, equity funds showed a 5.6 % decrease.

Graph 104

Net assets of investment funds

Billions of pesos



Data as of November, 2022

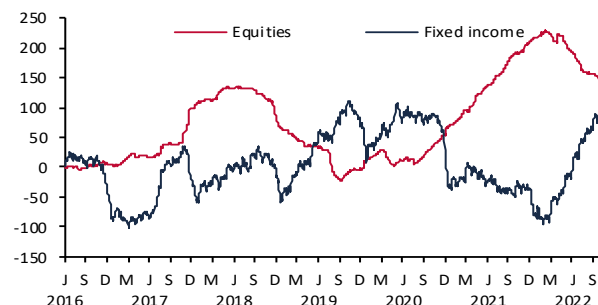
Source: Banco de México with CNBV data

Since June 2022, fixed-income funds have accumulated 86 billion MXN in inflows, in line with the trend seen since the beginning of the year (Graph 105). In addition, these funds have shown returns above the historical average⁶¹ since May 2022 (Graph 106).⁶¹

Graph 105

Accumulated investment fund cash flows

Billions of pesos



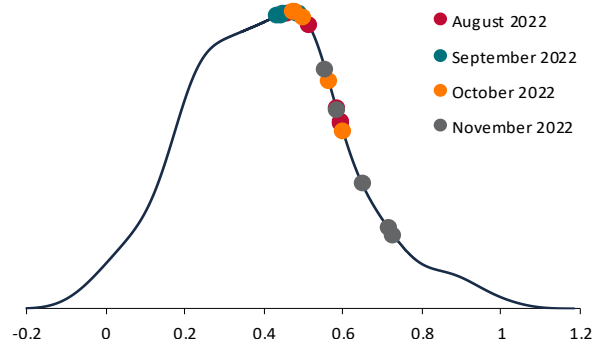
Data as of October, 2022

Source: Banco de México with CNBV data

Graph 106

Monthly returns on fixed-income funds ^{1/}

Percent



Data as of November 2022

Source: Banco de México with data from CNBV and Morningstar Direct

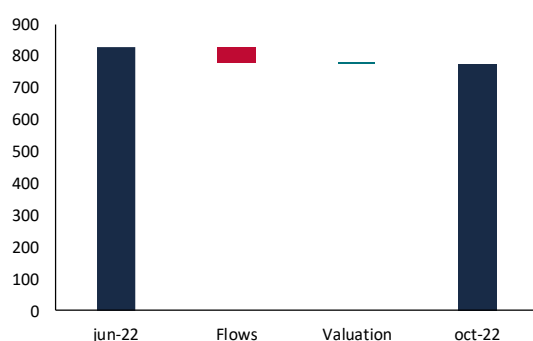
^{1/} Each point refers to daily average observations of monthly yields for one week of the month

Conversely, from June to October 2022, equity funds showed cumulative redemptions totaling 51 billion MXN and, in general, they have experienced capital losses during the period (Graph 107 and Graph 108). Thus, its total assets have fallen to 777 billion MXN.

⁶¹ Estimated since January 2016 as the weekly average of monthly returns.

Graph 107**Change in total assets of equity funds**

Billions of pesos

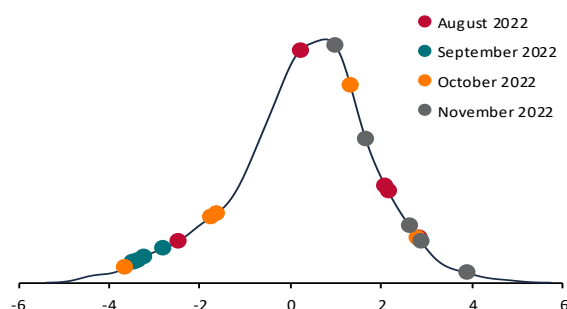


Data as of October 2022

Source: Banco de México with CNBV data.

Graph 108**Monthly returns on equity funds ^{1/}**

Percentage



Data as of November 2022

Source: Banco de México with data from CNBV and Morningstar Direct

^{1/} Each point refers to daily average observations of monthly yields for one week of the month.

Regarding funds' liquidity, liquid assets⁷ for fixed-income investment funds have increased 0.79 % since the end of the first semester of 2022, while liquid assets for equity investment funds decreased by 15 % for the same date (Graph 109).⁶²

In this vein, fixed-income investment funds without enough liquid assets to meet their expected liquidity loss⁸ (PEL, *its acronym* in Spanish) account for 5.5 % of the sector's total assets. Conversely, equity funds

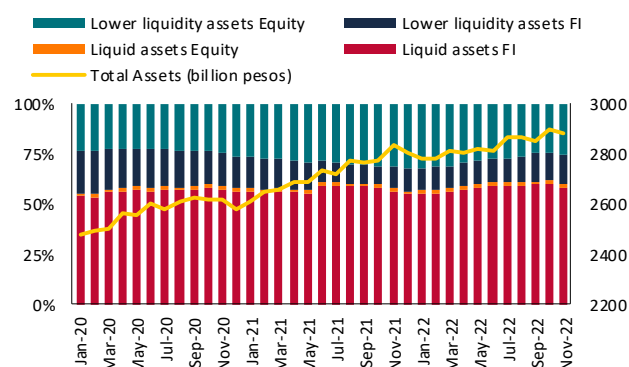
⁶² Estimated as liquid assets over total assets. The following are considered liquid assets: bank deposits, CETES, BONDES, bonds, udibonos and BPAs in direct and repurchase.

with insufficient liquid assets to meet their liabilities amounted to 78.1 % of the total assets held by these funds. However, this behavior is not necessarily a risk indicator, since it is associated with equity funds investment strategies and, based on their prospectus, these funds are expected to increase their risk appetite.⁶³

Graph 109**Liquidity composition**

Left axis: Percentage

Right axis: Billions of pesos



Figures as of November 2022

Source: Banco de México with CNBV data.

In addition, the investment fund system is well diversified among investors. Individuals hold more than 50 % of total assets, while around 18 % are in hands of corporate investors, and 5 % are in fund holdings.

On the other hand, investment funds are liquidity suppliers in the repo market. In 2022, funding granted by investment funds increased by 23 %, totaling 516.2 billion MXN. Investment funds grant development banks 39 % of the total repo financing they receive through this market, and 15 % and 12 % of funding received in this market by broker-dealers and commercial banks, respectively. Development banks are the largest borrowers, with 281.12 billion MXN, followed by domestic systemically important banks (Graph 110). Regarding the reverse repurchase, the funds have not engaged in this type

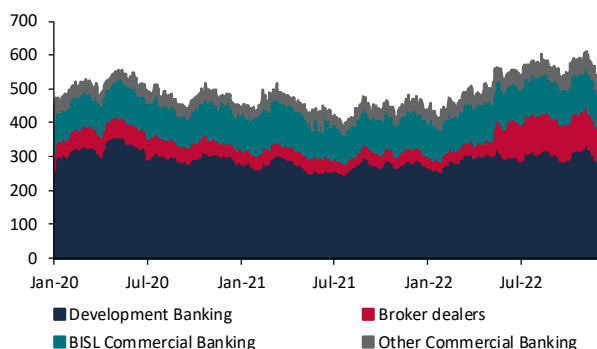
⁶³ Estimated as monthly average outflows in the 95th percentile or higher of the flow distribution, according to historical figures as a share of total assets at the beginning of the month.

of agreements, despite having been authorized to do so as of June 2020.

Graph 110

Daily funding amount by investment funds in the repo market

Billions of pesos



Data as of November 2022

Source: Banco de México

V.3.4. Broker-dealers

Regarding broker-dealers, the main risk is leverage through securities repurchase agreements and their investment portfolio's market risk. At the end of the third quarter, broker-dealers' leverage has been reduced versus the figures recorded in the last *Report*. However, in previous months there was an increase due to higher liability positions with repos, mainly with investment funds and individuals.⁶⁴ Meanwhile, the liquidity indicator for broker-dealers as a whole improved, while profitability has been on a downward trend since the last *Report*.

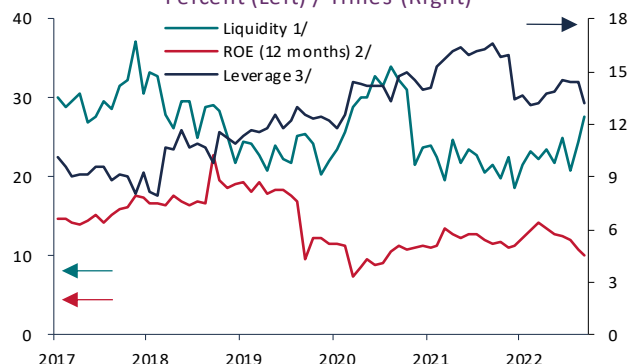
Regarding the sector's solvency, the Capital Adequacy Ratio (CAR) of the second quarter of 2022 declined slightly, and remains at high levels both for the system and for most individual institutions. The decline in the system's CAR can be explained by an increase in risk weighted assets, while there was a reduction in net capital. This fluctuation in risk weighted assets resulted from increased credit and operational risk and decreased market risk.

The sector's profitability, measured as a twelve-month net income to stockholders' equity ratio (ROE), has been on a downward trend since last April and remains below the long-term average level (Graph 111).⁶⁵

Graph 111

Leverage, liquidity and ROE

Percent (Left) / Times (Right)



Data as of September 2022

Source: Banco de México (SIE)

1/ Liquidity = Current Assets at the end of the month / Current Liabilities at the end of the month*100. Where:

Current Assets = Cash and Cash equivalents (Cash + Banks + Other cash and cash equivalents + Foreign currency receivable) + Unrestricted trading securities + Unrestricted available-for-sale securities + Receivables + Accounts receivable.

Current Liabilities = Short-term bank and other short-term loans + Creditors under repo + Other accounts payable

2/ ROE = Net income 12 months flows / Average stockholders' equity 12 months.

3/ Leverage = (Total Liabilities month-end balances - Trade Payables month-end balances) / Stockholders' Equity month-end balances.

Broker-dealers are exposed to market risk, measured by market *CVAR* as a percentage of net capital. This indicator shows an upward trend since March 2022, going from 10.86 %, to 16.83 %, as of September. This growing trend is mainly due to changes in the institutions' portfolio positions, which increased both the equity position and direct debt instrument positions (Graph 112).

⁶⁴ In January 2022, the IFRS9 new international accounting standards for broker-dealers came into effect, impacting their calculation and therefore

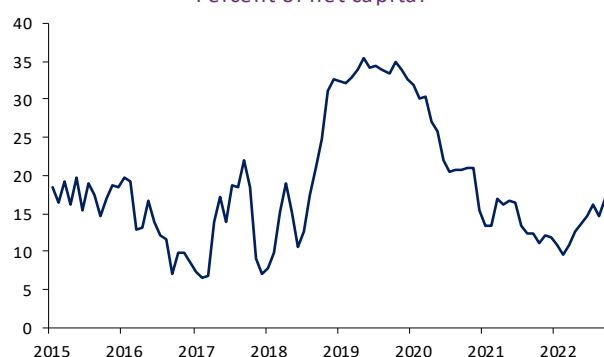
the level. Therefore, the indicator is not comparable with the figures prior to that month.

⁶⁵ The average ROE from December 2005 to September 2022 is 17.6 %.

Graph 112

Conditional Value at Risk (CVaR) at 99.9% for broker-dealer market risk

Percent of net capital



Data as of September 2022

Source: Banco de México, CNBV, BMV, Bloomberg and Valmer.

Interest rate sensitivity of the broker-dealer debt securities portfolio, as measured by market-based duration, has remained stable during the year, fluctuating at 0.73 years on average, with the highest value of 0.79 years observed in October.

V.3.5. Insurance companies and bonding institutions

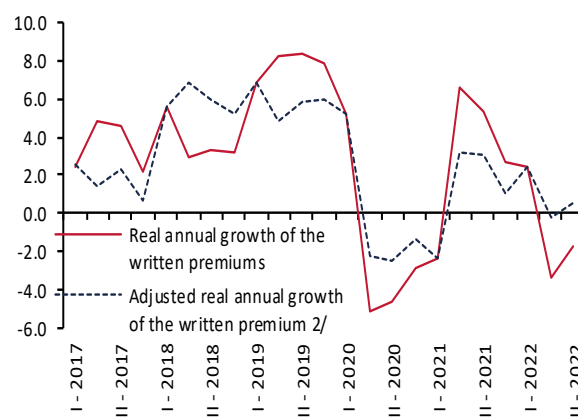
The insurance and bonding sector reported a real annual reduction in written premium. However, the sector's average cost of claims has decreased and its coverage indicators are above the regulatory thresholds in the third quarter of 2022.

The insurance and bonding sector consists of 114 institutions, including 104 insurance companies and 10 bonding institutions. The sector's assets totaled 2.08 trillion MXN, a 3.10 % decrease in real annual terms. The sector's assets account for 7.6 % of the financial system's total assets as of 2022.

Graph 113

Real annual growth of the written premiums of the insurance and bonding sector ^{1/}

Percent



Data as of September 2022

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.

As of the third quarter of 2022, the sector reported a decrease in premium issuance by 1.7 %⁶⁶ (Graph 113). The reduction in the written premiums is due, in part, to the biennial damage insurance policy contract that Petróleos Mexicanos took out in 2021. If the policy is adjusted by dividing its value evenly among the years in effect, it is observed that written premiums had showed a 0.5 % growth, which is still below the 2007-2022 average real growth rate, approximately equal to 5.7 %.

Life insurance is the main driver behind premium issuance slowdown, even though growth was recorded in the Accident and Health insurance operations. In the future, premium issuance growth in the sector will be subject to the rate of growth of the Mexican economy.⁶⁷

⁶⁶ The growth figures in this section are expressed as cumulative real growth compared to the same quarter of the previous year.

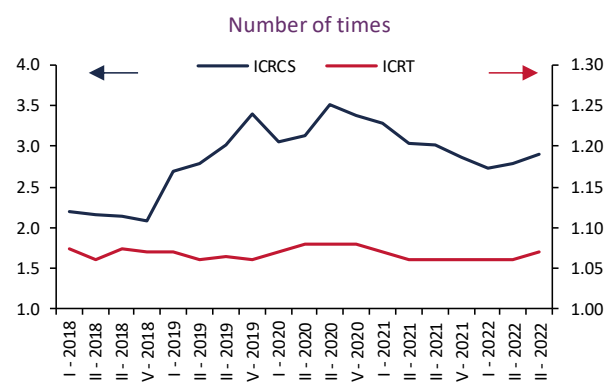
⁶⁷ See the document "Overview of the Insurance and Bonding Sector" issued by the CNSF for Q4 2021, Q1 2022 and Q2 2022.

The average cost of claims has decreased compared to the previous year and now stand at 73.5 %.⁶⁸ This can be explained by a lower loss ratio in the Life insurance operation due to reduced cost of claims related to the pandemic; while a higher loss ratio has been recorded in the Damage operation.

The sector as a whole reported a 27.7 % increase in profit versus the third quarter of 2021; however, there was a 24.4 % decrease in revenues from financial products. Increased profitability can be explained by lower reserve requirements and lower cost of claims; nevertheless, profitability levels remain below pre-pandemic levels.

The sector remains highly solvent. Both the Technical Reserves Coverage Index⁶⁹ (ICRT, *its acronym in Spanish*) and the Capital Solvency Requirement Coverage Index⁷⁰ (ICRCS, *its acronym in Spanish*) suggest that investments are sufficient to cover obligations to policyholders (Graph 114). Furthermore, the disaster risk reserve accounted for 3.3 % of total technical reserves as of Q3 2022. Therefore, the Mexican insurance sector maintains sufficient and liquid reserves to cope with risks without jeopardizing the sector's stability and solvency.

Graph 114
Coverage ratios for the insurance sector



Data as of September 2022
Source: CNSF

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

Regulated and unregulated financial entities within the financial system, and companies engaged in loan intermediation or credit operations on a regular and professional basis in the country (collectively referred to as other-non-bank financial brokers, *OIFNB its acronym in Spanish*), among other activities, are still encountering challenges.⁷¹ Specifically, risks associated with tighter global and local financial conditions, as well as perceived uncertainty about the sector.

Although the OIFNB sector's assets account for a low fraction of the Mexican financial system's assets, they are a major share of the total funding that some segments of the non-financial private sector receive, particularly the consumer and unbanked small-and-

⁶⁸ The average cost of claims is defined as the net cost of claims over the written premiums earned in the period using year-to-date data.

⁶⁹ The Technical Reserves Coverage Ratio is calculated by dividing the investments supporting the technical reserves by the amount of the required reserves. When this ratio is greater than or equal to one, it means that the institution maintains sufficient resources to support its obligations.

⁷⁰ The Capital Solvency Requirement Coverage Ratio (ICRCS, *its acronym in Spanish*) is calculated by dividing the sum of eligible own funds backing the Capital Solvency 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.

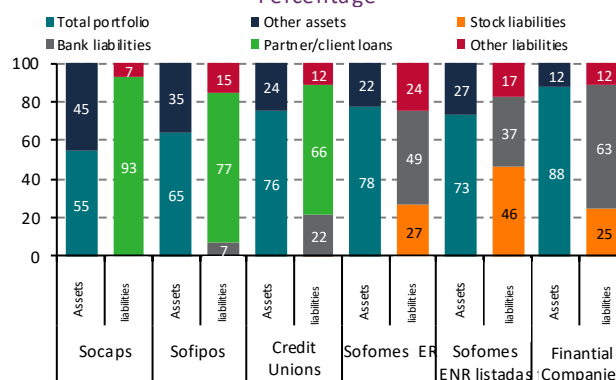
⁷¹ The entities comprising the NBF sector include entities that are part of the financial system, some of which are regulated (Savings and loan

cooperatives -socaps, *its acronym in Spanish*-, sofipos, regulated sofomes that are not subsidiaries of credit institutions and those that issue debt in the local market, as well as credit unions and general deposit warehouses), while others are unregulated (unregulated sofomes). It also includes funding granted by financial companies engaged in credit intermediation on a regular basis (leasing companies or financial arms of automotive companies), as well as financing granted directly by department stores listed on the stock exchange to their customers through credit cards. Although the entities mentioned here account for a small percentage of financing to the non-financial private sector, and because of their low interconnection with the country's banks they are not systemic, they do play an important role in inclusion in the financial system, since they serve savers and borrowers who are not served by the banks.

medium-size- enterprises (*pymes*, its acronym in Spanish) (Table 5). Therefore, considering the environment described above, financing granted by OIFNB sector entities as a whole remains in real annual decline at the end of September 2022, albeit more slowly compared to the last *Report*.

Some institutions, particularly non-regulated ones, remain at historically high non-performing loan ratio levels. Moreover, some of the sector's entities are involved in dissolution and liquidation processes, while others are undergoing restructuring with creditors or bankruptcy proceedings in order to ensure business operations. This is the result of their reliance on short-term market or bank funding, which can be a business model vulnerability when access to such funding is curtailed (Graph 115). Further impacts cannot be ruled out due to tighter financial conditions, the potential global recession and lower confidence of investors that used to provide funding to the sector, especially those with a presence overseas.

Graph 115
Structure of OIFNB's Assets and Liabilities ^{1/}
Percentage



Data as of September 2022

Source: CNBV, BMV and Condusef

1/ As of September 2022, there are 76 credit unions (40.8 billion pesos of total assets), 37 sofipos (40.8 billion pesos of total assets), 154 socaps (236.7 billion pesos of total assets), 9 finance companies (248.5 billion pesos of total assets), 1 listed ENR sofom (11 billion pesos of total assets) and 28 ER sofomes (217.2 billion pesos of total assets).

Table 5

Financial Stability Report												
December 2022												
Other non-bank financial intermediaries and activities not subject to banking regulation ^{1/}												
Entity / Instruments / Activity		Risk nature:			They are involved in non-bank loan intermediation.	Total assets			Regulation by:			Supervisor / Regulator
		Install. transfer	Leverage	Funding problems		Billions of pesos	% of GDP	Annual and actual percentage change	Capitalization	Liquidity	Leverage	
Socaps (levels 1 to 4)		✓	✓		✓	237	0.8	4.9	✓	✓		CNBV
Sofipos (levels 1 to 4)		✓	✓	✓	✓	41	0.1	8.0	✓	✓		CNBV
Credit unions (levels 1 to 3)		✓	✓		✓	65	0.2	-5.7	✓	✓		CNBV
Regulated Sofomes	Tied to a bank and consolidated with that bank	✓	✓			372	1.3	8.4	✓	✓		CNBV
	Tied to a bank and not consolidated	✓	✓			65	0.2	-1.2	✓	✓		CNBV
	No ties with a bank, issues debt 2/	✓	✓	✓	✓	202	0.7	-2.7				CNBV
Non-regulated Sofomes 3/		✓	✓		✓	577	2.0	-3.6				
Financial loan specialized in loans, leasing or financial factoring 4/		✓	✓		✓	248	0.9	-33.6				
Companies granting consumer credit 5/		✓	✓		✓	65	0.2	-0.5				
Securitizations of financial institutions 6/ 7/		✓	✓		✓	479	1.7	-5.6				CNBV
Securitizations of non-financial institutions 6/ 8/		✓	✓			271	1.0	-25.8				CNBV
Total non-bank financial intermediaries and activities						2,185	7.7	-13.2				
Trust on infrastructure and real estate (fibras) 6/			✓			446	1.6	4.2			✓	CNBV
Mortgage trusts (other than fibras) 6/		✓	✓		✓	7	0.02	-18.5			✓	CNBV
Development Capital Certificates (CCD) 6/			✓			365	1.3	3.3			✓	CNBV
Trust on energy and infrastructure (fibra E) 6/			✓			131	0.5	-2.8			✓	CNBV
Trust on investment projects (cerpis) 6/			✓			57	0.2	22.4			✓	CNBV
Total infrastructure financing vehicles						1,005	3.5	3.6				
Total financial intermediaries, activities and vehicles for infrastructure finance						3,190	11.2	-8.5				
Other intermediaries or loan activities 9/					✓	1,018	3.6	-76.6				CNBV/CNSF
Equity investment funds 10/						0	0.0	n.a.				
Retirement funds 11/						5,513	19.3	-9.4				Consar
Commercial banking		✓	✓	✓		12,513	43.9	3.8	✓	✓	✓	CNBV/Banxico

Data as of September 2022

Source: Banco de México, CNBV, CNSF, Condusef, Ineval & BMV

1/ The red marks show cases where the risk described could occur or is currently occurring in only some of the entities comprising the specific sector in Mexico. The risks in the columns are defined as: (i) term transformation risk: that which arises from obtaining short-term funding to invest in long-term assets (term mismatch); and (ii) leverage risk: that which arises when techniques or strategies are used in which resources are borrowed and then purchased to magnify the potential gains (losses) of the investment.

2/ In 2014, several legal provisions were amended to include, in the scope of regulation, sofomes issuing stock market debt. As of 2015, 18 unregulated companies changed their status to regulated because they are debt issuers and gradually began to report information to the CNBV.

3/ Figures on unregulated sofomes are taken from the Commissions Registry - RECO (Condusef). Asset figures are not available, so they are approximated by the size of the total loan portfolio granted by these entities and reported to Condusef. The loan portfolios held by unregulated sofomes providing loans only to related entities or subsidiaries are not taken into account, since they are not credit intermediaries per se. The portfolio figures gathered by Condusef for unregulated sofomes are subject to change as the authority follows validation processes.

4/ These are companies that take on debt but are not financial entities under Mexican law. For example, the financial arms of automakers and companies involved in lending or leasing transactions. The figures shown here include only entities that issue debt in the financial markets. Two entities changed their status from regulated and non-regulated sofome, respectively, to financial company. Therefore, the growth of this line of business is impacted by this new status.

5/ It only includes the loan balance granted directly by department stores to their customers without any financial institution.

6/ This refers to the outstanding value at market prices.

7/ This includes bank, sofomes, Infonavit and Fovissste securitizations.

8/ This includes private sector and public sector securitizations, such as government and non-financial corporate securitizations.

9/ This includes fixed-income mutual funds, local exchange-traded funds (ETFs), bond ETFs, bond warehouses, brokers and loan insurers.

10/ This includes mutual funds invested in equity instruments, local exchange-traded funds that track stock indexes.

11/ Siefores are included.

While most institutions' profitability increased at the margin, an economic slowdown could potentially worsen some institutions' balance sheets going forward. However, the banks' exposure to these institutions remains limited and does not pose a risk to financial stability; likewise, the interconnection with the country's banks remains low (Table 6).

Table 6

Main exposures (assets minus liabilities) of commercial banks with NBFIs				
Entity	Commercial bank assets with NBFIs	Liabilities of commercial banks to NBFIs	A - P	
	1/			
	Millions of Pesos	Millions of Pesos	Millions of Pesos	% of Bank Capital
Socaps	91	57,143	-57,052	-4.41
Sofipos	734	1,883	-1,149	-0.09
Credit unions	5,355	5,321	34	0
Regulated Sofomes	68,317	8,899	59,418	4.6
Non-regulated Sofomes	41,490	n.a.	41,490	3.21
Financial companies	20,525	n.a.	20,525	1.59

Data as of September 2022

Source: Banco de México and Indeval

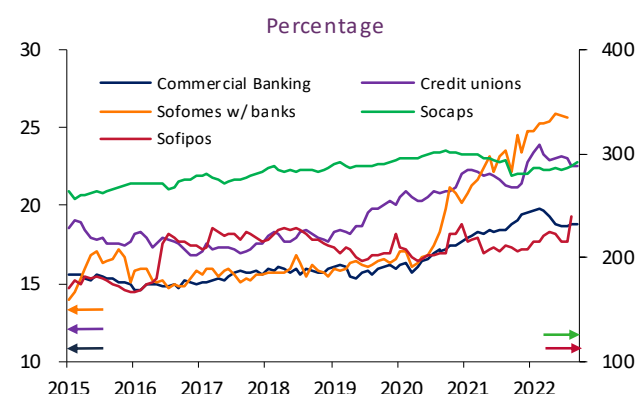
1/ Banking assets with NBFIs include loans and investment in securities, while banking liabilities with NBFIs include deposits with banks, investments in bank securities and multiple banking liability positions in repo agreements with NBFIs.

Regarding the OIFNB that depend on funding through traditional savings or member contributions, such as sofipos⁷², socaps⁷³, and credit unions, the non-performing loans ratio of the sofipos and credit unions portfolio has recently increased. Furthermore, sofipos' profitability has deteriorated at the margin. On the other hand, regulatory capital adequacy indicators in the respective entities listed here have improved since the last *Report*, particularly with respect to Sofipos (Graph 116). The largest sofipo made a capital injection to comply with the minimum

regulatory capital requirements after a follow-up period to perform remedial actions before the authorities.

Graph 116

Capitalization of regulated non-bank financial institutions



Data as of September 2022, except for sofipos, which are as of August 2022, and sofomes, which are as of July 2022.

Source: CNBV

1/ Right axis: Capitalization Level = Net Capital / Total Risk Capital Requirement. Socaps and Sofipos must maintain net capital equal to or greater than the total risk capital requirement, i.e., equal to or greater than 100%.

2/ Left axis: Capitalization index = Net capital / Risk-weighted assets. Commercial banks, regulated Sofomes with equity ties to commercial banks or financial groups and credit unions must maintain a minimum ICAP level of more than 8%.

Regarding the OIFNB dependent on foreign market funding (some sofomes and finance companies), access to this kind of funding has been impaired. This is due to tighter global financial conditions, and financial and reputational issues in some sector entities which have led to some contagion to entities perceived as comparable. Commercial banks have not been impacted by their exposures to sector entities, as these are either limited or have guarantees.

⁷² Sofipos rely heavily on traditional fundraising to support their lending activity. In order to collateralize its deposits, a sofipo must be associated with the Protection Fund, which is a trust set up by the Federal Government with the development bank acting as trustee institution, without such trust being a federal public administration entity or a public trust (Articles 98 and 99 of the Savings and Popular Credit Law --LACP, its acronym in Spanish). Deposit insurance is managed by Prosofipo via the trust, and the deposits of sofipos' customers are covered for up to 25 thousand udis in the event that a sofipo is either liquidated or disappears (Article 105 of the LACP). The Protection Fund's equity will be made up of

the following resources: the contributions made by the Federal Government; the ordinary monthly installments to be paid by the sofipos; the special installments to be paid by the sofipos; and the other assets, rights and obligations acquired by the Fund (Article 101 of the LACP).

⁷³ Socaps are cooperatives involving individuals who form a partnership to pool their own resources and lend them to each other, generating a profit on the savings. They are also known as savings banks and are not-for-profit corporations. Like sofipos, socaps have a savings protection fund that covers up to 25,000 udis per saver and is managed by the Cooperative Protection Fund Trust (FOCOOP its acronym in Spanish).

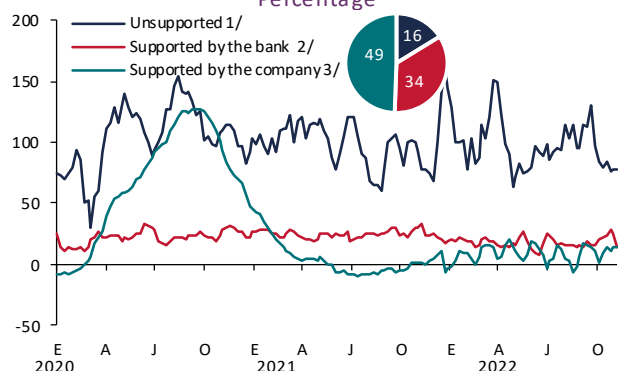
With respect to the OIFNB operating in the local market and which issue debt on a regular basis, as is the case of auto loan companies and some stand-alone finance companies, issuance costs have increased or they have issued lower amounts during some periods since the last *Report* (Graph 117); for the other OIFNB issuance volumes have improved in recent months, although they have yet to recover in the international markets. This is partially due to disruptions in the automotive sector associated with supply chain disruptions, which have recently shown signs of recovery.

Graph 117

Short-term debt of NBFIs:

a) Issuance rate minus TIE28.

Percentage

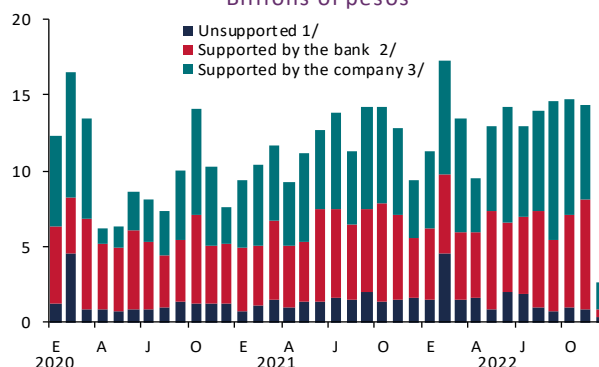


Data as of December 1st, 2022

Source: Indeval and BMV

b) Amount placed

Billions of pesos



Data as of December 1st, 2022

Source: Indeval and BMV

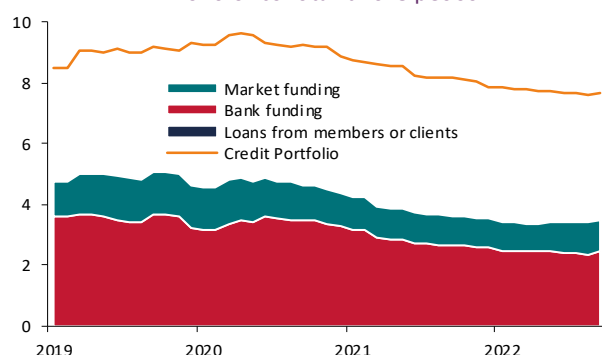
1/ Unsecured NBFIs: Mercader, Crediclub, Factoring Corporativo, Financiera Bepensa, Ion Financiera, Mercader Financiera, Portafolio de negocios, Sofoplus, Cetelem (these are ER sofomes), Corporación Actinver and BBVA Leasing (these are finance companies).

2/ NBFIs backed by a bank: Afirme almacenadora, Afirme arrendadora, Afirme Factoraje, Fundación Dondé and Start Banregio (the first is an ACO, the rest are regulated sofomes).

3/ NBFIs backed by the automaker: GM Financial, Navistar Financial (these are ER sofomes), Paccar Financial, Toyota Financial, VW Leasing (these are finance companies).

The funding secured by OIFNB has a direct impact on the loan origination that these entities grant to the different economic sectors (Graph 118). In this vein, financing granted by commercial banks to the financial institutions examined here continues to decline, even though the contraction rate has slowed down in recent months.

Graph 118
NBFIs' funding sources dependent on bank or market
financing
 Billions of constant 2018 pesos



Data as of September 2022

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

1/ This includes listed financial companies, unregulated sofomes and regulated sofomes issuing debt.

Finally, new participants in the local credit market which formerly supported their lending activities through private equity investors have recently agreed, for the first time, to raise bank funding from abroad in order to cover their loan portfolio origination in several countries. No financial data is available for these unregulated non-financial entities, as they do not access the capital market to raise funds.

Other financing vehicles

At the end of Q3 2022, the leverage and liquidity mismatch risks of the financing or investment vehicles in the country are low and their leverage and profitability levels are stable enough to meet their financial obligations. In addition, there is no refinancing risk.

Real Estate Investment Trusts (Fibras, *its acronym* in Spanish) have experienced a slight slowdown in their operating cash flow, except for commercial and hospitality sectors. The former show improved occupancy levels, while the latter show a recovery in both revenues and occupancy from the levels seen at the beginning of 2020. Additionally, leverage and debt service indicators are stable and at low levels.

Regarding investment trusts such as CCD (Certificates of Capital Developments), Cerpis (Senior Trust Bonds for Investment Projects) and Fibras E, the outstanding issuance balance, and debt securitizations, decreased slightly since the last *Report*, mainly due to lower issuances by Infonavit and Fovissste, the main players in this market. Furthermore, the profitability of the vehicles that manage securitizations remains high and covers administration expenses. Conversely, profitability decreased in the vehicles managing CCD, Cerpis, and Fibras E. The leveraging of the trusts backing the CCD, Cerpis and Fibras E issues remains low, while the leverage of the trusts backing securitizations worsened slightly in this quarter with respect to the last *Report*, as did the liquidity indicator.⁷⁴

Institutions using financial technology

The Financial Technology Institutions (ITF *its acronym* in Spanish) sector continues to grow, though still accounting for a smaller share of the financial system. Therefore, this sector does not pose a systemic risk to the financial system.

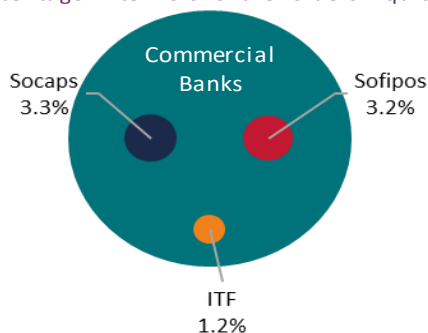
As of November 2022, 42 authorizations have been published in the Federal Official Gazette to operate as an ITF under the Financial Technology Institutions Regulation Law (LRITF, *its acronym* in Spanish). Fourteen of these authorizations, relate to Crowdfunding institutions (IFC, *its acronym* in Spanish) and 28 to Electronic Payment Fund Institutions (IFPE *its acronym* in Spanish). During the second half of 2022, 8 ITF have been authorized, all of which are IFPE: Swap, Sacbé, Sonect, Toka, Eplata, Peibo, Spin and Kuspit. Some of them, such as Swap, Sacbé, Toka, Eplata and Spin, were already operating under the transitory Article 8 of the LRITF.

The ITF sector still remains at relatively small levels compared to the banking sector, based on the contributed capital of ITF (Graph 119). However, compared to other financial intermediaries such as socaps or sofipos, the size of ITF capital accounts for a

⁷⁴ The liquidity indicator refers to the current assets to current liabilities ratio of the trusts backing securitizations.

larger share (37.0 % and 38.9 % as of November 2022). Although ITF do not pose a financial stability risk due to their size, it is important to keep monitoring the development of this sector in order to timely anticipate or identify any vulnerabilities.

Graph 119
Relative size of financial intermediaries compared to commercial banks ^{1/}
Percentage in terms of Shareholders' Equity



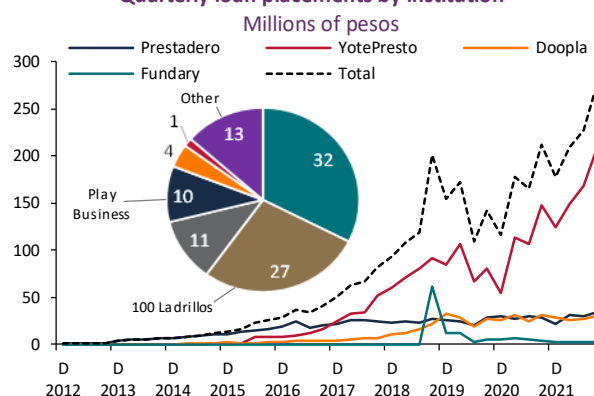
Data as of November 2022

Sources: CNBV, Federal Official Gazette, Crunchbase and entities' websites.

^{1/} For the case of Financial Technology Institutions (ITF), this refers to the contributed capital, which results from the sum of the initial capital stock plus the financing obtained through several investment rounds. Capital stock for Commercial Banks is as of August 2022, while data of Socaps and Sofipos is as of April 2022 and May 2022.

IFC connect borrowers and investors through their platforms by using artificial intelligence technologies, they can apply different authorization criteria for loan approvals. IFC continue to show growth in the placement of credit, with an average increase of 16 % in the first three quarters of 2022 and a 20.9 % quarterly growth in September 2022 (Graph 120), after credit placements fell by 16 % in the last quarter of 2021. However, this business model continues to be tested as some institutions are experiencing issues with their past-due loans, with average non-performing loan levels per placement close to 25 %.

Graph 120
Quarterly loan placements by institution ^{1/}
Millions of pesos



Data as of September 2022

Source: Institutional websites

^{1/} The pie chart depicts the share of IFC paid-in capital versus the total. The placement series skip some institutions due to the low frequency of their data.

On the other hand, there are other Fintech entities (in the broad sense), which use technology to innovate in financial services business models, but which do not engage in any of the activities reserved by the LRITF ⁷⁵, these entities are also included.

Fintechs in Mexico have developed at an accelerated pace. According to the latest report by Finnovista and the Inter-American Development Bank (IADB), Mexico is among the main Fintech markets in Latin America, ranking second with 512 Fintech companies in 2021, which accounts for a 21 % regional share, only after Brazil, which holds 31 %.⁷⁶

One type of Fintech that is showing remarkable growth are the so-called "neobanks" or "digital banks". According to Finnovista et al. (2022), Mexico and Brazil lead this segment in Latin America with a total of 27 and 17 digital banks, respectively, out of a total of 60 operating in the region in 2020. According to this report, the number of digital banks in Mexico has grown after only 3 were listed in 2018. The report also shows that 32 % of digital banks in Latin America focus on unbanked consumer solutions, while only 5 % serve small and medium-sized-business (SMEs).⁷⁷

⁷⁵ For more on Fintech in a broad sense, see Box 8 of the Financial Stability Report for the first half of 2022.

⁷⁶ Finnovista, IDB y IDB Invest: "Fintech in Latin America and the Caribbean. A Consolidated Ecosystem for Recovery", 2022.

⁷⁷ According to Finnovista et al. (2022) these institutions differ from traditional banks in that they do not necessarily hold a banking license, but provide a specific financial solution to their users. "Digital banking"

Importantly, Fintechs contribute to financial inclusion by developing new techniques and information sources for assessing credit risk on online financial platforms, thereby providing funding to consumers who previously did not have access to credit, and providing accessible payment solutions. According to

said report, 36 % of Fintechs in Latin America focused on financial inclusion in 2020. In Mexico, the percentage is 32.2 %.

refers to Fintechs which provide at least one payment or transfer system to link the user to the rest of the financial system through investments, peer-to-peer lending or corporate financial management platforms.

Box 7: Recent volatility events in the Virtual Assets markets

I. Introduction

The purpose of this Box is to provide an overview of the development of the virtual assets (VA)¹ markets, including a description of some high-volatility events observed during 2022 and the implications of such events for both, users and investors of these assets, as well as for financial stability.

The trading of VA between individuals is still very low and interest in these assets seems to have declined since the loss and the volatility events experienced earlier this year and more recently, in early November, due to the bankruptcy of FTX, the second largest VA exchange. In parallel, the traditional financial system has, generally, remained on the sidelines of recent events and the operations of the VA market.

However, it is important to monitor the development of this market. According to Chainalysis' Global Crypto Adoption Index (2022)², emerging economies are the leading adopters of these assets, ranking in the top ten places of the Index, with the exception of the United States, the only developed country in this group.

Mexico ranks 28th in said Index and is ranked as the 4th economy in Latin America in terms of the VA inflows value, after Venezuela, Argentina and Brazil. One of the metrics where Mexico ranks lower is the volume of peer-to-peer (p2p) VA exchange, where the country ranks 121st out of 146 economies.³

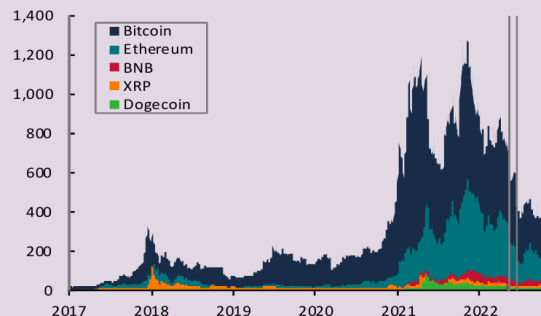
II. Recent developments in the VA markets

Banco de México has pointed out the presence of significant risks for the population associated with the use of VA, due to the intricate, opaque and volatile structures associated with them. This may expose users to a potential loss of the invested resources. Therefore, Banco de México has underscored the risks to VA users through statements issued in 2014, 2017, 2019 and 2021.⁴

The 2022 volatility events and the collapse of some of the major VA market players highlight the risks faced by VA users and the various vulnerabilities in the ecosystem (Graph 1 and Graph 2).

Graph 1

Market Cap of main Virtual Assets¹
Billion USD



Data as of November 30, 2022

Source: Coinmarketcap

1/ The vertical lines represent the following dates: TerraUSD loses its peg (May 9, 2022); Celsius suspends redemptions (June 12, 2022); and Binance announces the sale of its FTT holding (November 6, 2022).

In early 2022, some VA projects proved to be unsustainable, as they depended on asset price expectations, which had been on the rise for a long time. In addition, some of these arrangements used to operate under business models where returns to existing investors could only be sustained through continued capital inflows from new underwriters. As yields on other traditional assets increased due to the tightening of the global financial conditions, VA became less appealing. This, coupled with a waning confidence in these assets, triggered a downward spiral in the VA markets.

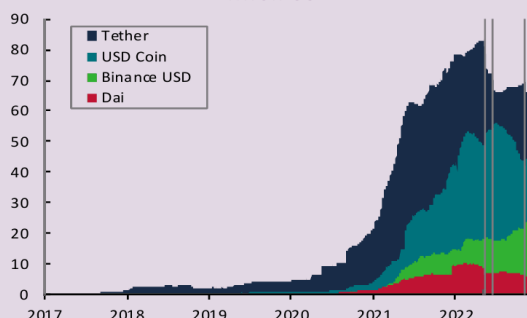
¹ Please refer to Box 6 of the S2 2021 Financial Stability Report for a definition and description of the VA.

² Chainalysis "The 2022 Geography of Cryptocurrency Report", 2022. Chainalysis focuses on leveraging different types of virtual asset services; it derives its information from blockchain data, an extensive network of clients, and uses machine learning to map blockchain data with real institutions.

³ The Chainalysis Global Cryptocurrency Adoption Index ranking includes the following 5 rankings: centralized service value received; centralized retail service value received; private-to-private (P2P) virtual asset exchange volume; value received at DeFi; and retail value received at DeFi.

⁴ Warnings on using virtual assets as payment substitutes in legal tender: <https://www.banxico.org.mx/publicaciones-y-prensa/miscelaneos/%7B881612EF-DEC3-E03E-8C5A-C795CA66ACEA%7D.pdf>; <https://www.banxico.org.mx/publicaciones-y-prensa/miscelaneos/%7B6D5AAB8C-3BFA-0A8B-5EDD-7EDC04E1931C%7D.pdf>; https://www.gob.mx/cms/uploads/attachment/file/470439/Comunicado_de_prensa_CESF_junio_19_Final.pdf; <https://www.banxico.org.mx/publicaciones-y-prensa/miscelaneos/%7B56A7FE3D-C30E-86ED-E5C9-D9876D47D21E%7D.pdf>

Graph 2
Market Cap of main stablecoins¹
 Billion USD



Data as of November 30, 2022

Source: Coinmarketcap

1/ The vertical lines represent the following dates: TerraUSD loses its peg (May 9, 2022); Celsius suspends redemptions (June 12, 2022); and Binance announces the sale of its FTT holding (November 6, 2022).

A clear example is the collapse of TerraUSD⁵, a type of VA of the so-called stablecoins.⁶ On May 9, TerraUSD lost its 1:1 peg to the U.S. dollar, breaching the offer to maintain a relative price through a stabilization mechanism.⁷ This led to the collapse of TerraUSD and Luna (down 99% in value), which in turn drove increased volatility in the prices of other VA and caused other stablecoins to lose their peg (e.g. Tether⁸); further triggering questions about the entire stablecoin framework and eroding the confidence in the entire industry.

In addition, vulnerabilities have been observed related to the vertical integration of different activities or services (in the traditional financial system, these types of activities would be divided into different regulated entities); lack of transparency in corporate governance and structure; inappropriate use of client funds; high levels of reliance on unsecured self-issued tokens⁹; and high levels of interconnectedness between affiliated and non-affiliated entities in the sector.

In this regard, the most notorious and recent case is that of FTX,¹⁰ which went from being one of the largest VA exchange trading platforms to filing for bankruptcy within one week.

On November 2nd, CoinDesk¹¹ released an article reporting that Alameda Research, a VA hedge fund and FTX-affiliated entity, showed a very large FTT holding, the token issued by FTX, suggesting very close ties between FTX and Alameda, despite the fact that they are separated entities.¹² Then, on November 6th,

Binance (the market's largest VA exchange) announced its intention to sell its FTT holdings (around US\$500 million at the time), which triggered a plunge in its price and that of the major VA. On November 8th, following 48 hours of intense speculation about its solvency and that of its affiliate, FTX faced problems processing a large volume of withdrawal requests (approximately USD 5 billion) and was forced to halt customer redemptions.

Despite declaring its intent to buy and rescue FTX, Binance pulled out of a non-binding agreement on November 9th, resulting in the collapse of FTX. On November 10th, the Bahamas Securities Commission froze the assets of FTX Digital Markets Ltd. (as well as regulators in Japan and Australia, in the case of the relevant local subsidiaries). The following day, FTX filed for bankruptcy under Chapter 11 protection in the U.S. District of Delaware.¹³

III. Final considerations

The events described in this section allow us to illustrate and have a clearer picture of the latent risks in the VA ecosystem, revealing the problems and fragilities present in its products, markets and intermediaries. It illustrates risks related to inappropriate and/or unsustainable business models; liquidity risks; risks related to lack of transparency in corporate governance and processes; risks related to inappropriate use of client funds; cyber risks; and risks arising from high interconnectedness within the sector. Regarding the latter, all of the events described above involved shocks and contagion to the main VA, impacting in the volatility of their prices and their market capitalization. However, due to the still weak relationship of the VA with the traditional financial sector, such contagion remained within the VA sector, without impacting financial stability.

These experiences show that healthy distance and limited exposure between traditional financial institutions and the VA ecosystem have been decisive in preventing a contagion and potential impacts on financial stability. They also show that participation in these markets and investment in VA involve significant risks that investors should be aware of.

Banco de México will further encourage a healthy distance between VA and the traditional financial system, and will follow up on these market developments in order to timely pinpoint the implications that such developments could have on financial stability and, if necessary, promote measures to safeguard it.

References

Chainalysis. "The 2022 Geography of Cryptocurrency Report", 2022.

CoinDesk. The Fall of Terra: A Timeline of the Meteoric Rise and Crash of UST and LUNA (August 19th, 2022).

⁵ CoinDesk, [The Fall of Terra: A Timeline of the Meteoric Rise and Crash of UST and LUNA](#).

⁶ Please see Box 6 of the S2 2021 Financial Stability Report for a definition of stablecoins.

⁷ This was actually based on the VA with no intrinsic value, Luna.

⁸ On May 12th, Tether temporarily lost its peg to the U.S. dollar (falling to as low as USD 0.95). Technically, its peg was recovered in July, following two months ranging between US\$0.99 and US\$1.0.

⁹ A token is a digital embodiment of an interest, either a security, a claim to a benefit, or to perform specific functions, or to have no specific purpose or use (FSB, 2018).

¹⁰ FTX is a Bahamas-based VA exchange platform. As of 2021, it had more than one million registered users on its platforms and estimated transaction volumes of around US\$630 billion.

¹¹ CoinDesk is a comprehensive news, events, data and index platform focused on crypto-assets. www.coindesk.com

¹² CoinDesk, [Divisions in Sam Bankman-Fried's Crypto Empire Blur on His Trading Titan Alameda's Balance Sheet](#) (November 2nd, 2022).

¹³ The Block. [FTX files for Chapter 11 bankruptcy](#) (November 11th, 2022).

CoinDesk. Divisions in Sam Bankman-Fried's Crypto Empire Blur on His Trading Titan Alameda's Balance Sheet (November 2nd, 2022).

Federal Official Gazette: "Law to Regulate Financial Technology Institutions (LRITF)". Last amended on 20-05-2021.

Financial Stability Board (2018): "Crypto-asset markets: Potential channels for future financial stability implications". October 2018.

The Block. FTX files for Chapter 11 bankruptcy (November 11th, 2022).

V.4. Infrastructures of financial markets

Securities depository institutions and securities settlement systems

The Securities Deposit, Administration and Settlement System (DALÍ, its acronym in Spanish) is Indeval's infrastructure responsible for offsetting and clearing securities market transactions. The DALI records and settles debt securities and shares issued in Mexico, and settles the direct purchase and sale transactions, repurchases and securities loans made by depositors in the financial market. This settlement system provides various services such as: Securities Deposit, Administration, and Settlement System (DALI, its acronym in Spanish), Securities Administration Module, Securities and Cash Settlement and Clearing Services, Indeval Financial Protocol and SPEI Financial Link.

At the close of November 2022, the DALI's cumulative availability level is 99.80 %, and its clearing and settlement services were 100 %. Peripheral services availability during the same period was 100 %, ⁷⁸ as follows:

- Collateral management for repurchase agreement transactions, with a tenor greater than three days (SAVAR, its acronym in Spanish), which manages collateral for repurchase transactions with maturities beyond three days in Mexico;
- Securities lending facility for federal government bonds (Valpre E, its acronym in Spanish), which manages securities lending in Mexico in connection with the market makers program operated by SHCP; and

- Securities lending facility for DALI participants (Valpre FV, its acronym in Spanish), which allows for loans to be arranged between financial institutions in Mexico.

As of the end of August 2022, the average daily settlement amount in DALI was 3.94 trillion MXN. Settlement was mostly in government securities, which accounted for 86.3 % of the average amount settled, followed by banking instruments with 10.8 %, corporate sector securities with 1.9 % and capital market securities with 0.8 %. ⁷⁹

Central counterparties

A central counterparty is a financial market infrastructure which stands between the parties entering into financial transactions, thereby serving as a buyer for each seller, and a seller for each buyer.

Contraparte Central de Valores, S.A. de C.V. (CCV its acronym in Spanish) and Asigna Default and Settlement (Asigna) trust are the central counterparties in Mexico for clearing and settling securities and derivatives transactions, respectively. Asigna and CCV have procedures and methods to request financial resources that will cover the credit and liquidity risk exposures incurred by these infrastructures as a result of their reciprocal debtor and creditor role in the financial transactions they offset and settle. These resources are mainly formed by the Contribution Fund and the Default Fund. The Contribution Fund is formed from collateral posted by central counterparty participants, also known as Clearing Members, and the clients of such members to cover their market and liquidity risk exposures in the event of the materialization of a Clearing

⁷⁸ Figures provided by Indeval as of November 30th, 2022.

⁷⁹ Figures provided by Indeval as of August 31st, 2022.

Member's credit risk. In turn, the Default Fund is formed by the Clearing Members with collateral that can be mutualized to deal with a default, particularly in stressed market conditions. As of March 2022, the CCV and Asigna systems have shown a 100 % cumulative availability level. CCV completed the implementation of its new risk model, in order to strengthen its resilience and management during bad debt and insolvency events of its Clearing Members.

During the second half of 2022, Asigna and CCV have covered their risk exposures which is consistent with the resources required as collateral for the Contribution Funds and the Compensation Funds. Asigna's safety net⁸⁰ is 34,098 million MXN, which is mainly comprised of a 29,546 million MXN Default Fund, 53.05 % of which is in cash, and a 3,652 million MXN Compensation Fund, which is comprised of cash resources.⁸¹

CCV's Safety Net is 4,834 million MXN and is mainly integrated by a 3,850 million MXN Contribution Fund, with 95.15 % cash resources, as well as a 419 million MXN Default Fund, composed of cash resources.⁸²

V.5. Other risks for the financial System

V.5.1. Operating continuity risk

Due to the systemic relevance for the economy and financial system, Financial Market Infrastructures and payment systems must provide their services and operate under any conditions, anytime and from anywhere. Banco de México must maintain a high availability rate of the systems it manages and operates.

At the end of Q3 2022, the SPEI average availability rate of the two system instances was 99.99 %, due to maintenance time required for the infrastructure supporting system operation.

Likewise, as of September of this year, the first operating continuity stage became effective in order

to ensure that, should a SPEI instance become unavailable, processing of all transfer orders can resume through the entity that Banco de México may choose. The first stage involves those SPEI members that also operate in the Digital Collection (*CoDi*, its acronym in Spanish) functionality. The second stage, which includes the remaining SPEI members, will come into effect in December of this year.

On the other hand, operating continuity mechanism exercises continued during the year, implemented jointly with the stakeholders. The purpose is to ensure that all necessary resources are in place to deal with any event that might impact both the central infrastructure and the stakeholder's availability

During this period, Banco de México has not reported any technological infrastructure incidents regarding its payment systems or its operating processes. The payment systems have not been disrupted as a result of any incidents.

V.5.2. Cybersecurity risks

Cybersecurity risks keep growing and have positioned themselves as one of the main non-financial risks to the global financial system, with a high potential for systemic impact and therefore to financial stability should they materialize.

This risk escalated with the conflict between Russia and Ukraine. As discussed in the previous *Report*, global financial institutions and authorities adopted different actions to deal with this situation, raising their warning levels. However, the cybersecurity attacks associated with that event have remained targeted to the conflict zone. So far, no activities or attacks potentially associated with the conflict have been detected in other countries. Furthermore, given that the global financial sector has not been the main target of cybersecurity attacks originated by the aforementioned conflict so far, and institutions in Mexico report that they have not reported any activities or attacks attributable to the war, Banco de

⁸⁰ The Safety Net is a set of financial resources that the central counterparties make up, mainly from the requirements they make to their participants, to cover credit and liquidity risk exposures.

⁸¹ Figures provided by Asigna as of October 31st, 2022.

⁸² Figures provided by CCV as of October 31st, 2022.

México agreed, together with the financial authorities, to lower the alert level for the sector's institutions (Orange).⁸³ However, Banco de México believes that efforts should continue to strengthen the response and protection systems of financial institutions and has focused its efforts in that area.

During 2022 in Mexico, [1] relevant cybersecurity attack on a financial institution has been reported.⁸⁴ Through its Information Security Sensitive Incidents Response Group (*GRI its acronym* in Spanish), during this period, the financial authorities issued [27] newsletters with technical data on attacks in the Mexican and international financial sector, enabling institutions to apply incident prevention measures.

Ransomware attacks, triggered by phishing campaigns, remain one of the most worrying cybersecurity risks for financial stability in Mexico and worldwide, as their impact can bring the organization's operations to a standstill for days.⁸⁵

In response to the recent attacks that some Mexican government institutions have experienced, Banco de México has conducted in-depth infrastructure inspections to ensure that there are no vulnerabilities exploited in such attacks. In addition, newsletters have been issued to financial institutions with

technical support to cover vulnerabilities and detect similar attacks.

In order to further develop institutional capacities to deal with potential cybersecurity incidents, in the second half of this year a resilience test was conducted together with Banco de México, the National Banking and Securities Commission and the Institute for the Deposit of Securities (*Indeval* its acronym in Spanish), running a scenario to assess the ability to detect, contain, investigate and remediate a cybersecurity attack on such infrastructure.

As discussed in the previous *Report*, Banco de México is developing some metrics based on its experience and cybersecurity plans, strategies, incidents and actions gathered directly from financial institutions. A first score has been termed the Cybersecurity Index for Financial Institutions Regulated by Banco de México. By 2022, this overall indicator was found to be 82 %. Banco de México also tracks indexes based on international guidelines such as the IMF's methodology. The Financial Cyber Risk Index, which assesses cybersecurity risk in the financial sector for different countries based on international newspaper reports (see Table 8), is presented for this purpose.

⁸³ Under this new alert level, technological and operational steps to monitor the SWIFT system and other international transaction platforms used will be comprehensively addressed and, if necessary, the action protocol for cybersecurity attacks on such systems will be timely prepared and enabled.

⁸⁴ See the main relevant cybersecurity incidents reported to Banco de México in 2022 in the national financial system, [in this link](#), in this link.

⁸⁵ Cyber risk in central banking, BIS Working Papers No. 1039: [in this link](#).

Box 8: Mexican Financial System Cybersecurity Assessment

I. Introduction

This Box outlines the methodology and findings of the cybersecurity indexes tracked by Banco de México, as part of the actions conducted to assess and foster cybersecurity in the Mexican financial system.

The financial system has become increasingly exposed to cybersecurity risk, which has evolved from being an operational risk with limited impact, to being considered a risk to financial stability and the economy as a whole. In recent years, not only have digital platforms and remote work arrangements become increasingly prevalent, but the digital interconnectivity of the financial system has also grown. Institutions share assets, data, software and infrastructure; allowing cybersecurity threats to quickly spread between institutions and putting financial stability at risk, either through financial losses or by eroding confidence in the system.

Cybersecurity risk management calls for rapid and effective communication between institutions and joint actions to mitigate the risk. Therefore, Banco de México tracks international indexes such as the Global Cybersecurity Index (GCI) by the International Telecommunication Union (ITU),¹ to assess cybersecurity status relative to other countries. However, because of limited information availability,² tools have also been developed to allow a continuous follow-up on the cybersecurity situation in Mexico. Among these tools are the Cybersecurity Index of Financial Institutions Regulated by Banco de México, the Cybersecurity Risk Perception Index for the Financial Sector and the Cybersecurity Risk Index in Mexico.

II. Cybersecurity developments

Cyber risk has grown considerably due to increased interconnections and growing use of digital technologies. The financial system has not been immune to these developments and the impact of potential cyber-attack could be systemic. In this regard, the European Systemic Risk Board (ESRB) developed a conceptual framework to assess the conditions under which a cybersecurity incident could pose a systemic risk. The model has 4 stages:

1. **Background:** Circumstances in which a cybersecurity event takes place. The assessment includes the origin, threats, vulnerabilities and affected assets.
2. **Shock:** Description of the immediate event impact for the concerned institutions, the impact can be technical (e.g. loss of confidentiality) or business related (e.g. loss of reputation).
3. **Amplification:** Divided into i) amplifiers that can increase the impact or consequences of the shock and

ii) transmission mechanisms (operational, financial or confidence erosion).

4. **Systemic risk:** If the transmission mechanisms are triggered, the original shock may spread to the financial system and potentially hit institutions originally unaffected by the cybersecurity incident.

In order to mitigate the potential impacts of a cybersecurity attack on the financial system, Banco de México is continuously tracking the different areas susceptible to a cybersecurity attack. It also assesses potential threats and liaises with financial system stakeholders to develop the appropriate tools to reduce the mechanisms and amplification channels of a cybersecurity attack. Thus, Banco de México seeks to prevent any cybersecurity attack that could escalate into a systemic risk. Therefore, some indicators have been developed to provide a consistent and timely evaluation of the cybersecurity: i) to the current cybersecurity status of the financial system, ii) to the evolution of local and global cyber-attacks, and iii) to the potential occurrence of cyber-attacks.

III. Cybersecurity Index of Financial Institutions Regulated by Banco de México

During 2022, Banco de México developed an index to measure the cybersecurity status of financial institutions regulated by Banco de México, i.e., to determine their strengths and weaknesses.

This index is based on a 30-question self-assessment questionnaire grouped into 5 topics:

Governance: Develop an organizational understanding for cybersecurity risk management.

The institution has a cybersecurity structure that reports to senior management, information security policies, and has identified its critical processes.

Technical Capability: Develop and implement appropriate security measures to ensure that critical services are delivered.

The institution has information security controls in place and performs technical security assessments to test those controls.

Resilience: Develop and implement appropriate activities to maintain resilience plans and restore any disrupted capabilities or services due to a cybersecurity event.

¹ See section V.5.2. Cybersecurity risks from the June 2022 Financial Stability Report.

² The GCI is generated biannually. At the time of publication of this report, the most updated index corresponds to 2020 data.

The institution has response plans for cybersecurity incidents and for business continuity, and tests them on a regular basis.

Training and Awareness: The institution has a cybersecurity awareness program for all staff, and provides training to staff operating or administering security controls, as well as senior management.

Intelligence: Develop and implement appropriate activities to detect any cybersecurity events.

The institution gathers intelligence information of any threat and proactively anticipates that a threat-related risk may occur in its infrastructure or processes.

Each area receives a 20 % weight and each question was rated on a scale of 0 to 2. The highest score is 60 points, equal to 100 %. The self-assessment was completed by 79 financial institutions regulated by Banco de México, and 82 % was the total weighted score.

Based on these results, it stands out as a strength that institutions have well defined critical business processes in order to secure them and establish organizational cybersecurity policies which include technological control assessment through penetration tests (pentesting).

Areas of opportunity were also identified, including: the need to allocate specialized staff to assess and share the intelligence information of the threats already collected by the institutions; to promote cybersecurity training for senior management and for people who operate critical processes; and to engage in cyber-resilience exercises to test cybersecurity incident detection, containment and response skills, either individually or as a group.

Based on these findings, Banco de México is working with the institutions to address the areas of opportunity revealed by the self-assessment.

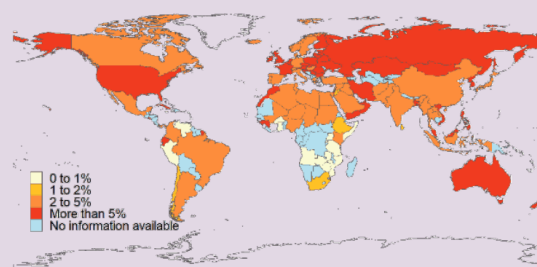
IV. Financial Sector Cybersecurity Attack Risk Perception Index

Measures the perception of cyber risk in the financial sector for different countries based on international newspaper coverage.³ The country index is estimated based on a methodology developed by the International Monetary Fund (IMF) as the ratio between news items related to cyber risk and news items related to risk overall, both based only on the financial sector.⁴ Therefore, the higher the value, the higher the number of articles related to financial cyber-attacks for the evaluated country. By applying the above methodology with news items from 2017 to 2022, Banco de México found that Mexico has a 4.36 % score, below the mean (6.81 %) and median (4.78 %) of the index regarding all countries, i.e. it is better off relative to the median (Figure 1).

³ Reuters and official Twitter accounts from international newspapers: @Breakingviews, @business, @markets, @BBCBusiness, @ftfinancenews, @MarketWatch, @BusinessInsider, @BW, @YahooFinance, @economics, @WSJmarkets, @CNBC, @financialpost.

Figure 1

Financial Sector Cybersecurity Attack Risk Perception Index



Data as of November 2022

Source: Banco de México with news from international newspapers

The index for Mexico has shown a downward trend since 2018. Meanwhile, there has been a decrease in the number of cybersecurity risk reports in the Mexican financial sector over the last three years, which could suggest an improvement in the Mexican financial system's cybersecurity situation.

The Russian and U.S. indicators stand out, with values higher than 5 %. For the United States, the index currently is at 6.72 %, above the median of the countries' distribution. Unlike Mexico, the rate decreased in 2019 and 2020 but increased again in 2021; however, by 2022, a level of less than 5 % is observed.

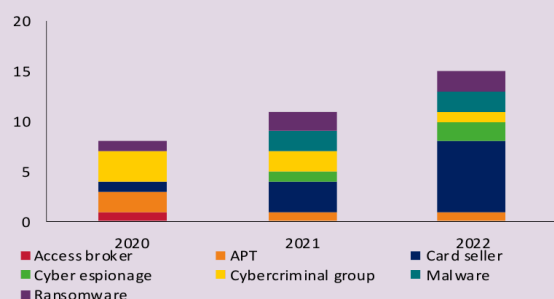
On the other hand, Russia recorded a 10.6 % index, higher than the distribution median and close to twice the average. Although the index shows a decrease from 2021 to 2022, this is because, while cyber-risk news increased by 15 %, the denominator increased by 372%.

V. Cybersecurity Attack Risk Index in Mexico

Measures cyber risk in the Mexican financial sector based on cybersecurity intelligence sources. The index accounts for the total articles in which a cybersecurity threat was reported and a cybersecurity risk to the sector was proven.

⁴ The numerator is the number of news articles containing words related to cybersecurity (cyber, cybersecurity), financial sector (bank, market, financial, finance, insurance company, Fintech, credit card) and risk (risk, threat, vulnerability, uncertainty, loss, attack, incident, hack, fraud, data breach, data loss).

Graph 1⁵
Cybersecurity Attack Risk Index in Mexico
 Number of news



Data as of November 2022

Source: Banco de México

The year with the most reported news was 2022, with 15. Reports of ransomware continue to increase and remain the greatest concern for the Mexican financial sector due to their possible impact on financial stability (Graph 1). Likewise, reports associated with card sellers continue to increase, as the theft and sale of personal and financial data from financial institutions' clients (e.g., bank card data) in clandestine Internet forums has been identified as a profitable business. While this does not pose a threat to financial stability, it does have a long-term adverse effect on the public's trust in financial institutions about the handling of their personal information and increased fraud.

Threats from widespread cybercriminal organizations have shown a downward trend which can be explained as the result of a diversification and specialization of these groups in specific threats such as ransomware, card seller, etc. The financial authorities have alerted institutions to these risks through their Sensitive Information Security Incident Response Group (*GRI*, its acronym in Spanish), enabling them to implement incident prevention measures.

VI. Final considerations

Banco de México encourages institutions to work on reinforcing their cybersecurity strategy, developing their proactive capabilities such as threat intelligence, awareness-raising among all their staff and senior management, and conducting drills to deal with cybersecurity attacks. These actions, together with compliance with the cybersecurity measures outlined in the regulation, lead to better preparedness for cybersecurity protection and resilience. The high interconnectedness of the

financial system can lead to a breach in one financial institution potentially impacting the entire system, which is the reason why institutions should strengthen their cybersecurity capabilities as needed.

Banco de México constantly engaged in monitoring cybersecurity from different perspectives. Furthermore, ongoing communication is maintained with financial institutions regarding cyber risk developments in the system, in order to minimize cyber incidents and mitigate their impact, should they occur. The indexes shown in this Box were created to develop additional tools to help assess the Mexican financial system's cybersecurity status. Despite the favorable assessment, cybersecurity risks may still have a significant impact on the financial system, which is why cybersecurity is an ongoing activity in which work is constantly being done to improve it.

References

Bouveret, A (2018): "Cyber Risk for the Financial Sector: A Framework for Quantitative Assessment", WP/18/143, June 2018

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National Institute of Standards and Technology, "Framework for Improving Critical Infrastructure Cybersecurity." Version 1.1, April 16, 2018.⁶

European Systemic Risk Board (2020): *Systemic cyber risk*. See: [Systemic cyber risk \(europa.eu\)](https://www.esrb.europa.eu/en/systemic-cyber-risk)

Bouveret, A (2018): "Cyber Risk for the Financial Sector: A Framework for Quantitative Assessment", WP/18/143, June 2018.

⁵ Access broker: Threat actor who 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 required to manage to breach the target organizations in order to sabotage them or obtain sensitive information or financial gain, through the use of various sophisticated attack vectors.

Card seller: Threat actors whose main activity consists of stealing information related to bank cards of customers of financial institutions, in order to sell such information on clandestine Internet forums.

Cyber espionage: Threat aimed at extracting sensitive information from government institutions or large corporations.

Cybercriminal group: Threat engaged in criminal activities directed at computer systems mainly for the purpose of obtaining economic resources. This category groups together generalized threats that cannot be associated with any of the other categories.

Malware: Threat designed to compromise the confidentiality, integrity or availability of information on a computer system.

Ransomware: A type of malicious software whose purpose is to hijack sensitive information from a computer system in order to make the victim pay a ransom for it or to prevent its publication on clandestine Internet forums.

⁶ [Framework for Improving Critical Infrastructure Cybersecurity \(nist.gov\)](https://www.nist.gov/framework-for-improving-critical-infrastructure-cybersecurity).

V.5.3. Environmental risks and sustainability of investments

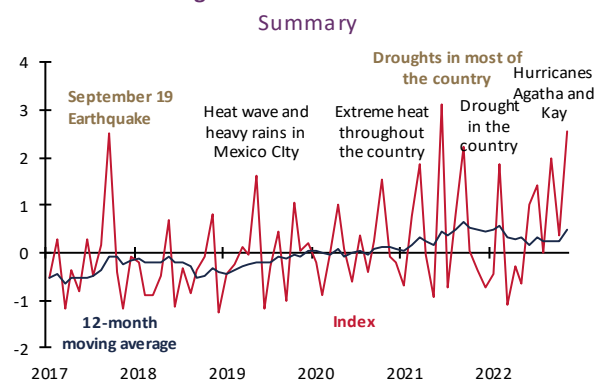
Banco de México has been actively working to help financial system stakeholders internalize the risks associated with climate change. Banco de México continues to improve and expand the tools and analysis it has carried out on this topic.

Public interest indexes related to environmental risks and natural disasters

Two indexes are constructed to capture Mexican society's environmental awareness, specifically related to: (i) extreme hydrometeorological events and natural disasters; and (ii) transition risks. For this purpose, information is collected on web searches associated with (i) and (ii) online.⁸⁶ An increase in indexes reflects greater public awareness that may derive from positive, negative or neutral environmental events and should not be mechanically associated with an increment of environmental risks or higher transition costs.

The index was above its historical average and the value recorded in the last version of this *Report*, reflecting increased public interest. The most searched terms were "drought", "heat wave", "hurricane" and "typhoon," given the occurrence of: i) droughts and the subsequent declaration of emergency during July; and ii) abundant rainfall nationwide due to hurricanes Agatha and Kay in September (Graph 121).

Graph 121
Interest index on issues related to extreme hydro-meteorological events and natural disasters

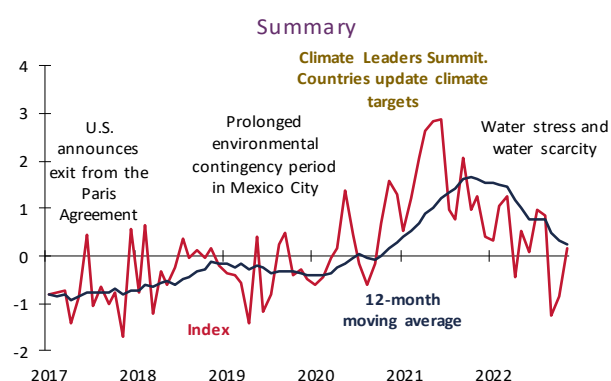


Data as of November 2022

Source: Own compilation with Banco de México and Google trends data.

The public awareness index for transition risks was also higher than its historical average, but it was, on average, lower than that in the previous edition of this *Report*. The most searched terms were "water stress" and "lack of water availability," reflecting that, as reported by Conagua, almost two thirds of Mexican municipalities experienced water shortages during July (Graph 122).

Graph 122
Interest index on issues related to transition risks



Data as of November 2022

Source: Own compilation with Banco de México and Google Trends data.

⁸⁶ To determine the search terms, the following work is used as a basis: Zhang, L. (2021). This author provides a similar assessment of Hong Kong. Based on this work, relevant terms are selected for the environmental risks and natural disasters index and for the transition risks index. For

more details, see the June 2022 Financial Stability Report. The information collected is seasonally adjusted, so that the indexes capture the Mexican society's awareness above and beyond what would otherwise reflect seasonal factors.

Transition risks

There is consensus on the need to reduce greenhouse gas (GHG) emissions, as reported during the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP27). However, this brings new challenges and new policies, such as adopting new technologies, responsibly managing natural resources, and funding these activities.

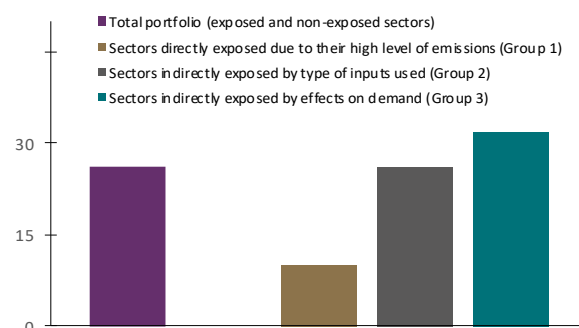
Therefore, a disorderly transition to a cleaner economy, whether more slowly or more quickly, could lead to risks that may impact the economic feasibility of the most polluting industries and related sectors. If these transition risks are not incorporated into lending decisions and risk premiums, such a transition could create financial stability challenges.

Loan performance in the sectors most exposed to transition risks is analyzed. For this purpose, three sector groups are examined: (i) those directly exposed to transition risks because they produce high emission levels (Group 1); (ii) those indirectly exposed because they use inputs which create high emissions in their production process (Group 2); and (iii) those indirectly exposed because their demand depends, to a large extent, on polluting industries (Group 3).⁸⁷ This breakdown is supplemented with company profiles for each group so that each group can determine their vulnerabilities.

The sectors indirectly exposed to transition risks (Groups 2 and 3) are more represented by small companies, and companies engaging with a bank for the first time, therefore, companies in these groups are more vulnerable to the materialization of transition risks and could encounter more refinancing problems should such risks materialize (Graph 123a and Graph 123b).

⁸⁷ The Group 2 definition is related to Scopes 2 and 3 of the GHG Protocol, since these scopes allow companies to produce emissions even when they are physically located in the input production plant and not in the

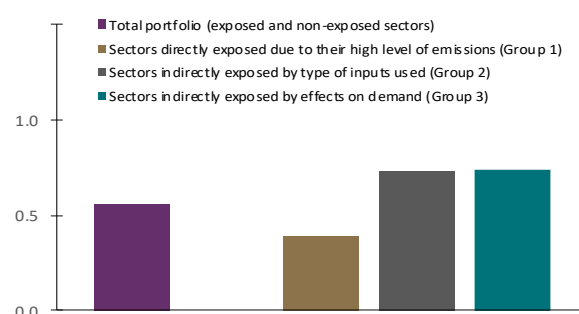
Graph 123
Portfolio in sectors exposed to transition risks, by type of exposure
a) Portfolio percentage to SMEs
Percentage



Data as of June 2022

Source: Own compilation with Banco de México, CNBV and INEGI data.

Portfolio in sectors exposed to transition risks, by type of exposure
b) % of the portfolio to companies interacting with the bank for the first time
Percentage



Data as of June 2022

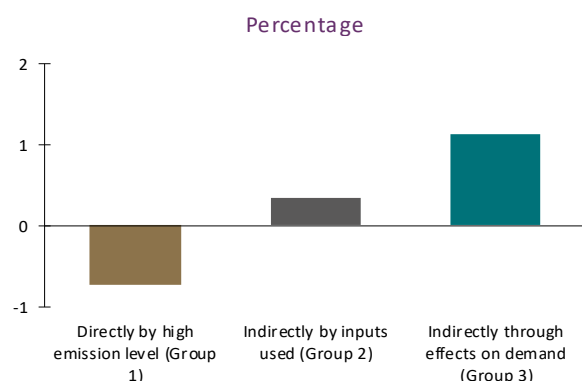
Source: Own compilation with Banco de México, CNBV and INEGI data.

Furthermore, Group 1 recorded a decrease in the credit balance, whereas Groups 2 and 3 recorded increases. The group of companies with indirect exposure (Groups 2 and 3) includes smaller companies and first-time bank customers. Therefore, against a post-pandemic financing recovery backdrop, these groups saw increased lending and, as a result, the banking system's indirect exposure to transition risks increased (Graph 124).

consuming company. In other words, they may indirectly produce emissions through input use. The Group 1 definition is directly related to the Scope 1 definition.

Graph 124

Portfolio balance changes in sectors exposed to transition risk

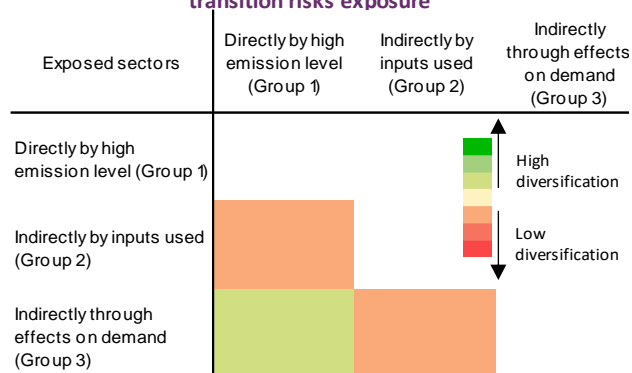


Data as of June 2022

Source: Own compilation with Banco de México, CNBV and INEGI data.

In line with this increase, most banks expanded their portfolio in indirectly exposed sectors (Groups 2 and 3). Banks with more portfolios in Group 2 sectors are also the least diversified against these risks, i.e., they hold more exposed portfolios in Groups 1 and 3 (Graph 125). In addition, the financial intermediaries with the largest portfolio in the two indirectly exposed groups show the most risk amplifiers, e.g., lower levels of liquidity and profitability (Graph 126). Graph

Graph 125

Portfolio diversification among sectors with different transition risks exposure ^{1/}

Data as of June 2022

Source: Own compilation with Banco de México, CNBV and INEGI data.

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 credit portfolio shares in sectors exposed to different transition risks.

Graph 126

Risk amplifiers and mitigants, depending on the bank's exposure to transition risks^{1/}

Variables	Directly by high emission level (Group 1)	Indirectly by inputs used (Group 2)	Indirectly through effects on demand (Group 3)
Capital Adequacy Ratio (CAR)	Green	Green	Yellow
Allowance for Loan Loss Coverage Ratio (ALLL)	Yellow	Orange	Yellow
Liquidity	Yellow	Yellow	Red
Return on assets (ROA)	Yellow	Red	Orange
Non-performing loan rate (IMOR)	Yellow	Yellow	Yellow
Portfolio to companies (%)	Green	Orange	Yellow

Data as of December 2022

Source: Banco de Mexico, CNBV and INEGI

1/ Shades of green show mitigating effects while shades of red show amplifying factors. The color is defined by the correlation coefficient between each factor considered and the credit

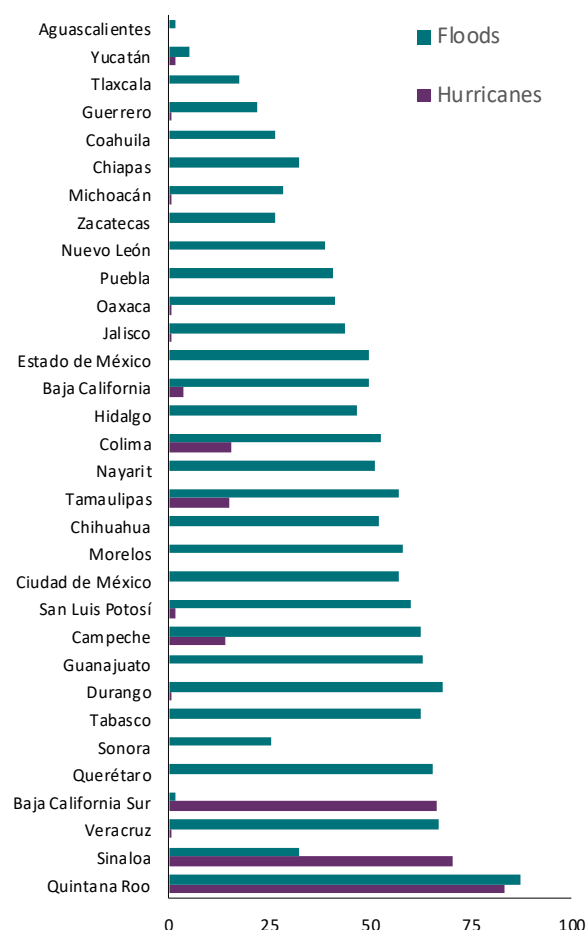
Physical Risks: Corporate Loan Portfolio

This section examines the commercial bank's exposure to physical risks in the corporate loan portfolio, based on four hydrometeorological phenomena: hurricanes, droughts, heat waves and

floods.⁸⁸ Specifically, loans are detected in sectors and regions exposed to the same type of phenomenon. First, the bank loans granted to companies operating in municipalities exposed to hydrometeorological events are accounted for. Subsequently, for each municipality, only the loans granted to sectors at the vulnerability to the same phenomenon are included. The analysis is made for the different federal entities of Mexico (at the state level) and the banks residing in the country (at the bank level).

At the state level, floods remain the most important event in terms of exposure (Graph 127). Nevertheless, exposure to this hydrometeorological event consolidated its downward trend as found in the previous *report*. Drought events are the only ones for which there was increased exposure nationally, mainly by states whose exposure increased due to higher portfolios in the primary sector (Graph 128). Graph

Graph 127
Portfolio in sectors and municipalities vulnerable to cyclones and floods
Percentage



Data as of June 2022

Source: Own compilation with Banco de México, CENAPRED, CNBV and INEGI data.

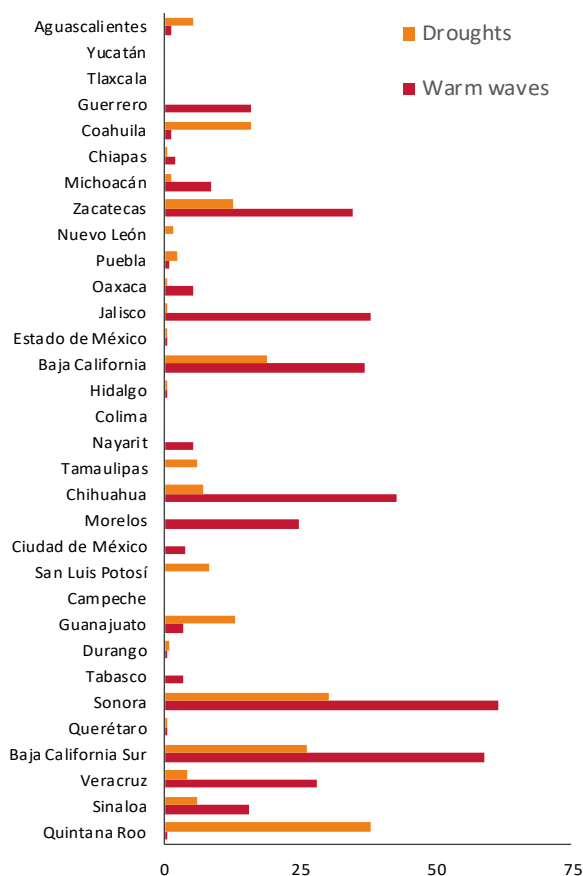
⁸⁸ The Sixth Assessment Report released by the Intergovernmental Panel on Climate Change (IPCC, 2021) confirmed that these are the four

extreme hydro-meteorological events that are expected to increase in frequency or intensity going forward.

Graph 128

Portfolio in sectors and municipalities vulnerable to heat waves and droughts

Percentage

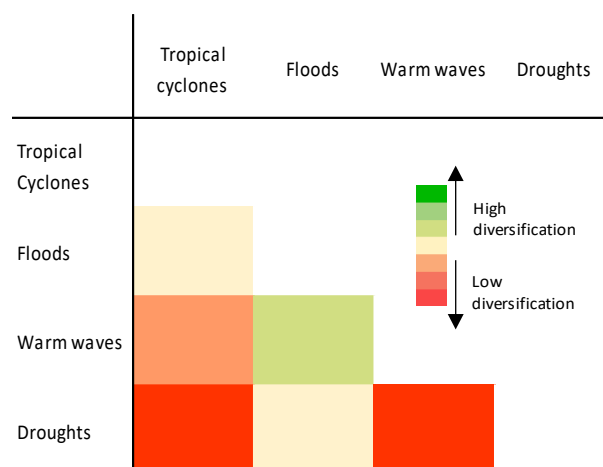


Data as of June 2022

Source: Own compilation with Banco de México, CENAPRED, CNBV and INEGI data.

Graph 129

Portfolio diversification among sectors and municipalities exposed to different hydro-meteorological events (for different states) ^{1/}



Data as of June 2022

Source: Own compilation with Banco de México, CENAPRED and CNBV data.

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 state's share of loan portfolios exposed to different hydro-meteorological events.

The states with more credit exposed to droughts are those that could be more affected if there were more than one hydrometeorological event in a short period of time. (Graph 129). Nevertheless, these states are still the ones with more credit risk mitigating characteristics, such as a lower share of the population informally employed (Graph 130).

Graph 130

Amplifying and mitigating factors of physical risks (for different states) ^{1/}

Variables		Tropical Cyclones	Floods	Warm waves	Droughts
Infrastructure	Homes with air conditioning (%)	Green	Yellow	Yellow	Green
	Dwellings with resistant roof (%)	Green	Orange	Orange	Yellow
	Dwellings with access to public sewage (%)	Yellow	Yellow	Green	Green
	Homes with access to public water service (%)	Green	Orange	Green	Green
Socio-demographic structure	People with access to some health service system (%)	Green	Orange	Green	Yellow
	Labor income per employed person (average)	Yellow	Yellow	Yellow	Yellow
	Population living in poverty (%)	Green	Yellow	Green	Green
	Population in informal employment (%)	Green	Yellow	Green	Green
Economic structure	Companies with some type of financing (%)	Green	Yellow	Green	Green
	Companies with electric power generators (%)	Yellow	Orange	Yellow	Yellow
	Electricity consumption per person (average)	Green	Yellow	Green	Green
	Population employed in the agricultural sector (%)	Green	Yellow	Yellow	Green
	Agricultural GDP (% of total GDP)	Yellow	Green	Orange	Yellow

Data as of June 2022

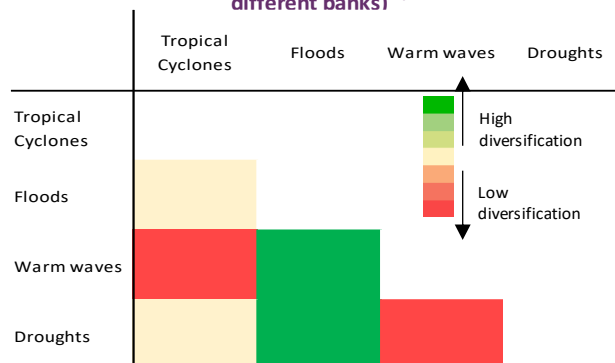
Source: Own compilation with Banco de México, CENAPRED, CNBV and INEGI data.

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.

In the analysis at the bank level, floods are also the most relevant event in terms of exposure and the one for which exposure fell the most. As risk-reducing factors, banks with the largest exposure to floods' portfolios are the most risk-diversified and those with the highest levels of capitalization and liquidity (Graph 131 and Graph 132).

Graph 131

Portfolio diversification among sectors and municipalities exposed to different hydro-meteorological events (for different banks) ^{1/}



Data as of June 2022

Source: Own compilation with Banco de México, CENAPRED and CNBV data.

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 132

Factors amplifying and mitigating physical risks (for different banks) ^{1/}

Variables	Tropical Cyclones	Floods	Warm waves	Droughts
Financial Stability Report	Red	Green	Red	Orange
Allowance for Loan Loss Coverage Ratio (ICOR)	Orange	Yellow	Yellow	Yellow
Liquidity	Green	Green	Green	Orange
Return on Assets (ROA)	Red	Orange	Orange	Yellow
Delinquency Rate (IMOR)	Yellow	Red	Yellow	Green
Portfolio to companies (%)	Yellow	Green	Orange	Orange

Data as of June 2022

Source: Own compilation with Banco de México, CENAPRED and CNBV data.

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.

Physical Risks: Housing and Consumer Loan Portfolio

The physical risk assessment is applied to mortgage loans and some consumer loans (payroll, auto, personal and revolving ones). As in the previous section, the same four hydrometeorological events are included and a similar process is used to determine the loan exposure, based on the municipality and sector where the loan is granted.⁸⁹

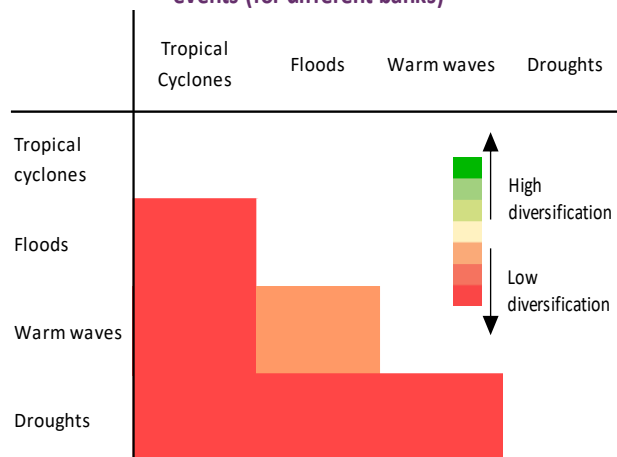
Floods are the phenomenon with the highest portfolio exposure, both for housing and consumption. In housing, banks decreased their diversification against these risks versus the previous version of this *Report*. Therefore, they could be even more impacted if more than one

⁸⁹ As with the corporate portfolio, loans are identified in regions and sectors exposed to the same type of hydrometeorological phenomenon. However, the share of the portfolio in the at-risk sectors is approached in this occasion by following two steps. First, for each municipality, the

hydrometeorological event were to occur (Graph 133). For housing, the banks most exposed to droughts are those that have more risk amplifying factors, e.g., a larger portion of their portfolio in mortgage loans (Graph 134).

Graph 133

Housing loan portfolio diversification among sectors and municipalities vulnerable to different hydro-meteorological events (for different banks) ^{1/}



Data as of June 2022

Source: Own compilation with Banco de México, CENAPRED and CNBV data.

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.

shares of the portfolio in high and low salaries are determined. Next, this information is combined with employment data from the last census. Specifically, for each wage level, the at-risk sector portfolio is estimated as the share of formal employment in these sectors.

Graph 134

Amplifying and mitigating factors of physical risks in the housing credit portfolio 1/

Variables	Tropical Cyclones	Floods	Warm waves	Droughts
Capital Adequacy Ratio (CAR)				
Allowance for Loans Loss Coverage Ratio (ALLL)				
Liquidity				
Return on Assets (ROA)				
Non-performing loans rate (IMOR)				
Housing loan portfolio (%)				

Data as of June 2022

Source: Banco de México, CENAPRED y CNBV.

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.

Banks are more diversified in the consumer portfolio than in the housing portfolio in the case of a hydrometeorological event, although there is heterogeneity. Droughts are typically the event for which banks are less diversified, both in consumption and in housing, making these events a greater risk. For consumer loan portfolio segments, banks are less vulnerable in the revolving consumer portfolio, but more vulnerable in the non-revolving portfolio (Graph 135).

Graph 135

Consumer loan portfolio diversification among sectors and municipalities vulnerable to different hydro-meteorological events (for different banks) ^{1/}

	Tropical Cyclones				Floods				Warm waves				Droughts			
	Payroll	Auto-loans	Individual	Revolving	Nómina	Automotriz	Individual	Revolving	Payroll	Auto-loans	Individual	Revolving	Payroll	Auto-loans	Individual	Revolving
Tropical Cyclones																
Floods																
Warm waves																
Droughts																

Data as of June 2022

Source: Own compilation with Banco de México, CENAPRED and CNBV data.

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 consumer loan portfolios exposed to different hydro-meteorological events.

A risk-amplifying factor highlighted across the consumer loan segments is the allowance for loan losses coverage ratio with preventive reserves (ICOR *its acronym* in Spanish), particularly for payroll credit portfolio. On the other hand, ROA stands out as a mitigating factor for the four hydrometeorological events in all consumer loan portfolio segments (Graph 136).

Graph 136
Amplifying and mitigating factors of physical risks in the
consumer credit portfolio (for different banks) 1/

Variables	Tropical Cyclones				Floods				Heat waves				Droughts			
	Payroll	Auto	Personal	Revolving	Payroll	Auto	Personal	Revolving	Payroll	Auto	Personal	Revolving	Payroll	Auto	Personal	Revolving
Capital Adequacy Ratio (CAR)																
Allowance for Loan Loss Coverage Ratio (ALLL)																
Liquidity																
Return on Assets (ROA)																
Non-performing loan ratio (IMOR)																
Portfolio by type of loan analyzed (%)																

Data as of June 2022

Source: Own compilation with Banco de México, 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.

Sustainable Finances Committee

The Sustainable Finances Committee (CFS), within the Financial System Stability Council, remained active during the second half of 2022. The task forces established by the Committee further developed assessments, suggestions, recommendations and training on sustainable taxonomy, environmental and social risk integration in decision-making by authorities and institutions, through scenario assessments, sustainable financing mobilization, and environmental, social and corporate governance disclosures by issuers and financial institutions. In addition, the Committee issued an opinion in July 2022 on the proposed sustainability-related disclosure standards published by the International Sustainability Standards Board (ISSB) under the IFRS Foundation. The Sustainable Finances Committee members or their agents, the standing guest or their

agents, observers or their agents (ABM, the Mexican Insurance Institutes' Association: AMIS, the Mexican Pension Funds Managers' Association: AMAFORE, the Mexican Stockbrokers' Association AMIB, the Mexican Market Research Agencies' Association AMAI, CCFV-GREEN FINANCES CONSULTATION BOARD), and experts, convened by the Working Group Coordinators for their knowledge and experience, participate in the working groups.

The Sustainable Finance Committee endorsed the creation of a Sustainable Finance Training Hub. The primary goal is to provide free access to online tutorials and a digital repository of updated and relevant training material on sustainable finance. Target audience: i) financial authorities; ii) financial institutions; iii) non-financial companies; and iv) the general public.

National and international experts, as well as various international organizations, will be involved in choosing and updating the content to be included in the platform. It will be managed by the Mexican Sustainable Finance Council.

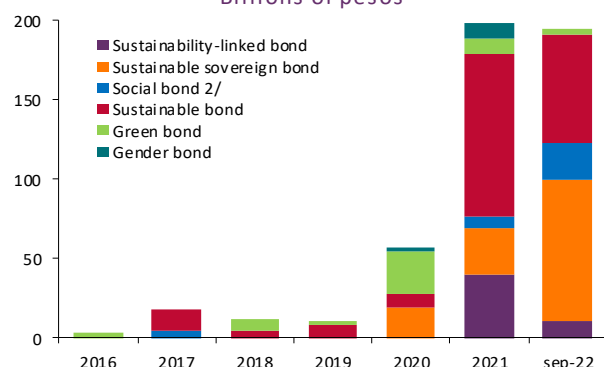
Sustainable financial assets

Between March and September 2022, there was an increase in the placement of thematic bonds in the Mexican market. This has led to greater opportunities for investors to fund projects based on sustainability criteria, which, in turn, reinforces incentives for issuing these types of bonds. Thus, domestic private and public issuers have reached a placement level, as of Q3 2022, very close to placement levels during 2021 in the domestic and international markets (Graph 137).

Sustainable bonds were issued by development banks, state-owned companies and the Federal Government amounting to 150 billion MXN approximately, and were placed in the domestic and international markets.

Graph 137

Placed balance of sustainable, green, social and gender bond issues^{1/}
Billions of pesos



Data as of September 2022

Source: Green Finance Advisory Council and Indeval.

1/ At face value.

2/ This includes the COVID-19 social bond.

VI. Stress tests and recovery plans

V.6. Credit stress tests

The stress tests included in this *Report* are conducted by Banco de México as part of its efforts to promote a sound development of the financial system. This exercise assesses commercial banks' resilience to severe macroeconomic and financial scenarios which may impair either their financial intermediation capacity or their solvency.

In order to run the stress tests, three sets of macroeconomic scenarios,⁹⁰ which are consistent with the macro-financial risks described herein, were assessed for their impact. Furthermore, three sets of historical scenarios were also examined to assess banking institutions' resilience to scenarios resembling the crisis events that the domestic economy has faced in the past.

These results show that the financial system is resilient to the shocks included in the scenarios.

⁹⁰ The variables used in the scenarios are the result of a set of simultaneous shocks to all variables. In the set of scenarios [Recession in the United States of America] the shocks vary between -2.11 and 3.38 deviations. The shocks of 1.17 standard deviations in unemployment, 3.38 standard deviations in the exchange rate and -2.11 in the annual growth of the IGAE are relevant. Finally, in the set of [Climate] scenarios the shocks for all variables fluctuate between -0.80 and 2.02 standard deviations. In the set of Scenarios [Demand Shock] the shocks fluctuate

Regarding solvency, the system's capitalization ratio remains above the regulatory threshold, as well as the leverage ratio.

Although the stress scenarios are based on the macro-financial risks contained herein, they should not be construed as forecasts about the expected economic performance, nor should they be associated with any likelihood of occurrence. Therefore, the exercise should be interpreted as a partial balance and counterfactual simulation that seeks to determine and assess the banking system's vulnerabilities as a whole.

Scenario A: Tighter global financial conditions and low global growth

The first series of paths under consideration refers to an environment where more restrictive monetary policy is enforced in advanced economies in response to additional and more persistent inflationary pressures, which leads to tighter global financial conditions. In this scenario, volatility in the financial markets would increase, capital flows would rebalance, and ultimately, global economic activity would decelerate. This would result in lower industrial production and lower imports in advanced economies, with potential impacts on the exchange rate and the country's economic activity. Given such an environment, we would see a decrease in banks' loan portfolios and higher unemployment rates, which may increase loan portfolio delinquencies and impact banks' ability to produce income, which would be translated into lower capital levels.

Scenario B: Weaker domestic consumption and investment

The second set of paths discussed is consistent with an extended and accentuated weakness in domestic

between -1.62 and 1.98 standard deviations compared to their historical values. The 1.98 standard deviation shock to the exchange rate and the -1.62 shock to the annual growth of the IGAE correlate. The set of scenarios [Loss of investment grade] covers shocks between -1.80 and 3.38 standard deviations for all variables. These include a 3.38 standard deviation shock in the exchange rate and a -1.80 shock in the annual growth of the IGAE.

consumption and investment, thus impacting capital flows into Mexico, the exchange rate, employment and household income levels, as well as the economic outlook for companies. Interest rates remain stable in the short and medium term, and inflation will converge to its mid-term target. Low interest rates and a lower output growth rate are the main factors that would hit banks' balance sheets.

Scenario C: Credit rating adjustment

Lastly, the third set of paths is consistent with a higher sovereign and Pemex debt risk premiums scenario, resulting from sovereign and Pemex debt changes, which causes high volatility in financial markets, depreciating the exchange rate and putting upward pressure on interest rates. In the short term, a contraction in aggregate demand would negatively impact output and employment. In such a scenario, loan growth and past-due portfolio could be impacted and commercial banks' income and capital could be hit thereafter.

Historical scenarios

Similarly, three historical scenarios, which replicate the path of the main macro-financial variables in such events marked by high stress or volatility, were considered. These scenarios were the 1995 crisis (H1 scenario), the 2008 global financial crisis (H2 scenario) and the May 2013 global financial volatility event (H3 scenario) around the U.S. Federal Reserve Board's monetary policy standardization, commonly referred to in the media as taper tantrum.

Methodological considerations

The scenarios were produced using the same methodology as in previous editions of the Report.⁹¹ The scenarios are generated using a vector autoregression econometric model (VAR *its acronym* in Spanish) based on a central path which includes the main macroeconomic and financial variable fluctuations over a 36-month horizon. This methodology can generate random and

simultaneous shocks which can influence the central path of the variables while maintaining the estimated internal consistency of the covariances and the variables' dynamics.

Despite this approach's value, the model may underestimate the occurrence of extreme events resulting from simultaneous shocks from different scenarios, feedback effects from the financial sector onto the real sector, or non-linear effects.

Based on the scenarios produced, the potential market losses that banking institutions would incur in a stress scenario were estimated. The losses factor in the financial contagion effects that would potentially spread and increase the scale of the shock through the interbank network.

Besides, an econometric model is used to estimate the impact of a macroeconomic shock on reserve formation, the likelihood of default in the loan portfolio and each bank's loan portfolio dynamics.

Additionally, the exercise includes differentiated effects by risk level for each economic activity, based on each sector's economic growth and its level of delinquency for the loan portfolio to private non-financial companies.

Similarly, the impact that the default of the largest borrowers would have on the system's capital levels is assessed through the concentration risk in the portfolio, using a simulation process to model low-probability, high-severity events.

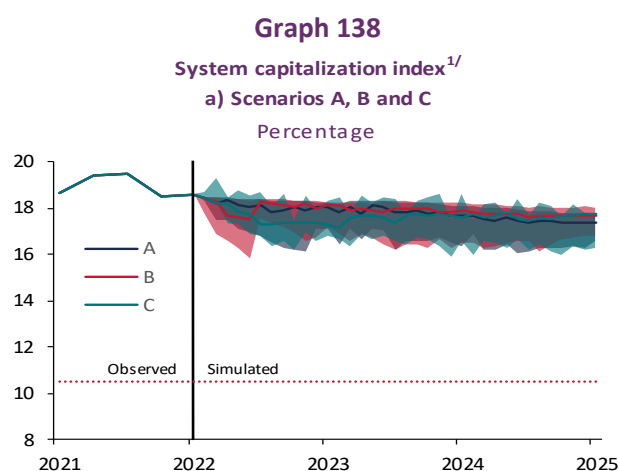
Finally, the financial margin is estimated based on each bank's lending and deposit interest rate elasticities relative to the cetes-treasury certificates rate, moreover, non-interest income and administrative expenses are modeled. Based on the outcome of the operation, market and contagion losses and credit losses, the shock absorption capacity and net capital evolution for the banking system are calculated for each scenario.

⁹¹ See Figure 3 Stress test methodology outline, released in the December 2019 Financial Stability Report.

The exercise assumes that no bank or regulator behavioral changes are accounted for by the occurrence of the simulated stress events. This means that, on the one hand, throughout the stress horizon, banks do not make any changes in their business strategy, capital contributions or adjust their derivative or repurchase positions. On the other hand, regulators do not take any corrective action or provide any facilities that would help mitigate the shock.

Key findings

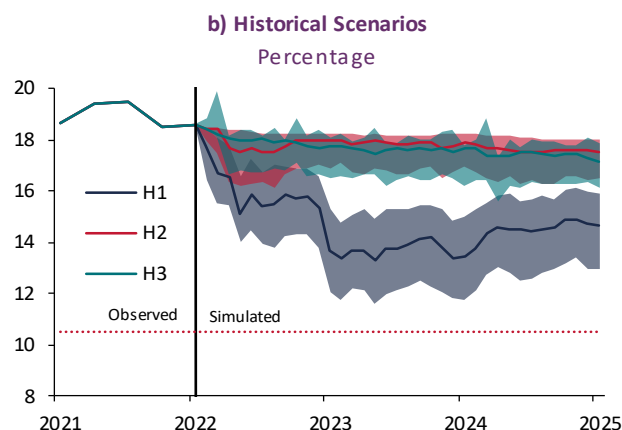
Results from the stress exercise reveal that the system ends the stress horizons above the regulatory threshold plus capital surcharges in all simulated scenarios (Graph 138). Interestingly, net capital shows a slight decrease in the short term, while it returns to its initial value in the medium term (Graph 139) in most of the scenarios. In contrast, four of the six scenarios show an increase in risk-weighted assets (Graph 140) starting in year 2 of the simulation.



Data as of September 2022 and simulations 3 years thereafter.

Source: Banco de México

1/ The horizontal line shows the minimum icap plus capital supplements.

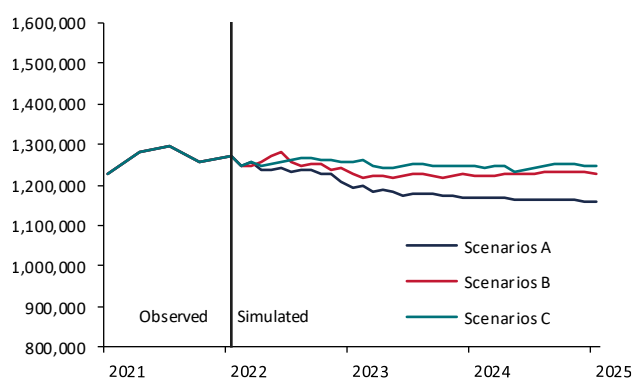


Data as of September 2022 and simulations 3 years thereafter.

Source: Banco de México

1/ The horizontal line shows the minimum icap plus capital supplements.

Graph 139
Evolution of the system's average net capital
a) Scenarios A, B and C
Million pesos

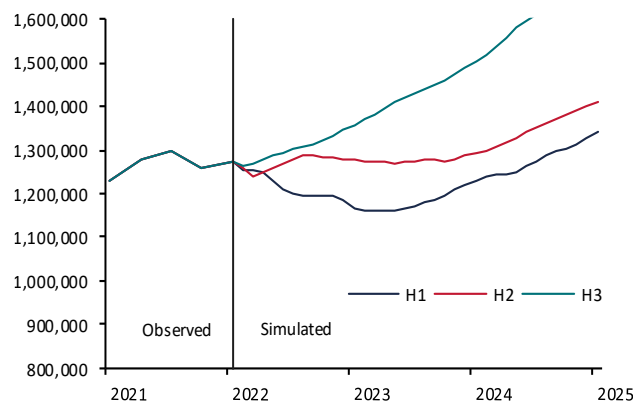


Data as of September 2022 and simulations 3 years thereafter.

Source: Banco de México

b) Historical Scenarios

Million pesos

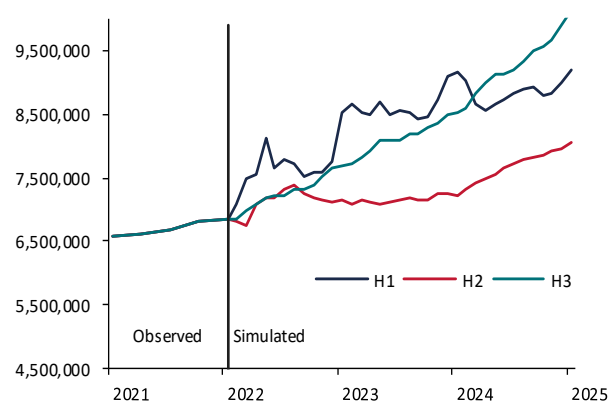


Data as of September 2022 and simulations 3 years thereafter.

Source: Banco de México

b) Historical scenarios

Million pesos



Data as of September 2022 and simulations 3 years thereafter.

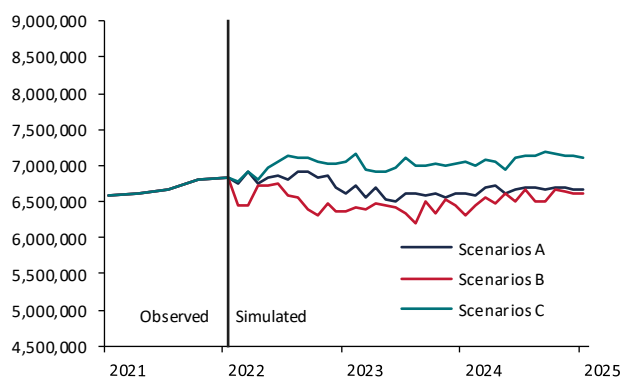
Source: Banco de México

Graph 140

Evolution of the average risk-weighted assets of the system

a) Scenarios A, B and C

Million pesos



Data as of September 2022 and simulations 3 years thereafter.

Source: Banco de México

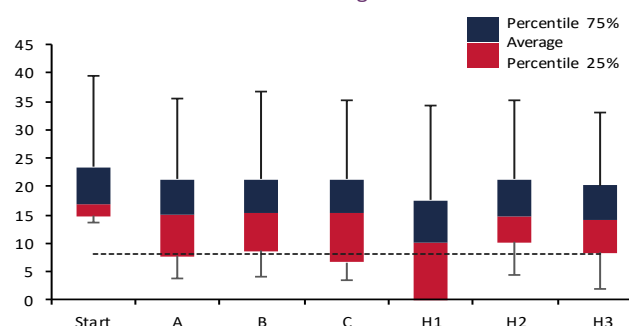
Importantly, some banks ended the year with capitalization levels below the regulatory thresholds in the extreme scenarios simulated (Graph 141), even though they account for a low percentage of the system's assets. Institutions that would end the year with a capitalization ratio below 8 % in scenarios A and C account for about 6 % of total system assets, while in scenario set B this percentage is about 3 %.

Shocks to macro-financial variables in the stress scenarios impact the banking system's delinquency levels by increasing the probability of default (Graph 142). Moreover, rising delinquency rates take a toll on banks' capital.

In addition, the exercise included the default materialization of the largest borrowers in the corporate loan portfolio. When factoring in the concentration effect, the CAR under the macro-financial risk scenarios would be 2.88 points lower on average, and that of the historical scenarios would be 3.11 points lower on average than in the simulations that do not consider this effect.

Graph 141

Average CAR distribution at the bank level at the end of the test ^{1/}
Percentage



Data as of September 2022 and simulations 3 years thereafter.

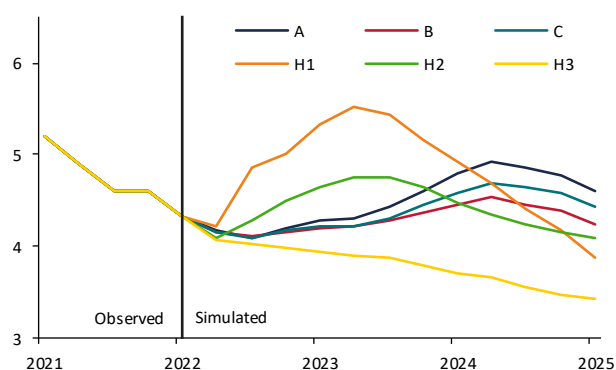
Source: Banco de México

1/ The dotted horizontal line shows the minimum CAR without including capital surcharges. In the box-arm plot, the arms account for 10% and 90% of the distribution.

Graph 142

Average default probabilities of the system's credit portfolio

Weighted by each bank's performing loans,
%



Data as of September 2022 and simulations 3 years thereafter.

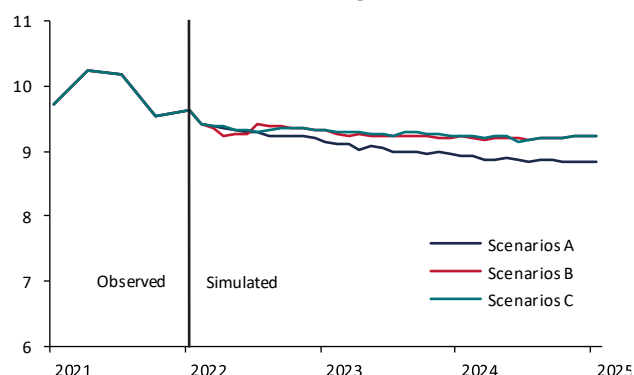
Source: Banco de México

Graph 143

Average System Leverage Ratio

a) Scenarios A, B and C

Percentage

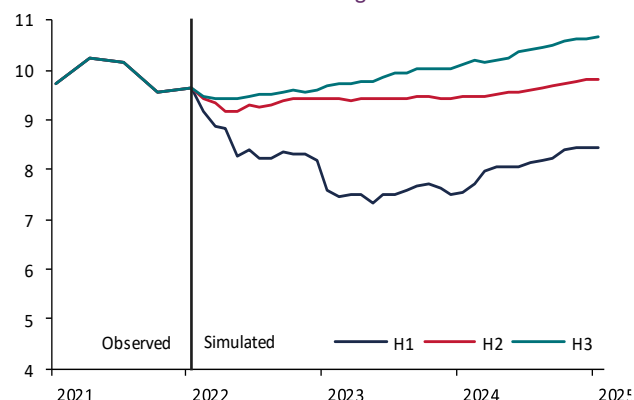


Data as of September 2022 and simulations 3 years thereafter.

Source: Banco de México

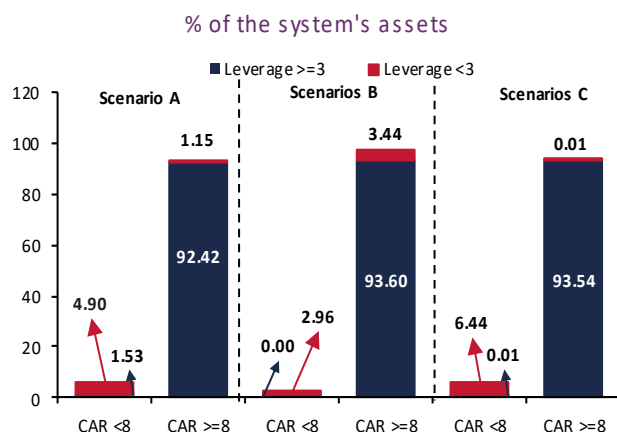
b) Historical scenarios

Percentage



Data as of September 2022 and simulations 3 years thereafter.

Source: Banco de México

Graph 144**Average CAR and leverage ratio in stress scenarios**

Data as of September 2022 and simulations 3 years thereafter.

Source: Banco de México

Finally, the exercise also assesses the impact on the banks' leverage ratio. In both the historical and macro-financial risk scenarios, the system's average leverage level was above the regulatory 3 % threshold (Graph); nevertheless, some banks would end the year with levels below the regulatory threshold. Similarly, institutions with a CAR above the regulatory threshold also tend to have a leverage ratio higher than the regulatory threshold (Graph 144).

To sum up, the stress tests suggest that the Mexican banking system has sufficient capital levels to cope with the simulated worst-case scenarios. However, some banking institutions would end the stress horizon with capital levels below the regulatory threshold, although these institutions account for a low percentage of the system's total assets. Furthermore, results show that concentration risks in the corporate portfolio could cause additional pressures on the system's capital. The system's leverage levels also remain above the regulatory threshold. Finally, the results do not contemplate the potential mitigating actions that could be taken by the banks considered in the test. Therefore, the exercises should be viewed on a system-wide basis and not necessarily for individual banks.

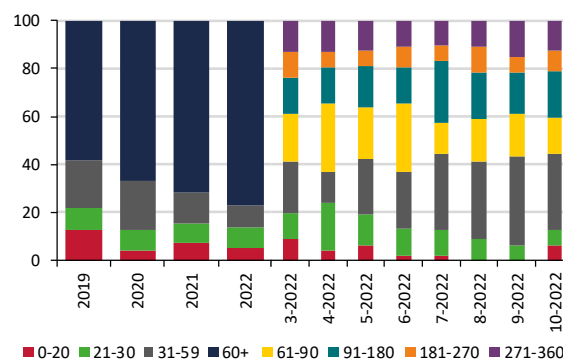
V.7. Liquidity stress tests

In order to assess the resilience of banks' liquidity position, two prospective liquidity stress test exercises are provided. The exercises assess various stress scenarios in addition to the one considered in the LCR regulatory standard (see Box 9).

First, according to the liabilities coverage horizon, as of October 2022, most banks can meet their commitments within 30 days. The liabilities coverage horizon assesses funding risk by estimating the number of days a bank could expect to meet the total outflows from financial counterparties and stressed outflows from retail and wholesale non-financial counterparties. The suggested scenario is more severe than the one used for the LCR, since it considers only the stock of liquid assets and excludes the inflows that the institutions may have (Graph 145).

Graph 145**Percentage of banks that could meet their obligations in an stress scenario^{1/}**

Y-axis: banks' percentage
X-axis: calculated exercise date
Color: total days banks could meet their liabilities



Data as of October 2022

Source: Banco de México

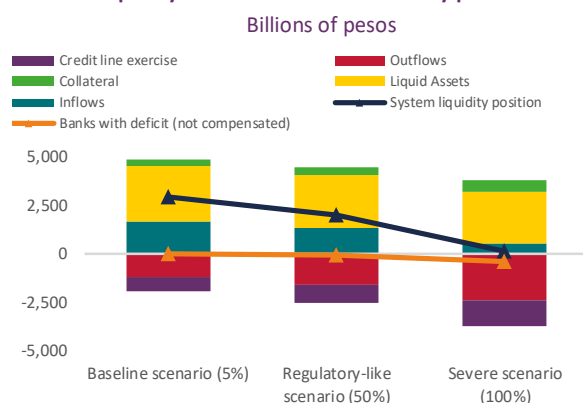
1/ For each month, banks are aggregated by term range, according to the monthly average for each bank, calculated based on daily observations of the number of days that could fulfill their obligations in the event of a severe stress scenario.

Second, in order to assess the resilience in a longer period scenario, the second exercise simulates different stress levels on contractual cash flows, both inflows and outflows, considering a 90-day horizon

and assuming increasingly stringent assumptions beyond those established by the LCR regulatory standard. Under this exercise, the banking sector as a whole maintains a liquidity surplus. However, some institutions, which account for a small percentage of the system's assets, would face a liquidity deficit in the most severe case scenario. These banks account for 3.34 % of the system's assets (Graph 146).⁹²

Graph 146

Liquidity stress scenarios over 90-day periods ^{1/}



Data as of October 2022

Source: Banco de México

1/ In the severe scenario (100 % severity), a haircut on liquid assets of around 4 % is considered. Repos have a roll-over of 45 % and released collateral has the same haircut as liquid assets. Inflows from loans portfolio are not considered (100 % haircut). Wholesale deposits (demand and term) have a 20 % run-off factor and retail deposits (demand and term) have a 10 % run-off factor. Contingent liquidity and credit lines granted have a 40 % run-off factor. The baseline scenario and regulatory-like scenario consider a 5% and 50 % severity compared to the severe (100 %) scenario. The regulatory-like scenario estimates an aggregate outflow which is similar in magnitude to the outflow calculated under the 83 (See Box 9).

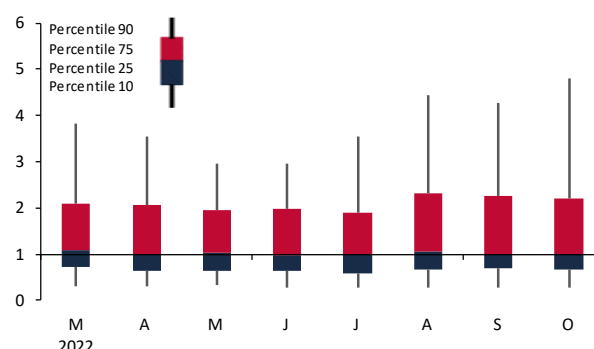
Individual institutions showed resilience throughout 2022. The 75 % of the Distance to Liquidity Stress Indicator (DLSI), that measures the severity required for an institution to face a liquidity deficit, has increased, suggesting that more institutions are resilient to the assessed scenario (Graph 147).

Graph 147

Distribution of the Distance to Liquidity Stress Indicator (DLSI)

^{1/}

Index



Data as of October 2022

Source: Banco de México

1/ DLSI measures the required severity for an institution to face a liquidity deficit. The severe scenario is adjusted to 1, higher values show greater resilience compared to the suggested severe scenario.

⁹² The hypothetical liquidity position (deficit/surplus) is estimated by comparing the liquidity needs (stressed outflows and exercise of credit

lines) against the assets available to meet them (liquid assets after haircut, stressed inflows and net effect of collateralized transactions).

Box 9: Stress testing methodologies based on cash flows

I. Introduction

Liquidity risk, unlike other risks, can appear quickly and suddenly. Thus, liquidity stress tests are a key risk management tool for banks, and a tool also used by supervisors. Liquidity stress tests help to assess funding liquidity risk and market liquidity risk.¹

Although there are standard methodologies to perform liquidity stress tests, the literature emphasizes the importance of calibrating them for each financial system, given the particular context, qualitative elements, expert judgement and data availability.

This Box presents two tools that expand the prospective liquidity assessment, leveraging on the greater detail of information reported in the liquidity regulatory return since March 2022. The addition to the first tool, consists in having the calculation horizon extended beyond 30 days, exploiting the greater detail of the available information. The second tool, whose development was made possible by the greater granularity of information on maturities, provides some analytical strengths such as increased flexibility regarding the use of weights, the behavioral assumptions behind the inflows and outflows, the time horizon covered by the analysis and the particular type of scenario that can be simulated.²

Additional liquidity indicators are developed and tracked to complement the current regulatory requirements and provide a broader picture of the intermediary's liquidity situation. This is particularly relevant since regulatory indicators could lose some of their informative power over time as institutions increasingly manage their resources more efficiently, incorporating regulatory compliance restrictions.

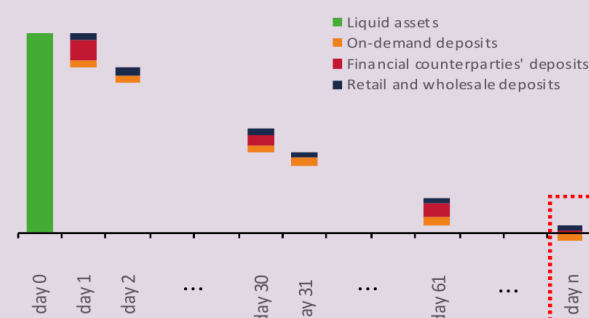
II. Liabilities Coverage Horizon

The Liabilities Coverage Horizon estimates the number of days a bank could meet its commitments using only its available liquid assets under a funding liquidity stress scenario. Values can range from 0 to 360 days. As the indicator is expressed in number of days, its interpretation is easy and allows for comparison between institutions.³

As a first step, the indicator considers the same liquid assets available on the first day of the horizon calculation as for the LCR calculation, but without applying any discount factors, i.e., assuming that they could be sold in the market without losing value and thus achieving immediate liquidity (no liquidity stress in the markets is assumed). The second step is to subtract the estimated outflows for each subsequent calculation day

according to its maturity, considering outflow factors differentiated by the type of counterparty involved (Figure 1), which are detailed below.

Figure 1
Diagram on the assets and flows considered in the calculation of the Bond Coverage Horizon^{1/2/}
amount of cashflows



Source: Banco de México.

1/ Diagram for explanatory purposes on the determination of the Bond Coverage Horizon.

2/ Net liquid assets, understood as liquid assets minus obligations for each day, are represented as the lower part of the bar for each day. The Obligation Coverage Horizon corresponds to day n, when assets are insufficient to cover obligations up to that day.

For deposits from financial counterparties, demand balances are assumed to be withdrawn immediately and loans and interbank securities are assumed not to be renewed at maturity (100 % outflow factor). For deposits from retail and non-financial wholesale counterparties, outflow factors equal to those of the LCR are assumed; that is, demand deposits are reduced at (5/30) % or (10/30) % each day until they are exhausted and term deposits are reduced at maturity at a rate equal to the LCR outflow factor and the remainder of the deposit is renewed. As for secured funding sources, such as repos, a complete rollover (0 % outflow factor) is assumed, consistent with the fact that no stress in the financial markets is modeled. Regarding inflows, the exercise estimates that all loans granted are fully renewed (0 % inflow factor); therefore, no cash inflow is included in the calculation that could be used to cover liabilities. The above assumptions complement the LCR, since using more severe assumptions, allows to have a more sensitive appraisal of the liquidity position strength and the leeway they could have,

¹ Funding liquidity risk means that an institution may not be able to meet its short-term liabilities due to withdrawal of its funding sources, contingent liabilities or cash inflow shocks. Market liquidity risk refers to an institution's inability to buy or sell assets in the market, or to do so at high costs and at punished prices.

² In Mexico, institutions have been reporting information to estimate the LCR since 2014. However, as of the effective date of the Net Stable Funding Ratio in March

2022, the liquidity information regulatory returns were modified to include, among others, greater granularity on the maturity of the liabilities.

³ This indicator has been published since the June 2019 Financial Stability Report. However, beginning with this Report, more granularity is being added to flows with maturities beyond 30 days, since more detail is available on the maturity of the liabilities.

expressed in number of days, under an extreme scenario as the one outlined.^{4,5}

III. Cash Flow Analysis and Distance to Liquidity Stress Indicator

In a second exercise, contractual inflow and outflow cash flows are used to assess the banks' ability to cope with severe liquidity scenarios. This exercise was developed in collaboration with the IMF in the context of the Financial Sector Assessment Program (FSAP) to Mexico in 2022 (see Box 4).⁶

The exercise assumes a funding liquidity risk scenario, in which the liquidity needs that banks could face under the assumed scenario are estimated, as well as a market stress scenario by assuming a loss in the value of available assets. A feature of these exercise is that the scenario accounts for varying degrees of severity. The scenario considers a 90-day stress horizon on cash flows, as opposed to the 30-day horizon considered for the LCR, a term that includes the most relevant maturities of the Mexican financial system.^{7,8}

The methodology has four steps. First, identify liquid assets and contractual inflows and outflows with maturities below the 90-day horizon. Second, liquidity needs are estimated under different stress degrees, assuming outflow factors for funding sources and assuming that a share of the credit lines granted by the banks is used (Table 1).

The third step is to estimate the available assets also under different stress degrees, considering the liquid assets with a haircut reflecting stressed market conditions (discount factor) and the inflows considering defaults or equivalently, for liquidity purposes, the renewal of the loans granted (Table 2).

Table 1
Stress factors for outflows and contingent flows under the most severe stress scenario

Flow	Description	Stress factor 1/
Outflows	Transactional retail deposits	10 %
	Non-transactional retail deposits	20 %
	Operational wholesale deposits	25 %
	Non-operational wholesale deposits	40 %
	Financial wholesaler and Call money received	100 %
	Secured funding received: L1	30 %
	Secured funding received: L2A and L2B	50 %
	Secured funding received: Other assets	100 %
	Other outflows	100 %
Contingent outflows	Revocable credit facilities	40 %
	Irrevocable credit facilities	40 %
	Liquidity facilities	100 %
	Other contingent liabilities	40 %

1/ The stress factor in the table corresponds to the severe scenario presented in Graph 1, position 21. Since they are outflows, these are shown with a negative sign.

Table 2
Discount factors for liquid assets and inflows under the most severe stress scenario

Flow	Description	Stress factor 1/
Liquid Assets	Cash and banknotes	0 %
	Level 1	10 %
	Level 2A	20 %
	Level 2B	20 %
Inflows	Loan portfolio flows	100 %
	Call money and deposits in other banks	100 %
	Secured funding granted AN1	30 %
	Secured funding AN2A and N2B	50 %
	Secured funding Other Assets	100 %
	Other items	100 %

1/ The stress factor in the table corresponds to the severe scenario presented in Graph 1, position 21. Since they are available assets, these are shown with a positive sign.

The net effect (positive or negative) of collateral received and delivered in repo, reverse-repo and other secured financing transactions, is added to available assets. In other words, the collateral that would be released upon non-renewal of the received funding is included, as well as the collateral that must be repaid upon non-renewal of the funding granted by the bank. For commercial banks, the aggregate net position due to released

⁴ See Annex 2: Outflow factors for liabilities or other transactions of the General Provisions on Liquidity Requirements for Commercial Banks.

⁵ Regarding the coverage horizon presented in previous editions of the Financial Stability Report, the calculation for the first 30 days remains unchanged. From day 31 onwards, there is now additional information enabling a more accurate estimate of the outflows and therefore the number of days in which liquid assets would be depleted according to the methodology described in this Box.

⁶ Contractual cash flows refer to cash flows that by law must be delivered on a predefined date or upon certain events, i.e., they remain fixed and unchangeable. On the other hand, the flows expected from agents' behavior ("behavioral flows") may either increase or decrease when accounting for behavioral assumptions on

funding sources renewal, refinancing of loans granted or contingent flows such as credit lines and facilities. Under normal conditions the expected flows due to agent behavior are considered to be less severe than the contractual ones since counterparties are expected to renew at least part of the funding.

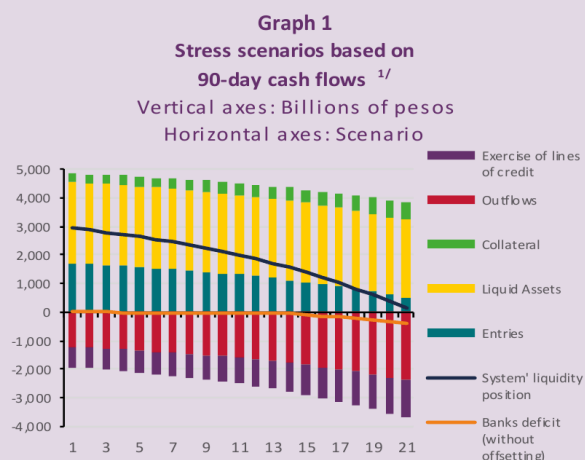
⁷ The methodology allows to envisage different scenarios, i.e. different sets of variables for which stress situations are assessed, with increasing severity on the assumptions of each variable.

⁸ Although the outlined approach is not strictly comparable with the LCR, as it differs in both the time horizon and the weights used, a similar stress level in magnitude can be obtained in order to compare the overall test results with the LCR indicator.

collateral under the above assumptions is positive, since secured funding received is greater than funding granted. Collateral is treated with the same stress discount factors described for liquid assets.

The fourth step is to estimate the hypothetical liquidity position (deficit or surplus) by comparing the liquidity needs (step 2) and the assets available to meet them (step 3).

For the exercise shown, 21 scenarios are used, where the lowest stress scenario has a severity degree equivalent to 5 % of the stress factors assumed in the most stressed scenario. Assumptions are increased in severity in each scenario using an exponential growth function, until 100 % of the stress is reached in scenario 21. There is no limit to the number of scenarios that can be envisaged (Graph 1).⁹



Data as of October, 2022

Source: Banco de México.

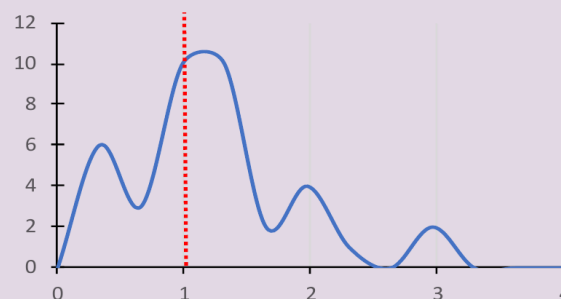
1/ Results are presented according to the methodology explained for a range of 21 scenarios. The most severe scenario corresponds to scenario 21 (100 % severity), while scenario 1 is the least severe (5 % severity). The severity grows exponentially in each scenario.

The methodology also allows to assess individual institutions' resilience to the liquidity stress scenario. The literature uses a Distance to Liquidity Stress Indicator (DLSI), which represents the severity that would be necessary for an institution to have a liquidity deficit compared to the outlined assumptions. To estimate the DLSI, the above methodology is followed, but expanding the stress scenario range, so that the severity degree

surpasses 100 % and each institution records a liquidity deficit in one of the scenarios. The DLSI will correspond to the severity degree at which the first liquidity deficit is recorded. In other words, the severity in each of the scenarios becomes a variable of interest in terms of resilience.¹⁰

The DLSI is independent from the functional form of the severity degree increments. In this context, the most severe scenario, i.e. scenario 21 of the exercise, is normalized to 1. Thus, DLSI of less than 1 suggests that the institution would not be able to meet its liabilities in scenario 21 and would have a liquidity deficit in the event of a stress lower than that of the most severe scenario. Similarly, DLSI above 1 suggests an ability to withstand a higher stress level compared to scenario 21 without showing a liquidity shortfall (Graph 2). Based on October 2022 data, 25 banks, accounting for 76.5 % of the system's total assets, recorded a DLSI above 1, which suggests that they could face an adverse liquidity scenario even more severe than the one modeled in this exercise.

Graph 2
Distribution of the Distance to Liquidity Stress Indicator (DLSI)^{1/}
Vertical axis: number of institutions
Horizontal axis: DLSI



Data as of October, 2022

Source: Banco de México.

1/ The DLSI refers to the severity sufficient for the institution to present a liquidity deficit. The severe scenario is normalized to 1; higher values denote greater resilience with respect to the scenario presented.

⁹ The severity growth function can take any increasing functional form, e.g., linear or exponential. The exercise presented uses an exponential function fitted to 21 scenarios.

¹⁰ The DLSI is not comparable to the LCR as it differs both in the assumptions used and the time horizon covered.

IV. Conclusions

The two methodologies presented expand the prospective liquidity assessment by leveraging on the greater detail of information available in the regulatory returns that became effective as of March 2022. This contributes to the micro and macroprudential supervision carried out by the authorities. The different liquidity indicators are aligned and have the common goal to provide information on the liquidity position of an institution. Therefore, in general, institutions with an adequate liquidity risk management are expected to have favorable indicators in the different metrics (LCR, NSFR, Liabilities Coverage Horizon and DLSI). However, having different indicators, each associated with a particular scenario, is useful because using different assumptions and scenarios contributes towards a more robust liquidity monitoring and, if necessary, to reveal particular vulnerabilities not identified with the generic indicators established by the regulation.

References

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V.8. Stress tests of physical risks associated with climate change

This kind of exercise assesses the financial system's impact on extreme hydro-meteorological events. The approach is similar to that of historical scenarios, i.e., recent historical events, i.e., the occurrence of extreme hydrometeorological events, are assumed to be recurrent. Similar shocks were assessed compared to the ones used in the previous report. Given that the credit exposures in vulnerable sectors and regions did not exhibit major changes, the results of the exercise were similar.⁹³ As a result, findings of this type will be reported less frequently.

V.9. Recovery plans

Commercial banks' recovery plans maintain constant improvement compared to the plans presented in previous years, strengthening their response capacity to shocks that could jeopardize their liquidity, solvency or, in general, its operations.⁹⁴

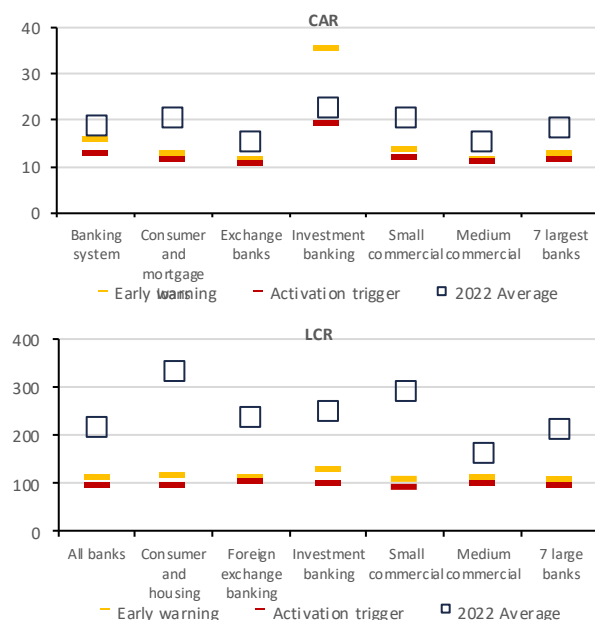
During 2022, the observed CAR and LCR levels for most institutions remained above the triggering threshold defined in the recovery plans (Graph 148).

⁹³ The average drop in system capitalization ratio was 2 and 2.38 percent in the two scenarios, compared to 2.22 and 2.45 percent in the exercise published in the previous version of this Report.

⁹⁴ Commercial banks must have recovery plans to identify the actions that banks could implement to restore their financial situation against adverse scenarios that could impact their liquidity or solvency. These plans are a relevant instrument of crisis preparedness and risk management.

Graph 148

Trigger thresholds and observed CAR and LCR ^{1/}
Percentage



CAR and LCR data observed from January to September 2022

Source: Banco de México and CNBV

^{1/} Threshold averages and observed data are shown by type of institution. The most recent threshold available is considered. For the observed data, capped averages are presented due to scales issues, the LCR is capped to 350 and CAR capped to 25.

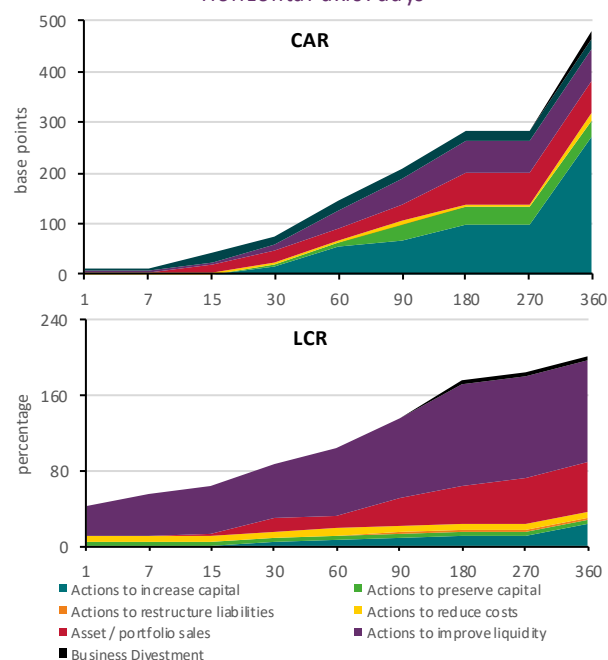
From the plans submitted between 2020 and 2022, the recovery actions included have been generally tailored to each institution, including previous experience considerations, even if this experience was in the business as usual operation scenario.

Banking institutions have a reasonable recovery margin for solvency and liquidity, provided that: i) the actions are properly and timely implemented, ii) the potential impact of their recovery actions on their financial situation is not weakened, and iii) other shocks do not materialize. According to estimates included in the plans, the envisaged actions could increase the system's CAR (total asset-weighted) by

200 bps in about 90 days and the LCR (total asset-weighted) by 100 % in about 60 days. (Graph 149).⁹⁵

Graph 149

Recovery capacity of CAR and LCR
Vertical axis: CAR in basepoints and LCR %.
Horizontal axis: days



Data for plans submitted between 2020 and 2022

Beginning in 2023, some changes to the recovery planning requirements will come into effect. These modifications seek to ensure that the institutions maintain continuously improving recovery plans, that these are up-to-date and incorporated into its comprehensive risk management process. The changes include amendments to the structure of the plans, as well as, greater detail and more in-depth information, in order for banks to further strengthen clarity, credibility and feasibility of their recovery actions to address potential adverse solvency or liquidity scenarios.⁹⁶

⁹⁵ Recovery capacity margin refers to the impact that the potential recovery actions contemplated in the recovery plans would have on the capitalization ratio (bp) and on the LCR (percentage) for the institutions against an adverse shock. The assessment does not address any potential incompatibility nor cross-over effects. The impact of the action is assumed to materialize in the time of implementation that remains over

time and accumulates with the other measures that would be implemented according to the plan.

⁹⁶ Annex 69 of the Single Banking Circular (CUB, its acronym in Spanish) as amended on September 2nd, 2022. See Section IV. Policy measures implemented to preserve this Report's sound development of the financial system.

VII. Final considerations

Since June 2022, date in which the last *Report* was published, the Mexican financial system continues to show a sound and resilient position in which commercial banks have capital and liquidity levels well above the regulatory minimums. Nevertheless, in the current situation, the Mexican financial system faces a more complex and uncertain environment. On the one hand, there have been high inflation levels and deteriorating growth prospects, in addition to a greater and more accelerated tightening of global financial conditions and risks to financial stability in advanced countries.

Global economic activity showed weakness in the second and third quarter of 2022, albeit with cross-country heterogeneity. This is largely associated with the conflict between Russia and Ukraine, a slower-than-anticipated recovery in China, and the tightening of global financial conditions due to a tightening of monetary policy stances worldwide. Likewise, inflation in most advanced and emerging economies remained above their respective central banks' targets, while inflation expectations also increased for several economies.

Given this scenario, vulnerabilities and imbalances that could arise in the financial system and may impact adequate functioning should continue to be monitored, as certain external risks have intensified and some internal risks persist. On the one hand, risks of a greater and more accelerated global financial tightening and a lower than anticipated and downward trend in world economic growth have been exacerbated. On the other hand, the risk of a further weakening of the aggregate demand and additional adjustments in the sovereign and Pemex debt persists.

Based on these risks, stress tests were conducted for the Mexican banking system. Based on the results of this exercise, we may conclude that the banking system, at an aggregate level, has capital levels that would allow it to cope with different simulated adverse macroeconomic and financial scenarios,

even though, at an individual level, certain banking institutions which represent a low percentage of the system's total assets could have a greater impact on their capitalization levels. Despite these results, the challenge remains to maintain financial stability in a domestic environment of robust and widespread credit reactivation that can accompany and boost economic growth.

Although certain risks heightened by the pandemic have diminished, including liquidity, credit and contagion risks for banks, market risk has increased since the previous *report*.

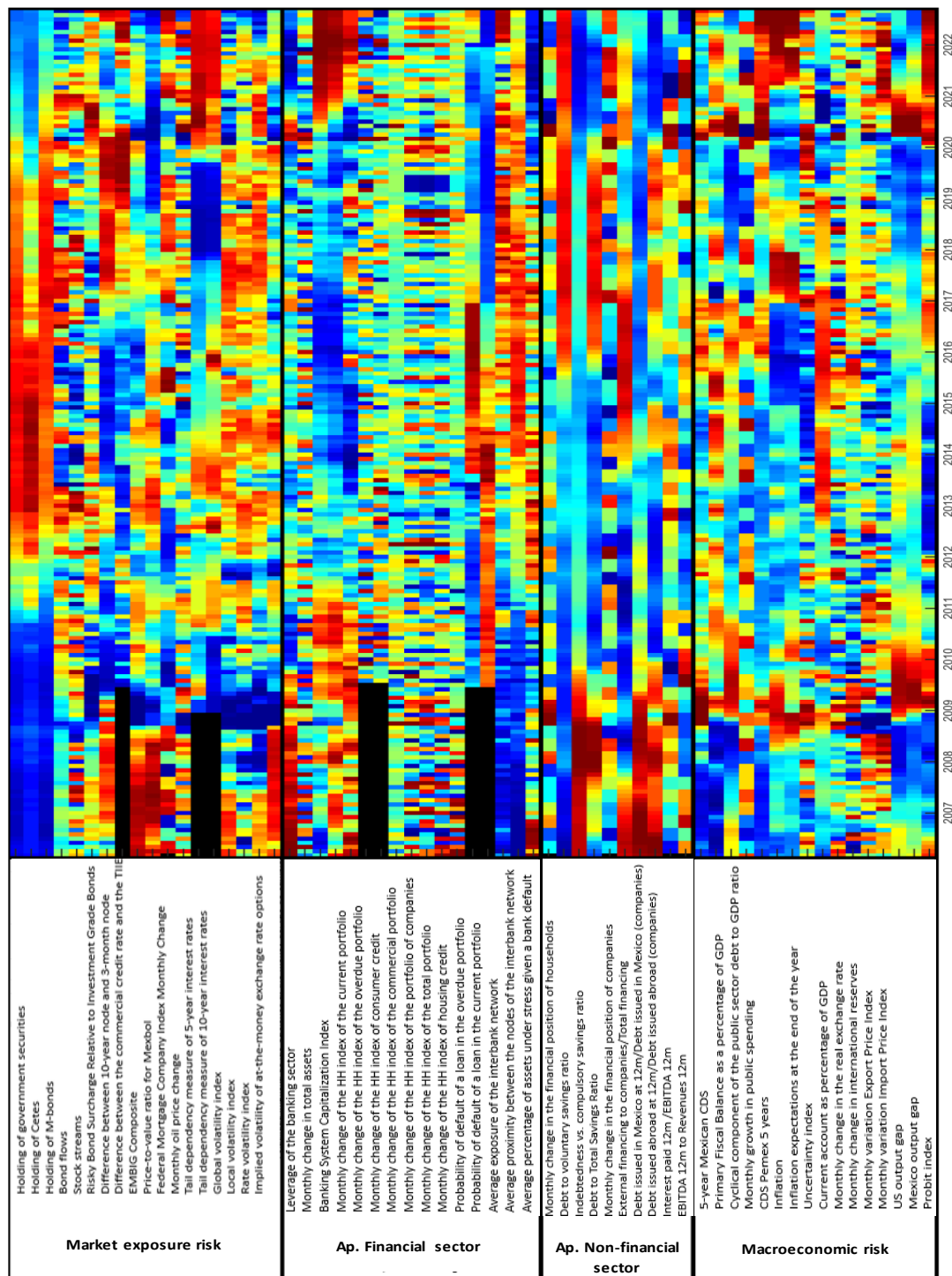
As for the other financial intermediaries' risks, they are relatively stable, while the situation in the non-regulated sector presents complex challenges, including reduced funding access due to the materialization of certain credit events and the tightening of both local and global financial conditions. This sector's assets represent a small share of the financial system; therefore, it does not represent a potentially systemic risk factor. Nevertheless, challenges remain in an environment in which the financing granted by this segment continues to shrink, albeit at a slower pace than the last *Report*.

During the period covered by this *Report*, the financial authorities have been working on continuously improving the regulatory framework and adopting international standards and best practices in order to maintain a robust and updated regulatory framework. Accordingly, the financial authorities made regulatory changes in credit and market risk, the financial safety net, and fixed-income and repurchase markets.

In this environment, Banco de México will continue to follow closely the evolution of Mexico's financial markets and will continue to take all the appropriate actions within its responsibilities, in strict compliance with its legal framework, and in coordination with other financial authorities, to maintain the stability of the financial system and the proper functioning of the payment systems.

Annex 1

Mexican financial system disaggregated heat map



Data as of September 2022

Source: Banco de México

List of initials and acronyms

ASG	Environmental, Social and Corporate Governance
Bancomext	National Foreign Trade Bank
Banobras	National Public Works and Services Bank
BCE	European Central Bank
BID	Inter-American Development Bank
BIS	<i>Bank for International Settlements</i>
BISL	Local Systemically Relevant Banks
BIVA	Institutional Securities Exchange
BMV	Mexican Stock Exchange
BOE	<i>Bank of England</i>
BONDES	Federal Development Bonds
BPAS	Savings Protection Bonds
CBFI	Real Estate Investment Trust Stock Certificates
CCD	Certificates of Capital Development
LCR	Liquidity Coverage Ratio
CCV	Mexican Central Securities Counterparty
CDS	<i>Credit Default Swaps</i>
CENAPRED	National Disaster Prevention Center
Cerpis	Senior Trust Bonds for Investment Projects
cetes	Federal Treasury Bills
CF	28-Day Equilibrium Interbank Interest Rate (TIIE) Deposit Cost
CFE	Federal Electricity Commission
CFEN	Net Stable Funding Ratio
CGV	Global Value Chains
CME	<i>Chicago Mercantile Exchange</i>
CNBV	National Banking and Securities Commission
CNSF	National Insurance and Bonding Commission
Conavi	National Housing Commission
Condusef	National Financial Services Users' Protection and Defense Commission
Consar	National Retirement Savings System Commission
CYRCE	Capitalization and Credit Risk
CUB	General Provisions Applicable to Credit Institutions (Single Banking <i>Circular</i>)
CVaR	<i>Conditional Value at Risk</i>
ERBA	<i>External-ratings-based approach</i>
ESRB	European Systemic Risk Board
Fibra	Real Estate Infrastructure Trust
FIFOMI	Mining Development Trust
FIRA	Instituted Trusts in connection with Agriculture (Agricultural Trusts)

FLAO	Additional Ordinary Liquidity Facility
FMI	International Monetary Fund
FND	National Farming, Rural, Forestry and Fisheries Development Bank
FONADIN	National Infrastructure Fund
FOVI	Banking Housing Financing Operation Fund
Fovissste	State worker's social security and services institute housing fund
FSB	Financial Stability Board
GCF	Great Financial Crisis
GTTR	Alternative Benchmark Rates Working Group in Mexico
CAR	Capitalization ratio
ICF	Financial Conditions Index
ICRCS	Capital Solvency Requirement Hedging Index
ICRT	Technical Reserves Hedging Index
IEMF	Financial Markets Stress Index
IFC	Crowdfunding Institutions
IFNB	Non-Banking Financial Institutions
IFPE	Electronic Payment Fund Institutions
IFRS	International Financial Reporting Standards
IGAE	Global Economic Activity Indicator
Imora	Non-performing loans rate
INEGI	National Geographical Statistics and Information Institute
Infonavit	Federal Housing Fund
IPYC	Stock exchange index
IPCC	<i>Intergovernmental Panel on Climate Change</i>
IIF	<i>Institute of International Finance</i>
ITF	Financial Technology Institutions
IRS	<i>Interest Rate Swap</i>
LDI	<i>Liability Driven Investment</i>
LIBOR	<i>London Interbank Offered Rate</i>
LIF	Federal Income Law
LRITF	Financial Technology Institutions Regulation Law
LTV	<i>Loan to Value</i>
MexDer	Mexican Derivatives Market
pymes	Micro, small and medium-sized companies
Nafin	Nacional Financiera (Mexican development bank)
NGFS	<i>Network for Greening the Financial System</i>
NICAP	Capitalization Level
OIFNB	Other Non-Banking Financial Brokers
OIS	Overnight Index Swap
P2P	<i>Peer to peer</i>

PEF	Federal Expenditure Budget
Pemex	Petróleos Mexicanos (Mexican State oil company)
PI	Probability of default
PIB	Gross Domestic Product (GDP)
PLD/FT	Money Laundering and Terrorist Financing Prevention
PRLV	Promissory Note with Interest Payable on Maturity
PTI	<i>Payment to Income</i>
pymes	Small-and-medium-sized companies
RCS	Capital Solvency Requirement
REA	Special Amortization System
RFSP	Public Sector Financial Requirements
ROE	<i>Return on Equity</i>
SAR	Retirement Savings System
SCV	Mortgage Credit Insurance
SHCP	Ministry of Finance and Public Credit
SHF	Federal Mortgage Society
SHRFSP	Historical Public Sector Financial Requirement Balance
siefores	Investment companies specializing in retirement funds (Pension Funds)
socaps	Savings and loan cooperatives
sofipos	Popular finance corporations
sofomes ENR	Non-Regulated Multi-Purpose Financial Companies
TIIE	Interbank Equilibrium Interest Rate
TMEC	United States-Mexico-Canada Agreement
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
UPI	<i>Unique Product Identifier</i>
UTI	<i>Unique Transaction Identifier</i>
VSM	Minimum Salary Multiple



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