Banco de México®

Financial Stability Report

June 2022

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Unless otherwise specified, this document has been drafted using information available as of the first quarter of 2022 for the macroeconomic and financial institutions' variables and as of June 13, 2022, for the market information. Data is preliminary and may be revised.

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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Executive Summary

The Mexican financial system maintains a solid and resilient position. In particular, commercial banks have capital and liquidity levels that amply exceed regulatory minima. Nevertheless, the system faces important challenges posed by the remaining effects of the COVID-19 pandemic and the new challenges stemming from the geopolitical conflict between Russia and Ukraine, on the one hand, and persistent global inflationary pressures, on the other. The latter have led to the withdrawal of monetary stimulus in several economies and, in general, to tighter global financial conditions.

During the first half of 2022, world economic activity registered a sharper-than-expected slowdown, and the IMF's growth estimates for the world economy have been revised significantly downwards for 2022 and, to a lesser extent, for 2023. This was a result of persistent bottlenecks in global supply chains, the continued negative effects of COVID-19, and increasing geopolitical tensions caused by the military conflict between Russia and Ukraine. In this context, global inflation continued increasing, particularly energy and food prices.

Thus, in such an environment of lower expected economic growth, greater uncertainty regarding the evolution of global financial conditions, and geopolitical tensions, monitoring the evolution of the financial system and maintaining its stability 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.

Domestic financial markets have also been affected by the above-described environment, with mixed performance and some volatility. The Mexican peso depreciated against the US dollar between late February and early March 2022. However, since then, it has strengthened. Meanwhile, the yield curve increased across all terms. All aggregate risk indicators exhibited some upward adjustments. The Mexican Financial Markets Stress Index (*IEMF*, its acronym in Spanish) increased slightly, and is above its pre-pandemic level, although below its average during 2020, showing mixed dynamics throughout the period analyzed in this Report. Meanwhile, the domestic Financial Conditions Index (*ICF*, its acronym in Spanish) has been slightly tighter since December 2021. Uncertainty regarding the future evolution of financial markets persists, and the possibility of new episodes that could generate a further deterioration of financial conditions cannot be ruled out. In such a situation, capital flows to emerging market economies, including Mexico, could be affected and firms' financing costs could increase.

Certain vulnerabilities and risks for the financial system that increased with the pandemic have been declining. Nevertheless, challenges posed by the current economic environment persist. Economic policy uncertainty has been increasing globally, mainly after the military conflict between Russia and Ukraine began. Furthermore, although the Mexican financial system's direct exposure to this conflict is limited, the international prices of certain commodities have risen, which could reduce the profitability of certain economic sectors that use them as inputs, reducing firms' ability to meet their credit obligations.

Total financing in the economy has displayed a slow recovery and, as a fraction of GDP, it is practically at the same level as that during the second quarter of 2017. The financing gap, the difference between trend credit growth and current period credit growth, continues to decline, and has recorded four quarters with negative figures, reaching levels similar to those observed at the end of 2006.

Total financing to households from all sources decreased marginally in real annual terms during the first quarter of 2022. Nevertheless, consumer credit granted by commercial banks and their subsidiary sofomes somewhat recovered, registering positive figures for the first time since the onset of the pandemic in practically all its segments, except for auto loans. At the end of the first quarter of 2022, total mortgage loans were slightly higher relative to the same period of the previous year, but growth has been at a slower pace since the last *Report*. Total financing to non-financial private firms in Mexico continues to decline in real annual terms both domestic and external components. During the first quarter of 2022, issuance of new loans to larger firms stabilized as the pace of contraction slowed, thus resulting in a milder deterioration of credit to these firms compared to that of smaller firms.

Regarding the public sector financial position, at the end of 2021, it registered a deficit equal to that planned in the 2021 Economic Package. The Public Sector Financial Requirements recorded a deficit equivalent to 3.8% of GDP. As for state-owned enterprises, Pemex's financial position has improved slightly in recent months. This improvement resulted from increases in its revenues and operating cash flow following the rise in oil prices, as well as higher export volumes. The company's credit ratings from the rating agencies remain unchanged.

Regarding external financial flows, during the fourth quarter of 2021 these continued to follow the pattern they have displayed since the beginning of the pandemic, dipping below historical trends, and in some quarters, registering outflows. According to the latest

available information, at the beginning of 2022, Mexico's portfolio flows resumed their downward trend but then recovered again in March 2022.

Regarding commercial banks, the banking system's total regulatory capital increased more than its risk-weighted assets between September 2021 and March 2022. Thus, the banking system's Capital Adequacy Ratio (CAR) continued to increase, a development that keeps these institutions, in general, in a sound position to face possible adverse scenarios. As for commercial banks' risks, those related to liquidity, credit and contagion have declined, while market risk has increased at the margin. This sector has thus continued to contribute to the overall financial system's resilience and generally solid position. Nevertheless, it will be important to monitor the evolution of these banks' positions.

Development banks and other development financial institutions remain financially sound, registering greater increases in their Capital Adequacy Ratio (CAR) and net profits than in the previous year, while maintaining a smaller loan portfolio.

Financing provided by other financial intermediaries continues to contract as of the end of March 2022, and certain risks persist. In particular, the impact of the pandemic and the slow recovery in economic activity has been more pronounced for this type of financing, especially that directed to firms. Throughout the pandemic, some of these intermediaries experienced an increase in delinquency rates and a fall in profitability. Since these institutions currently are relatively small and are not closely interconnected with the country's banks, they do not pose a risk to financial stability. Given the challenges they continue to face, the possibility of some of this sector's entities being negatively affected cannot be ruled out. Therefore, it will be important to continue monitoring their situation as well as their interconnections with the rest of the financial system.

This *Report* analyzes the following macro-financial risks to financial stability: i) a faster tightening of global financial conditions, given the monetary policy adjustments implemented in several economies, in response to more persistent global inflationary pressures; ii) lower-than-expected global economic growth, with implications for the post-pandemic recovery; iii) a prolonged and more accentuated weakness in domestic consumption and investment; and iv) possible adjustments in sovereign and Pemex's credit ratings. In addition to the risks already described, there are also cyber risks, which have been increasing globally.

This edition of the *Report* expands on the analysis that Banco de México has been presenting on climate-related risks and sustainable financial assets since 2018. In particular, a scenario analysis that explicitly considers the impact of physical risks associated with climate change is included.

Stress tests are also conducted to evaluate the resilience and loss absorption capacity of Mexican banking institutions under extremely adverse, but plausible, scenarios. The stress tests consider four sets of macroeconomic scenarios consistent with the macro-financial risks presented in this *Report*, and three sets of historical scenarios qualitatively similar to past crisis episodes faced by the Mexican economy.

The stress test results show that, with Mexico's banking institutions' current capitalization index, for each of the seven considered scenarios, the system as a whole finishes the simulation horizon with capital levels amply exceeding regulatory minima (including capital supplements). However, at the individual level, certain banking institutions, representing a low percentage of the system's total assets, could experience a greater negative impact on their capitalization levels in some of the simulated scenarios. Similarly, banking institutions' leverage ratio in aggregate would be on average, and in all simulated scenarios, above the regulatory minimum of 3%, although some individual institutions would end the simulation horizon below this level.

During the period covered by this *Report*, the liquidity and financing measures implemented by the authorities in response to the COVID-19 pandemic concluded. These measures contributed to a more orderly behavior of markets during the most critical period of the pandemic. Since their announcement, these measures granted resources and regulatory exemptions that provided additional support to financial intermediaries, fostering their orderly operation, even for those who did not make direct use of the facilities.

Banco de México will continue to monitor the evolution of financial markets in Mexico, and take the necessary actions, in strict compliance with the 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.

I. Introduction

In an economic and financial backdrop in which the impact resulting from the pandemic has not yet dissipated and that overlaps with the war between Russia and Ukraine, high inflation levels and tighter financial conditions, the Mexican financial system, at aggregate level, continues to maintain a sound and resilient position with levels of capital and liquidity well above regulatory minima.

Looking forward, risks associated to greater tightening of global financial conditions persist, given the possibility of more pronounced and accelerated monetary policy adjustments than those expected in the monetary policy positions of several economies. This, in a context of a higher and more persistent inflation than expected environment, caused mainly by the disruptions in global supply chains, and the war between Russia and Ukraine. In this situation, episodes of high volatility in the financial, raw materials, food and energy markets may arise. Also, capital flows to emerging market economies, including Mexico, could be affected, thus increasing companies' financing costs.

Thus, section II of this *Report* explains the macro-financial conditions in which the Mexican financial system has performed since its last publication. During the first semester of 2022, economic activity in Mexico has continued in its process of recovery. Nevertheless, the result has not yet reached the levels prior to the impact of the pandemic. In addition, despite the recovery, no reactivation on the granting of credit has yet been observed.

Section III outlines some of the risks and vulnerabilities that increased as a consequence of the health contingency crisis. Although some risks have been reducing, others have been accentuated in the light of an outlook of greater uncertainty associated with recent geopolitical events and their implications for the global economy. After more than two years from the outbreak of the pandemic and almost four months from the beginning of the conflict between Russia and Ukraine, some particular challenges for the Mexican financial system remain.

Next, section IV describes the measures that both Banco de México and other financial authorities implemented to foster and preserve the sound development of the financial system. In this regard, it highlights the implementation of certain international standards that had been postponed due to the pandemic.

In addition to a general overview of the risks faced by the Mexican financial system as a whole, section V of the *Report* also includes a narrative of the status and evolution of the main risks that may affect its different participants. The performance of commercial banking is also explained, which, in general, has recorded a relatively favorable performance, and remain healthy. Moreover, the non-performing loan ratio and liquidity risk indicators of the non-banking financial intermediaries have been relatively stable, whereas the financial institutions, which individually show certain vulnerabilities, represent a small fraction of the system as a whole; and are therefore not considered to be a risk with potentially systemic risk. In addition, other risks relevant to the financial system, such as the cybersecurity and environmental risks are also monitored.

Section VI elucidates the stress tests results which are used to assess the resilience and loss absorption capacity of Mexican banking institutions under extremely adverse, but plausible, scenarios. It must be reiterated that stress tests do not constitute a forecast by Banco de México with respect to the losses that banks may suffer. As with the previous editions, this *Report* also includes the results of the credit and liquidity stress tests. A new scenario analysis is also included, which explicitly considers the impact of physical risks associated with climate change.

Finally, section VII elaborates the final considerations of the *Report*. In the future, Banco de México will continue to take the necessary actions required in the exercise of its powers, in strict compliance with its 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.

II. Macro-Financial conditions

II.1. International economic outlook

Global economic activity continued to recover during the fourth quarter of 2021 and showed a more marked slowdown than that foreseen in the first quarter of 2022. This is a result of the persistence of bottlenecks in the global supply chains, the ongoing negative effects of COVID-19 and the increased geopolitical tensions caused by the war between Russia and Ukraine. Despite the global evolution of the pandemic would seem to be more favorable, the latter conflict has introduced an element of additional uncertainty.

The IMF's growth forecasts for the world economy were significantly downgraded for 2022 and to a lesser extent for 2023 (Graph 1 and Graph 2). These adjustments are due mainly to the economic costs of the armed conflict,

the sanctions imposed by various countries on Russia, the restrictions to movement caused by the increase in cases of COVID-19 in China, the disruptions in global supply chains and the expectation of a faster normalization of the monetary policies of the main advanced economies, particularly the United States.

Graph 1
GDP growth forecast
Annual change in percent

Data as of April 2022
Source: IMF, January 2022 and April 2022 World Economic Outlook

Graph 2
Growth in 2021 and forecasts for 2022 and 2023
Annual change in percent
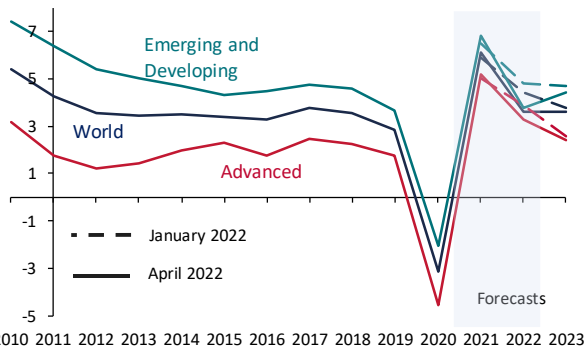
Data as of April 2022
Source: IMF, January 2022 and April 2022 World Economic Outlook

Global inflation continued to increase in the fourth quarter of 2021 and the first quarter of 2022, highlighting hikes in energy and food prices. This, as a consequence of the stronger demand, related to the recovery, the persistence of supply bottlenecks, as well as additional pressures on raw material's prices as a result of the conflict. Thus, in the majority of the main advanced and emerging economies, inflation stood at levels not seen in decades and, consequently, above the targets set by their respective central banks.

The Federal Reserve increased the target range of Federal funds rates by 25 basis points (bp) at its March meeting and by 50 bp at its May meeting. In line with its Monetary Policy Statement issued in May, the Fed began to reduce its balance sheet assets holdings as of June. The Federal Reserve also indicated that the conflict in Ukraine is causing additional pressures on the hike in inflation and that it is likely that this will have a negative effect on the United States' economy.

Box 1: Relationship between sovereign risk and commodity prices

I. Introduction

The conflict between Russia and Ukraine has led to an increase in the volatility of global financial markets and has led to commodity price increases not seen in the past 10 years. Similarly, the perception of the sovereign credit risk in several countries, measured by the prices of credit default swaps (CDS), increased as a result of this conflict. In this Box, an econometric analysis is made to determine whether increases in the price of commodities have had a differentiated effect on the sovereign risk between exporting and non-exporting countries of these products.

II. Empirical evidence

Various studies have found that movements in the price of sovereign *CDS* are strongly related to global factors, such as the return or the volatility of the US stock market.[1] Additionally, other studies have shown that increases in the international prices of a country exports cause a reduction in its sovereign risk.[2] In particular, Boehm et al. (2021) find that increases in the prices of commodities exported by a country are associated with reductions in their *EMBI*[3] levels, especially if the country is a major exporter of these products. This Box will test whether this conclusion holds in the context of the geopolitical conflict between Russia and Ukraine.

Unlike periods when movements in commodity prices have responded to fluctuations in the demand for commodities, the conflict has led to price increases due mainly to expectations of supply disruptions.[4] In addition, the countries involved in the conflict are important net exporters of commodities.

III. Data

Daily data from the 5-year sovereign *CDS* series from 23 countries[5] from 2015 to 2022 are used.[6] These countries are classified as exporters and non-exporters of commodities according to information from the World Bank's World Integrated Trade Solution.[7] Under this context, Brazil, Chile, Colombia, Indonesia, Peru, and South Africa are considered exporters of commodities. Additionally, days of high geopolitical risk, caused by the conflict are identified, using the Geopolitical Risk Index (*GPR*) of Caldara and Iacoviello (2022).[8]

Graph 1

5-year average CDS amd commodity price index

Index (Jan 3, 2022 = 100)
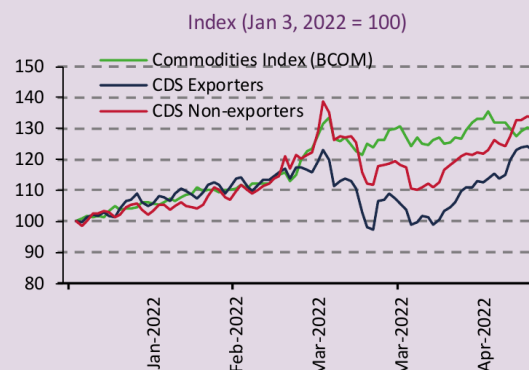
Data as of April 2022
Source: Bloomberg and Markit

The data show that, since March 2022, as market participants acknowledged that the intensity and duration of the conflict would be greater than anticipated, commodity prices experienced sharp increases. In this context, there is a relative decrease in exporters' *CDS* compared to that of non-exporters (Graph 1). In contrast, at the beginning of 2016 and in the spring 2020, when commodities reached minimum prices, *CDS* prices increased, especially those of exporting countries (Graph 2).

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[1]See Longstaff et al. (2011), Fender et al. (2012) and Hibbert and Pavlova (2017).
[2]See Hilscher and Nosbusch (2010) and Arezki and Brückner (2012).
[3]The Emerging Market Bond INDEX (EMBI) is an index developed by JP Morgan that reflects the perception of country risk through spreads on interest rates on the country's dollar-denominated debt relative to interest rates on United States Treasury bonds.
[4]See IMF (2022) and OECD (2022).
[5]The countries used are: Brazil, Chile, China, Colombia, Denmark, France, Indonesia, Ireland, Italy, Malaysia, Mexico, Netherlands, Panama, Peru, Philippines, Portugal, South Africa, Spain, Thailand, Turkey, United Kingdom and Vietnam.
[6]The price of the CDS must be highly liquid. The information and liquidity category were obtained from Markit.

[7]A country is defined as an exporter if its exports of commodities accounted for more than 20% of total exports between 2015-2019, on average, and net exports of such products were positive. As a test of robustness, exercises were carried out modifying the threshold for exports of commodities as a percentage of the total with 10%, 30% and 40%. The results are qualitatively similar.
[8]Between the days elapsed in 2022, it is defined as a period of high geopolitical risk when the weekly moving average of the GPR is above three standard deviations from its average between 2015 and 2022. Under this criterion, 41 high-risk days are identified between February 23, 2022 and April 4, 2022.

Graph 2

5-year average CDS and commodity price index

Lext axis: Index (Jan 3, 2022 = 100)

Right axis: Basis points

Data as of June 2022

Source: Bloomberg and Markit

Table 1.

Linear regression estimation

Dependent Variable: ΔCDS	Coefficient	P-value
ΔVIX_t	.564***	(0.000)
$\Delta ln(BCOM)_t$	-52.469**	(0.011)
$\mathbb{I}_i^{Exp}$	0.029	(0.271)
$\mathbb{I}_t^{GPR}$	-0.054	(.697)
$\Delta ln(BCOM)_t \cdot \mathbb{I}_i^{Exp}$	-148.372***	(0.003)
$\Delta ln(BCOM)_t \cdot \mathbb{I}_t^{GPR}$	103.217*	(0.0071)
$\mathbb{I}_i^{Exp} \cdot \mathbb{I}_t^{GPR}$	-0.863	(0.002)
$\Delta ln(BCOM)_t \cdot \mathbb{I}_i^{Exp} \cdot \mathbb{I}_t^{GPR}$	194.400**	(0.026)
Constant	Yes	
Number of observations	44,597	
Number of countries	23	
Goodness of fit	0.121	

Clustered errors at the country level. ** *, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

IV. Methodology.

The following econometric specification is used to explain the daily changes of the CDS:

$$\Delta CDS_{i,t} = \beta_0 + \beta_1 \Delta VIX_t + \beta_2 \Delta ln(BCOM)_t + \beta_3 \mathbb{I}_i^{Exp} + \beta_4 \mathbb{I}_t^{GPR} + \beta' Z_{i,t} + \varepsilon_{i,t},$$

where $\Delta CDS_{i,t}$, ΔVIX_t and $\Delta ln(BCOM)_t$ represent the first difference of the CDS in basis points, the implied volatility index of the United States stock market (VIX) and the natural logarithm of the Bloomberg Commodity Index, respectively; $\mathbb{I}_i^{Exp}$ and $\mathbb{I}_t^{GPR}$ are indicator variables that identify if the country is an exporter and if it is a day of high geopolitical risk, respectively; $Z_{i,t}$ is a vector of variables that includes all possible interactions considering $\Delta ln(BCOM)_t$, $\mathbb{I}_i^{Exp}$ and $\mathbb{I}_t^{GPR}$. Finally, $\varepsilon_{i,t}$ represents the error term.

V. Results

The results (Table 1) suggest, first, that increases in the prices of commodities decrease the price of sovereign CDS in general, but especially that of commodity exporters. Second, increases in commodity prices in periods of high geopolitical risk increase sovereign risk premiums in all countries.

Graph 3

5-year CDS accumulated variation

Basis points
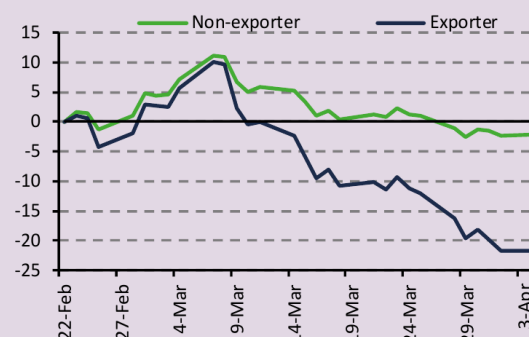
Data as of April 2022

Source: Own calculations with data from Bloomberg and Markit

In order to analyze the differentiated response of the CDS of exporting and non-exporting countries in the presence of the conflict between Russia and Ukraine, the trajectories of the CDS estimated by the model are presented, given the evolution of the explanatory variables from February 23, 2022 to April 4, 2022 (Graph 3).[9] Initially it is estimated that the CDS of all countries increase and, subsequently, the CDS of the exporting countries decrease to lower levels than those observed on February 22, while the average CDS of the non-

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[9] This period corresponds to the period with consecutive days in which the GPR index is above three standard deviations from its mean.

exporting countries reverts to their initial level in this window of time. While this reversal can be seen on average, it is possible that for some non-exporting countries the effect on sovereign risk may be more lasting due to the impact on their public finances and economic growth rates.

VI. Conclusions

This Box analyzes, through an econometric exercise, the impact of an increase in the prices of commodities on the CDS of exporting and non-exporting countries of these products in the context of the geopolitical conflict between Russia and Ukraine. The results suggest that, in general, increases in the price of commodities decrease the perception of sovereign risk for all countries, and to a greater extent for countries exporting these products. Intuitively, increases in the price of commodities cause exporting countries to experience higher tax revenues, higher revenues from state-owned enterprises, higher foreign exchange inflows and a strengthening of their economic activity. This facilitates the service of their government debt and improves the perception of their sovereign risk relative to non-exporting countries.

Similarly, it is found that, at the beginning of the conflict, the value of the CDS of the exporting and non-exporting countries had a similar increase. Then, there was a reversal in CDS prices, with exporters benefiting the most from the persistence of high commodity prices. However, it is possible that for some non-exporting countries the effect on sovereign risk may be more lasting due to the impact on their public finances and economic growth rates.

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II.2. Domestic economic outlook

Economic activity continued to show weakness in the fourth quarter of 2021, whereas in the first quarter of 2022, the GDP showed a quarterly seasonally adjusted growth of 1.0%. At the end of 2021, behavior among the sectors was mixed, with the service sector showing a contraction and with a modest growth in industrial activity. On the other hand, growth was driven by the advances recorded in secondary and tertiary activities during the first quarter of 2022 (Graph 3).

Graph 3

Gross Domestic Product ^{a.e./}
Quarterly change in percent
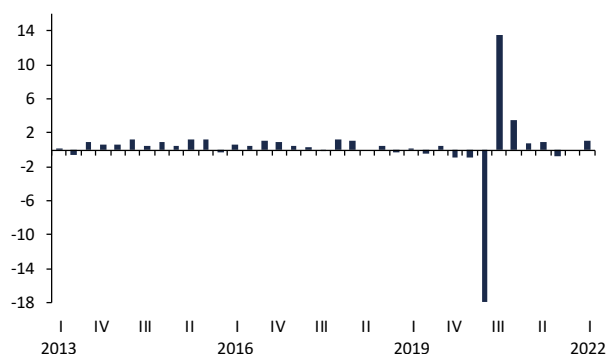
Data as of first quarter of 2022.
Source: INEGI
a.e./ Seasonally-adjusted figures

General annual inflation stood at 6.99% on average during the first quarter of 2021 and increased to 7.27% during the first quarter of 2022. In April 2022, the indicator registered 7.68%, whereas in May it fell slightly to 7.65%. The complex outlook for inflation at the beginning of the year became even more complicated because, in addition to the effects associated with the pandemic had not yet completely dissipated, additional pressures emerged on the prices of raw materials, food and energy as a result of the war between Russia and Ukraine (Graph 4).

Graph 4
INPC National Consumer Price Index
Annual change in percent
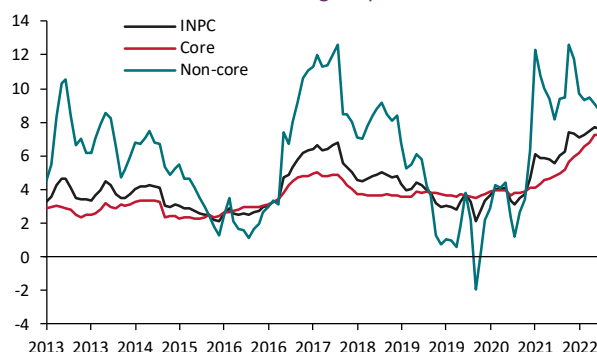
Data as of 2022
Source: INEGI

Banco de México's headline inflation projections, published in its Quarterly Report of January-March 2021, were 6.4% and 3.2% at the end of 2022 and 2023, respectively. The median of the general inflation expectations according to the survey conducted in May among private sector specialists were 6.81% and 4.34% for year-end 2022 and 2023, respectively (Graph 5).

Graph 5
Inflation expectations ^{1/}
Percent
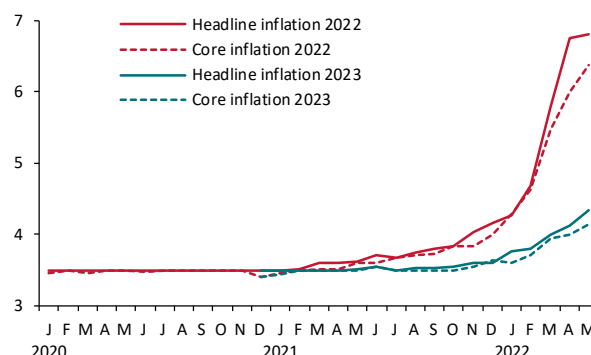
Data as of May 2022
Source: Banco de México, Survey of Private Sector Economic Specialists' Expectations.
^{1/} Median of annual inflation expectations

In the period covered by this Report, Banco de México's Governing Board increased the reference rate by 50 bp at each of its meetings of December, February, March and May, thus increasing it from 5.0% to 7.0%. In its monetary policy decisions, the Board of Governors took into consideration the following indicators: inflation forecasts, risks exposures, as well as the need to consolidate a downward trend for headline and core inflation towards Banco de Mexico's target. It also reiterated that moving forward, the control of monetary policy will depend on the evolution of the factors that influence the headline and core inflation based on its

foreseen paths of the forecast horizon and its expectations.

II.3. Financial markets

During the first half of 2022, the behavior of global financial markets has been mainly driven by two factors:

1) The beginning of monetary policy normalization in advanced economies and the expectation that this process, mainly in the United States, will proceed at a faster pace than it was expected some months ago.

2) The conflict between Russia and Ukraine, which has had a negative effect on the global economy through three channels: i) a significant increase in commodity prices, thus heightening inflationary pressures globally, ii) a downgrade adjustment in growth expectations due to possible disruptions in value chains, and iii) a sentiment of risk aversion that negatively affected the performance of certain financial markets.

Thus, since December 2021, the currencies of emerging countries have had a differentiated performance by region, , highlighting on the one hand the depreciations of currencies of European countries more exposed to geopolitical conflict, between -1 and -21%, and on the other hand, a more favorable behavior of Latin American currencies that benefited, among other elements, from an improvement in the terms of trade, which appreciated up to 13% (Graph 6). In the last few weeks of the period covered by this *Report*, the generalized weakness of the US dollar has resulted in a greater appreciation of emerging countries' currencies.

Graph 6
Exchange rate index performance [1/]
Index (January 2022 = 100)
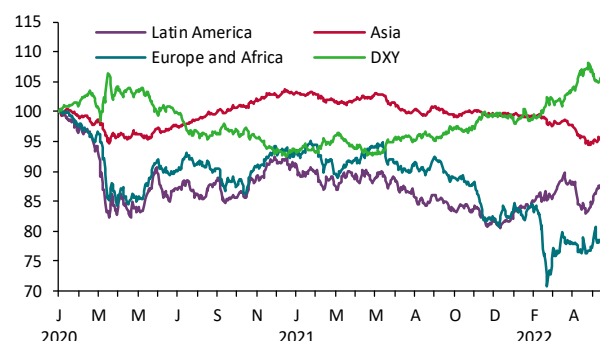
Data as of June 2022
Source: Banco de México calculations using Bloomberg data
1/ Latin America, including Peru, Brazil, Colombia, Chile and México. Asia, including The Philippines, South Korea, China, Malaysia and India. Europe and Africa, including Poland, Hungry, Russia, Czech Republic and South Africa.

Graph 7
10- and 2-Year rate spread for selected emerging countries
Basis points
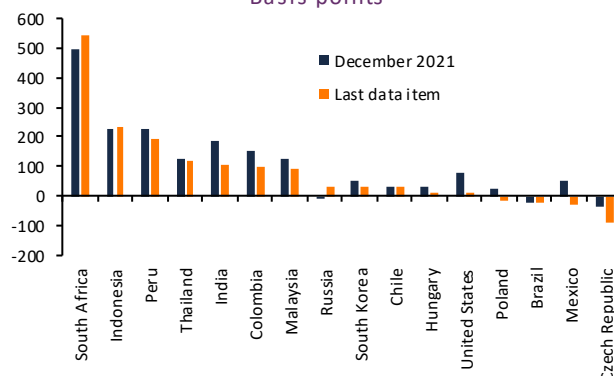
Data as of June 2022
Source: Banco de México calculations using Bloomberg data

Meanwhile, in the fixed-income market, the yield curves showed generalized increases between 30 and 420 bp, with the most significant increases in the short end of the yield curves in response to the expectations of a tighter global monetary policy in order to address pressures on prices. In this context, yield curves showed a flattening dynamic, with movements that averaged 24 bp declines in the 10 year- and 2-year interest rate spreads (Graph 7). In addition, in recent weeks, there has also been a return of interest rate hikes as a result of expectations that central banks in developed economies may be cautions in the pace of their target rates increases.

Lastly, during the months covered by the Report, stock markets performance was characterized by differentiated movements in emerging countries and

setbacks in advanced countries' indices during 2022, with an average performance of -1% and -8%, respectively (Graph 8). Emerging countries benefited from attractive valuations and growing capital flows towards this asset class. The exceptions were Russia and the Eastern European countries which may be most affected by the conflict.

Graph 8
Stock index performance
Index (January 2020 = 100)
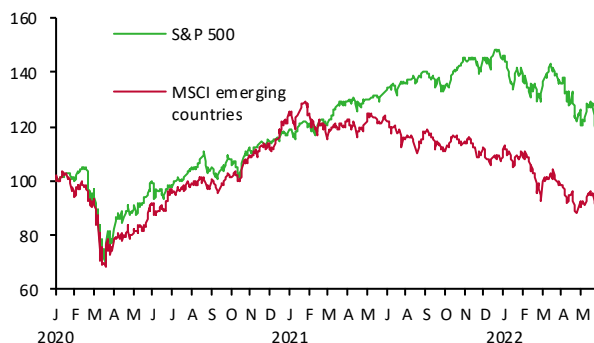
Data as of June 2022

Source: Banco de México calculations using Bloomberg data

II.3.1. Foreign exchange market

The Mexican peso has performed positively throughout the first half of 2022, trading in a range between 19.41 and 21.38 Mexican pesos per US dollar, although during this period, some episodes of higher volatility have been observed, associated with increases in market risk aversion (Graph 9). However, as the risk factor associated with the geopolitical conflict between Russia and Ukraine has been attenuated and the US dollar has weakened, the Mexican peso resumed its appreciation trend, reaching levels below 19.50 Mexican pesos per US dollar (Graph 10).

In addition, the foreign exchange market has been trading with resilience, as it has shown sound liquidity conditions, depth and agile transactionality. Nevertheless, some metrics have not yet reached the levels observed prior to the pandemic. With respect to prospective trading conditions, these showed an improvement in the period covered by the *Report* (Graph 11).

Graph 9
Trading conditions of Mexican Peso [1]
Mexican pesos per US Dollar/Index
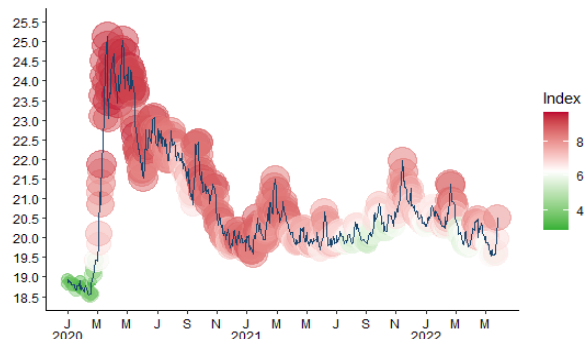
Data as of June 2022

Source: Banco de México calculations using 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, as well as of the observed volume and bid-ask spread, where the red color (green) indicates a greater (minor) deterioration of the operating conditions of the exchange rate market.

Graph 10
Mexican peso trading range [1]
Mexican peso-US dollar exchange rate
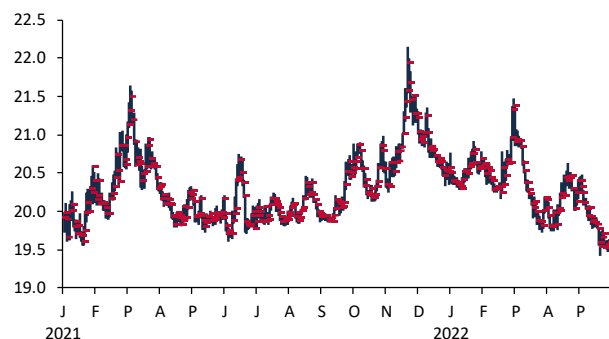
Data as of June 2022

Source: Bloomberg

1/ The red lines indicate the closing exchange rate, whereas the blue bars indicate the trading range.

Graph 11
3 M implicit trading conditions in FX options for Mexico and selected emerging economies [1/]
Percentage

Data as of June 2022

Source: Bloomberg

1/ The emerging countries considered are: Brazil, Colombia, Poland, and Hungary. The implicit skewness is measured through 25-delta Risk Reversal transactions. The kurtosis is measured with 25-delta Butterfly transactions. The shades indicate the range (interval between the maximum and the minimum values) of this set of countries. The solid line refers to Mexico.

II.3.2. Fixed-income market

In Mexico, during the period covered by this *Report*, the government securities yield curve showed general increases along all tenors, averaging 230 bp in the short term and 150 bp in the long term (Graph 12). The latter led to a significant flattening dynamic and even led the spread between the yields of 30- and 3-year terms to negative levels. This performance was associated with the publication of inflation data above market expectations, the continuation the monetary policy normalization stance for Banco de México's and, to a lesser extent, the lower participation of foreign investors in the local market.

Graph 12
Bonos M yield curve [1/]
Percent; basis points
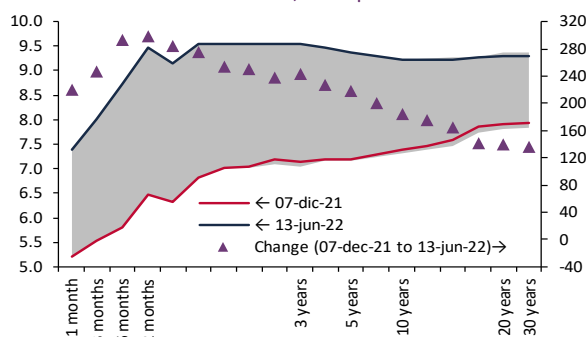
Data as of June 2022

Source: Banco de México calculations using PIP data

1/ Gray area refers to the range of daily yield curves since December 7, 2021.

The real yield curve also reflected generalized increases of up to 140 bp in the short term and 70 bp in securities with longer duration (Graph 13). As a result, inflation breakevens widened from December 2021 to June 2022 (Graph 14). It is noteworthy that during the first months of the year, foreign investors showed interest in participating in the local real rate fixed-income market, suggesting a greater appetite for assets that offer protection against inflation. Pension Funds (or *siefores*, its acronym in Spanish) continue to stand out as the main investors in this market.

Graph 13
Udibonos yield curve [1/]
Percent; Basis points

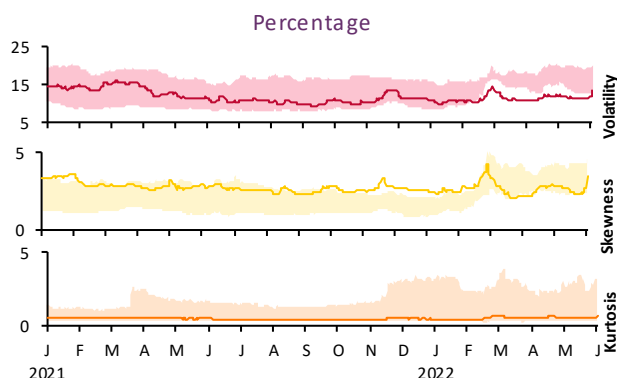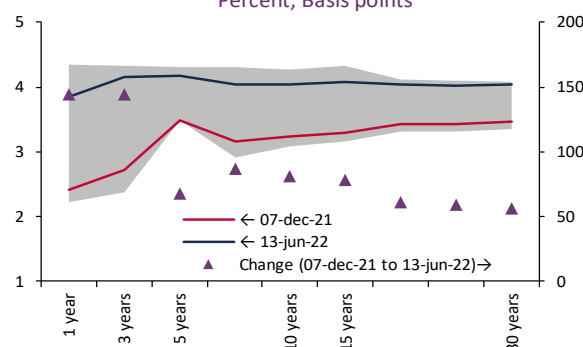Data as of June 2022

Source: Banco de México calculations using PIP data

1/ The gray area refers to the range of daily yield curves from December 7, 2022

Moreover, breakeven inflation reflected a negative dynamic in all tenors, reaching values greater than 500 bp during the period for 3, 10 and 30 year-terms.

Graph 14
Inflation breakevens in the government securities rate curves
Basis points
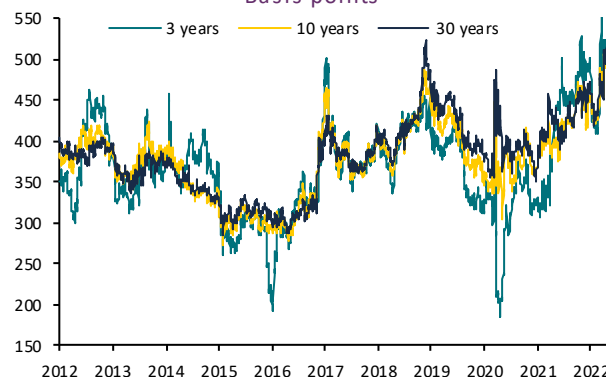
Data as June 2022

Source: Banco de México calculations using PIP data

The increases across the board in the government securities yield curve occurred in a context in which the trading conditions for this market deteriorated marginally during the period (Graph 15).

Graph 15
Bid-Ask spreads for selected terms of Bonos M
Basis points (10-day moving average)
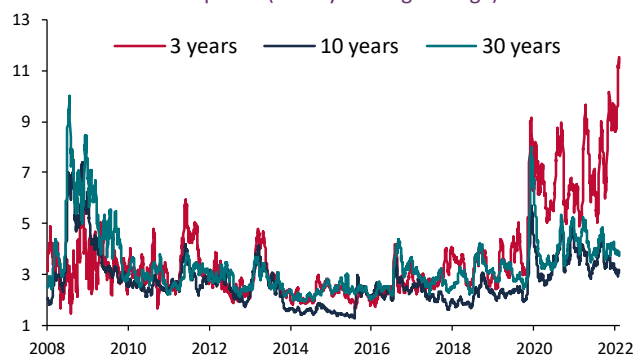
Data as of June 2022
Source: Banco de México

In terms of the flows of peso-denominated assets, foreign investors have continued to reduce their positioning in government securities; however, in contrast with the last two years, the pace of outflows has slowed (Graph 16). During 2022, the net positioning of this sector has decreased by 105 billion pesos, mainly as a result of outflows in Bonos M which was partially offset by the increase in the position in real interest rates securities (Graph 17).

Graph 16
Holdings of government securities by sector as a percentage of amount outstanding [1]
Percentage
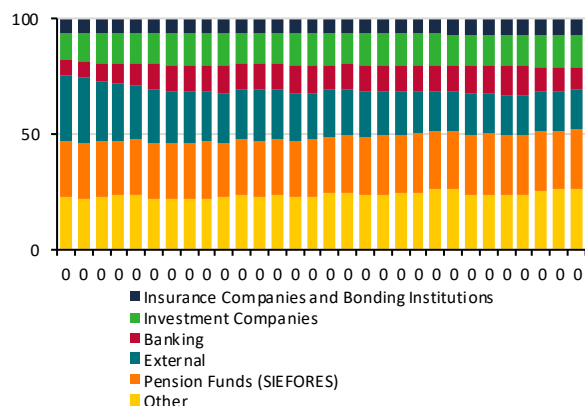
Data as of June 2022
Source: Banco de México calculations using Indeval data
[1] CETES, M Bonds Udibonos and Bondes are considered. Others include securities acquired by Banxico, Repurchases with Banxico, Guarantees received by Banxico and other domestic residents.

On May 2, 2022, the first auction of bonds with sustainability criteria and denominated in pesos, known as Bondes G, was held. This bond placement was made for a total amount of 20 billion Mexican pesos, distributed between maturities of 2- and 6-years. This instrument is referenced to the Overnight TIIE Funding

Rate (*TIIE*, its acronym in Spanish) and the placement of different tenors will seek to consolidate the development of a curve with environmental, social and governance (ESG) criteria in Mexico.

Graph 17
Foreign investor flows by government security during the year
Flows in billions of pesos
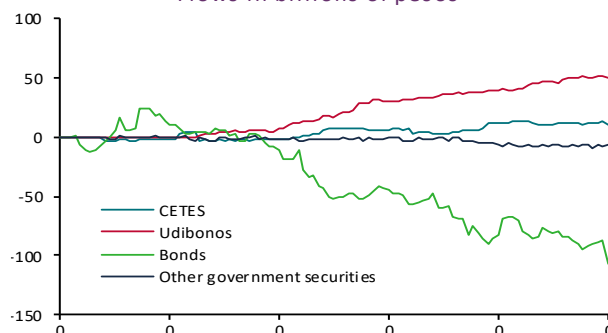
Data as of June 2022
Source: Banco de México calculations with Indeval data

II.3.3.   Equity market

Since the last publication of this *Report,* Mexican equity markets showed a positive performance in the aggregate level and differentiated by sector. These results were partly explained by a higher interest rate environment, stronger economic projections and higher commodity prices.

Thus, the *IPyC* which is an index that measures the largest and most liquid stocks listed on the Mexican Stock Exchange (*BMV*, its acronym in Spanish), has shown a loss of -4.8% in the period (Graph 18). The financial sector reflected the most favorable performance, driven by an environment of higher interest rates. In contrast, consumer staples and cement companies have had a negative performance due to the increase in input prices.

Graph 18
Cumulative performance of emerging countries stock indexes
1/
Index (January 1, 2020 = 100)
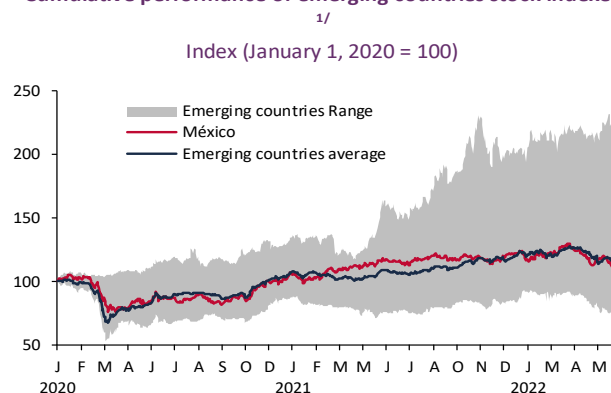
Data as of June 2022
Source: Banco de México using Bloomberg data

1/ Emerging countries considered : Argentina, Peru, Turkiye, Phillipines, Poland, Hungary, Indonesia, South Africa, Russia, Brazil, Colombia, Chile, Malaysia, and India.

Despite this behavior, the activity in initial public offerings (IPOs) in Mexico has not rebounded, and some companies continue to be interested in cancelling their registration in the Mexican Stock Exchange.

Finally, during the first half of 2022, foreign investors positions in this market has registered a positive cumulative flow of 416 million US dollars.

II.3.4.   Derivatives market

The derivatives market in Mexico continues to observe a gradual recovery in terms of the outstanding notional amount, following the pandemic shock. During the first quarter of 2022, the increase in the notional value occurs mainly in interest-rate transactions, which mostly refer to the Equilibrium Interbank Interest Rate (*TIIE*) Swap trades. It must be borne in mind that interest-rate trades where the main underlying asset is the *TIIE* and foreign exchange trades (mainly Mexican peso-US dollar), represent more than 95% of the outstanding notional value (Graph 19).

Graph 19
Notional and current amount by type of underlying 1/
Billions of pesos
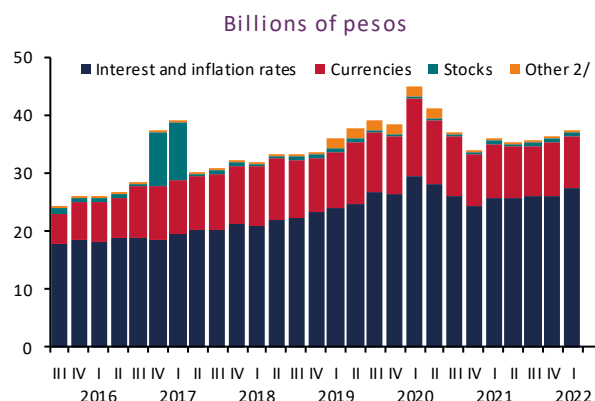
Data as of March 2022
Source: Banco de México
1/ Cross Currency Swaps (CCS) are now classified in Underlying Currencies from the Financial Stability Report of the first half of 2021.
2/ Includes debt instruments, commodities and other derivatives.

The increasing use of central counterparties (CCP) to clear over-the-counter derivatives have the potential to improve market resilience by reducing counterparty risk and increasing transparency. According to international reforms, driven by G20 countries, in order for over-the-counter operations to be cleared in a CCP, they must be standardized on the basis of criteria established by the authorities in each jurisdiction.[1] Among the several benefits of clearing standardized derivatives in a CCP are included: multilateral clearing which reduces counterparty and operational risks, greater efficiency in collateral management, uniform assessment of market prices, as well as margins and exposures, and the improving awareness of credit and market risks by disclosing them among participants. Currently in Mexico, standardized transactions that are susceptible to central clearing are interest rate swaps on the TIIE, which represent almost 50% of the outstanding notional amount of the total of OTC (Over-the-Counter) derivatives transactions at the end of March 2022. It should be noted that this is the highest percentage observed in the last two years, in which a growing trend has been observed in this indicator.

Thus, in Mexico, during the first quarter of 2022, slightly more than 75% of the notional amount of the IRS (Interest Rate Swaps) traded on the TIIE with standardized transaction characteristics, were cleared

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[1]   In Mexico, among other criteria, the following are taken into consideration: (i) The level of standardization of the terms and conditions of derivatives transactions, (ii) the liquidity, depth, the volume and negotiated and the magnitude of the derivatives

transactions in the Mexican market, (iii) the number and type of entities that have access to negotiate and liquidate them, and (iv) the availability of reasonable, reliable and generally accepted pricing sources.

in a CCP, a fraction that has remained stable in recent quarters (Graph 20).

Graph 20
Agreed notional amount of standarized swaps
Left axis: trillions of pesos
Right axis: percent
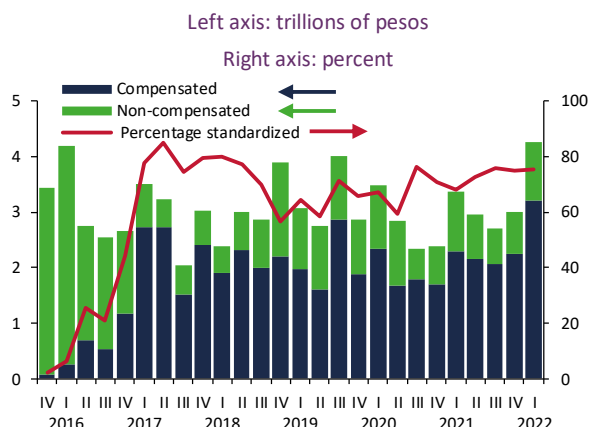
Data as of March 2022.

Source: Banco de México

Regarding to the TIIE Swap trades cleared in ASIGNA, differences in the terms in which these trades are arranged, can be observed between the organized market and over-the-counter markets. The volume of the agreements originating from the Mexican Derivatives Market (*MexDer*, its acronym in Spanish) has been concentrated in terms of less than one year, whereas those originating from the OTC market concentrate their volume in longer terms (Graph 21).

Graph 21
MexDer and OTC Transactions [1]
Left axis: Percent on number of contracts agreed
Right axis: millions of contracts
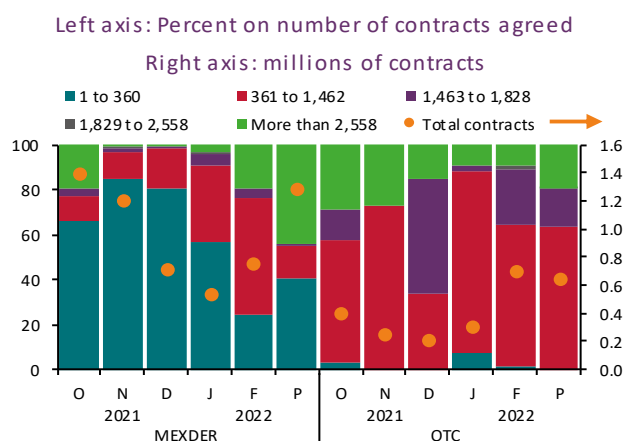
Data as of March 2022

Source: Banco de México and Asigna

1/ Term of agreement in days

In April 2022, the *MexDer* launched a liquidity provision program to guarantee the existence of bid and ask prices for US Dollar future transactions. Under this program, a winning participant of the semi-annual auction will be determined to act as liquidity provider

for six months and once this period has elapsed, *the MexDer* will call for a new bidding process.

Regarding to volatility, it has accentuated in certain underlying assets classes as a result of geopolitical tensions between Russia and Ukraine, as well as monetary policies normalization processes for certain advanced economies, which have led to increases in the margin requirements for derivative transactions, both in the organized, and the OTC markets. Particularly, on the *Chicago Mercantile Exchange* (CME), among the most relevant increases in the maintenance margins are those observed in trades with underlying assets of: energy, agricultural product and interest rates.

Moreover, in the OTC transactions carried out in Mexico, although the collateral requirements had stabilized throughout 2021, in November there was a temporary increase in collateral requirements due to greater uncertainty conditions that arose, among other events, due to the appearance of a new variant of SARS-CoV-2. Moreover, during the first quarter of 2022, a marginal increase in collateral requirements for domestic interest rate trades was recorded, particularly in the long-term transactions (Graph 22).

Graph 22
Collateral by type of underlying weighted by notional value
Billions of pesos
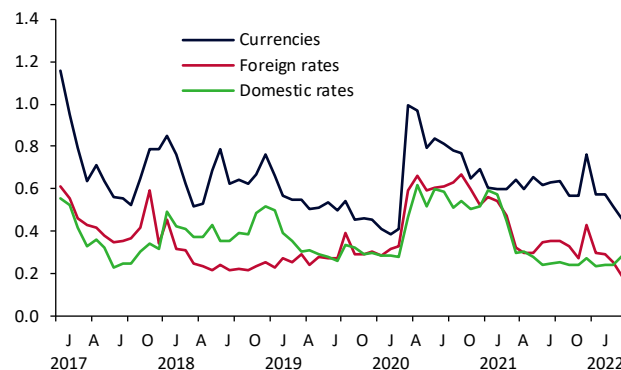
Data as of March 2022

Source: Banco de México

During the first months of 2022, a drop in the number of LIBOR-associated derivatives transactions was observed, meanwhile an increase in the negotiation of derivative transactions on fallback rates (mainly *OFR* and *ESTR*) was registered as these rates were adopted in substitution of the aforementioned market reference

(Graph 23).[2] The latter is also explained due to the cessation in December 2021, of the publication of the LIBOR for some terms; as well as the request made by the authorities in different jurisdictions to market participants to cease the use of the LIBOR rates as a reference for new contracts.

Graph 23
IRS and CCS Transactions
Percent of agreements at notional value

Data as of first quarter of 2022
Source: Banco de México
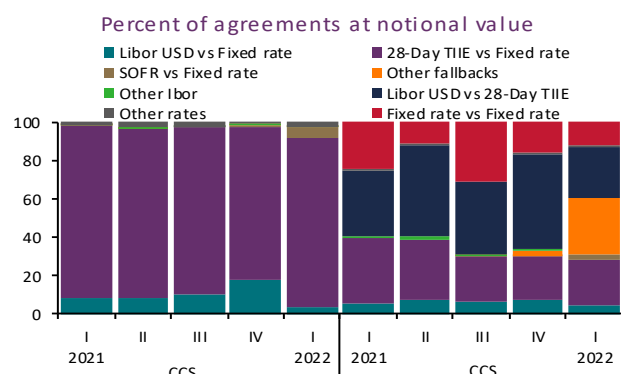
Among the latest technological innovations of the International Swaps and Derivatives Association (ISDA) is the quantitative engine "Perun", developed to explain the differences in the calculations of required capital under Basel III rules, which are due to be implemented globally at the beginning of 2023, and it uses standardized data that represents transactions through the communication of risk information factors (CRIF). The Perun pilot test started in 2018 in the United Kingdom and its fourth phase will conclude in June 2022, and its scope will cover other jurisdictions, possibly the United States of America. The aforementioned tool complements the development of ISDA's Common Domain Model (CDM) applied to the life cycle of derivative products (2018) and to the publication of the legal guidelines applicable to Smart Contracts for the FX derivatives market (2020).

II.3.5. Risk premiums

Global credit risk premiums, measured by the price of the Credit Default Swap (CDS) have shown a negative performance during the period covered by this Report, with increases for emerging countries as a whole.

Thus, the 5-year CDS for Mexico's sovereign debt has increased by 45 bp and is currently at a level of 150 bp (Graph 24). The foregoing behavior was in line with

what was observed in the rest of the emerging economies (Graph 25).

Graph 24
5 years Mexico CDS
Basis points

Data as of June 2022
Source: Bloomberg
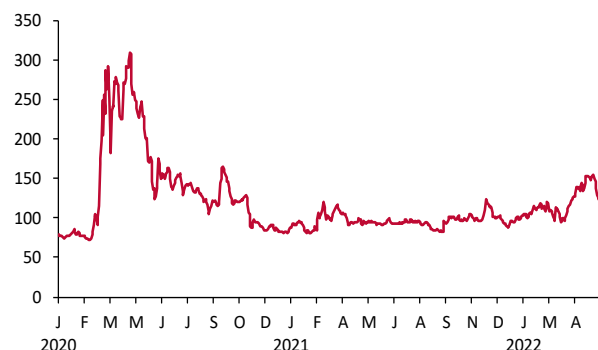
Graph 25
Credit Default Swap for emerging countries
Basis points

Data as of June 2022
Source: Banco de México calculations using Bloomberg data
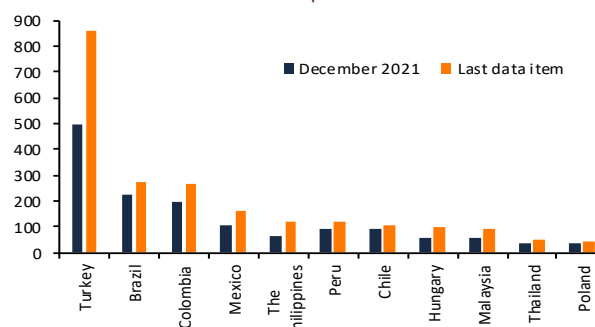
II.4. Macro-Financial risks

The Mexican financial system is facing relevant challenges in light of the current situation, which combines the remaining effects of the COVID-19 pandemic with the new challenges arising from the conflict between Russia and Ukraine and the tightening of financial conditions given the withdrawal of the monetary stimulus in several economies as a result of global inflationary pressures. Also, the increases recorded in inflation levels and the lower dynamism in terms of growth are factors that may be translated into greater challenges for the financial system due to the effects that this outlook may have on the payment capacities of companies and the purchasing power of

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[2] Further detail on the adoption of the new market references for rates close to the risk-free rate can be found in Box: "Funding Equilibrium

Interbank Interest Rate and the new reference rates", included in the Second Semester 2020 Financial Stability Report.

households. In this context, the Mexican financial system maintains a solid and resilient position with a commercial banking sector that has capital and liquidity levels that amply exceed the regulatory minima.

Furthermore, maintaining financial stability against a backdrop of lower growth expectations, greater uncertainty in the evolution of global financial conditions, and geopolitical tensions, continues to be an important challenge ahead. Additionally, the credit granting continues without a robust, and generalized reactivation that could accompany and drive economic growth.

II.4.1. An accelerated tightening of global financial conditions

So far in 2022, as has been mentioned in previous sections, the international financial markets have recorded episodes of high volatility and risk aversion, as well as a significant tightening of financial conditions (Graph 26). This is a result of the persistently high levels of inflation and the consequential expectation of a more accelerated tightening of the monetary policy stance by the main central banks. Also, financial markets were affected by the increase in uncertainty caused by the conflict between Russia and Ukraine, the sanctions imposed on Russia, and their additional impact on inflation and regional and global economic activity.

In this context, the risk that the global financial conditions will tighten more deeply and quickly based on a greater persistence of inflation will remain ahead. This may lead to changes in risk premiums and in turn, generate adjustments in investors' portfolios, thus affecting capital flows toward emerging market economies, including Mexico. Liquidity pressures may also arise in the global financial markets as a result of the withdrawal of the monetary stimulus by certain advanced economies and abrupt adjustments in certain asset prices, which could increase the risks for financial stability.

The effects on financial conditions, both domestic and foreign, would increase financing costs for companies, homes, and governments, to the detriment of economic recovery. Also, certain weaknesses in some economies, which increased during the pandemic, may be exacerbated, such as high levels of public and corporate debt and the high valuation of certain assets.
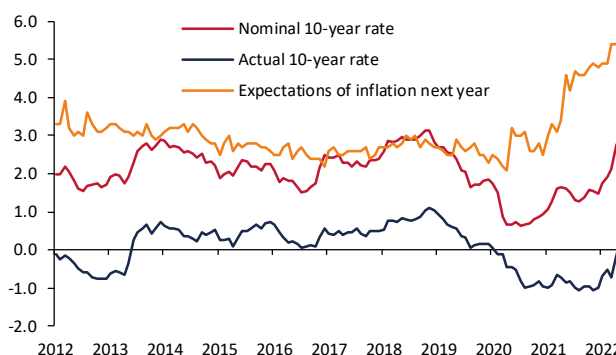
Graph 26
10-year Treasury Bond interest rates and United States inflation expectations
Percent

Data as of May 2022
Source: Federal Reserve and Universty of Michigan

II.4.2. A lower than expected world economic growth

The global economic activity has shown greater than expected slowdown, partly as a result of the persistence in the disruptions of supply chains associated to the restrictions on mobility in certain regions of China and the new outbreak of COVID-19 cases, as well as the economic repercussions resulting from the military conflict between Russia and Ukraine. In this situation, the short-term risk of a greater economic global slowdown has increased.

In particular, as a result of the conflict, economic activity and its perspectives have been affected in different ways among different countries and regions (Graph 27), mainly based on their commercial relationships with Russia and Ukraine and their sensitivity to increases in the prices of raw materials, foods, and energy.

In the medium term, the risks associated with the longer-lasting effects resulting from the impact caused by the pandemic persist, as well as greater and more persistent interruptions in global supply chains. Given the current geopolitical climate, as well as the reconfiguration of the value chains caused by the pandemic, there is the risk of certain weakening, and even setbacks, in globalization, in favor of greater regional integrations, which could lead to a fragmentation in worldwide trade. These elements may in turn have more generalized and profound repercussions on global growth, with implications for the potential growth of certain countries and possibly on their financial stability.

Credit risk for financial institutions may increase given the heterogeneity of the recovery and the increased global levels of public and private debt.

Graph 27
Annual GDP growth expectations
Percent

Data as of April 2022
Source: IMF, World Economic Outlook

Graph 28
Gross fixed investment and private consumption [1/]
Index (2013=100)

Data as of March 2022
Source: INEGI
1/ Seasonally-adjusted figures.

II.4.3. Weakening of domestic consumption and investment

The projections for the recovery rate of the Mexican economy have declined and have become more uncertain, to a great extent as a result of the evolution of the pandemic, which at the beginning of the year displayed an increase in the number of cases in the country, as well as the additional effects caused by the conflict between Russia and Ukraine.

On the one hand, the foregoing may have implications for the general levels of employment and household income, and on the other hand, for the economic and financial perspectives of companies. In this sense, there is still a risk that the weakening of domestic demand, particularly in terms of private consumption and investment (Graph 28), could worsen and/or extend for a longer period than expected. The materialization of this risk would represent a deterioration of the country's macro-financial outlook, both in the short, medium and long terms.

The growth path implicit in this macro-financial backdrop would be more moderate, with repercussions both in the real economy and in the financial system. For the economy, the marked weakness displayed by physical investment since the years before the beginning of the pandemic would lessen the capacity and dynamism of the national productive apparatus as a whole. For the financial system, the lower demand for financing, combined with a potentially lower availability of deposit funds, would mean a reduction in financial institutions' income, while credit risk may also increase in light of possible impacts on the repayment capacities of borrowers.

II.4.4. Possible adjustments in sovereign and Pemex debt

Since the publication of the last *Report*, the credit ratings on both sovereign and Pemex debt have remained unchanged and have in some cases been ratified by the credit rating agencies (Graph 29). It also should be noted that the position of the Mexican economy compared to other emerging economies is relatively better, as it has maintained its fundamentals and fiscal metrics throughout the period. Nevertheless, some credit rating agencies maintain a negative outlook on their rating, considering that certain risks persist.

In particular, the agencies indicate that although the increase in oil prices may favor both the Federal Government's fiscal balance and the financial results of Pemex and, thus, reduce the pressures on the credit ratings of both issuers, these depend on a variety of factors. Thus, in view of its recent performance and outlook, the risk of additional downward adjustments has not dissipated.

Among these factors, due to its relevance for fiscal revenues and the sustainability of public debt, the agencies emphasize the potential growth of the economy, which may face significant downward pressures in a more complex environment.

The rating agencies also explained that the possibility of changes in the country's regulatory, legal, and institutional framework persists, which may influence the productivity and competitiveness of the economy, and ultimately, its credit profile.

It must be pointed out that, according to the rating agencies, Pemex's financial viability continues to face fundamental challenges associated to its business

model and debt; therefore, the risk of additional adjustments to its ratings remains. Furthermore, in view of the close relationship between the company and the Federal Government, the perception that the company represents a contingent liability for the government continues to constitute a risk factor for the evaluation of the sovereign debt.

In the event that credit ratings or outlooks are downgraded in the future, increases in the risk premiums would be observed, both in the sovereign debt and Pemex debt. Based on the market reference provided by the bonds of these issuers, general adjustments in risk premiums would also affect the cost of financing for both households and companies and may further hinder the access to financing by the private sector, including financial institutions. Thus, the possible materialization of scenarios of this type would represent a deterioration in the profile of the economy's macro-financial risks.

Graph 29
Evolution of Mexico's and Pemex's credit ratings in foreign currency [1]
Fitch, S&P and Moody's scales

Data as of May 2022

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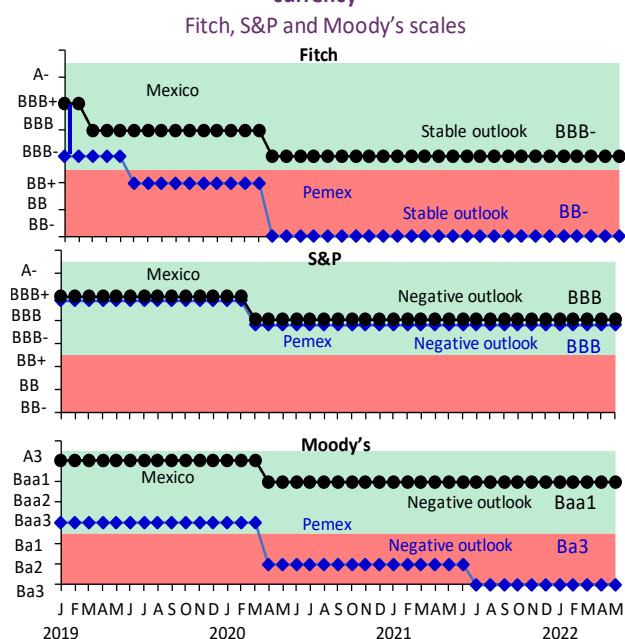
1/ The green areas denote the ratings that are included within the investment grade, whereas the red areas refer to speculative-grade credit ratings.

III. Update of challenges of the economic environment

III.1. Challenges arising from COVID-19

The pandemic caused significant economic and financial impacts with a high degree of heterogeneity among the different economic sectors. More than two years from its outbreak, the effects of the pandemic are still present, although they are starting to dissipate given its recent evolution. In this context, it is relevant to analyze the changes that the pandemic has caused in companies' credit portfolios. Therefore, this report studies the change in their composition between February and the present, making a distinction among sectors.

In terms of total portfolio, the sectors that lost most participation were wholesalers, retailers, electricity generators, transporters and distributors, and suppliers of gas and water via pipelines to end-users and the mining industry.[3] Whereas those that gained more participation were companies involved in primary activities, cultural and recreational services, temporary accommodation and food and beverage preparation services (Graph 30). When the analysis is restricted to credit granted to small- and medium-sized business (*pymes,* its acronym in Spanish), the retail commercial sector and to a lesser extent the wholesale commercial sector, continue to endure large losses of participation. In addition, the aforementioned service sectors, recreation and temporary accommodation and food and beverages, lost participation in the *pymes* portfolio instead of gaining it (Graph 31).

Graph 30
Corporate Portfolio and Economic Performance.
All Companies [1]
Percent
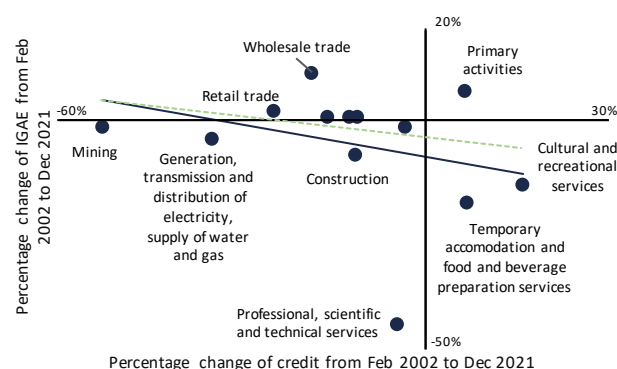
Data as of December 2021
Source: Banco de México, and INEGI
1/ Each point on the graph shows the combination of the percentage change in the total credit against the percentage change in the IGAE between February 2020 and December 2021. The solid line is the lineal trend adjusted considering all the sectors. The dotted green line is the lineal trend adjusted without considering the professional, scientific and technical services sector.

Graph 31
Corporate Portfolio and Economic Performance - Medium and Small Companies [1]
Percent
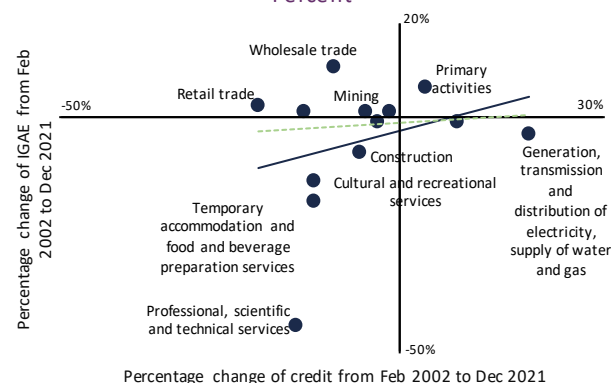
Data as of December 2021
Source: Banco de México and INEGI
Each point on the graph shows the combination of the percentage change in the total credit against the percentage change in the IGAE between February 2020 and December 2021. The solid line is the lineal trend adjusted considering all the sectors. The dotted green line is the lineal trend adjusted without considering the professional, scientific and technical services sector.

Evolution of uncertainty

Since the second semester of 2021, in general, the levels of uncertainty associated with economic policy have been increasing, as is shown in the economic policy uncertainty index from Twitter. Although for May the

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[3]In February 20202, these sectors had the greatest participation in the credit portfolio: wholesalers (10%), retailers (10%), electricity generators, transporters and distributors, and suppliers of gas and water via pipelines to end-users (2%) and the mining industry (1%).[3]

index registered a reduction with respect to April (Graph 32). This increase has been associated with the spread of the Omicron variant of COVID-19 at the end of 2021 and over the first months of 2022, with the global inflationary pressures and the conflict between Russia and Ukraine.

Graph 32
Economic Policy Uncertainty Index [1/]
Level of Uncertainty
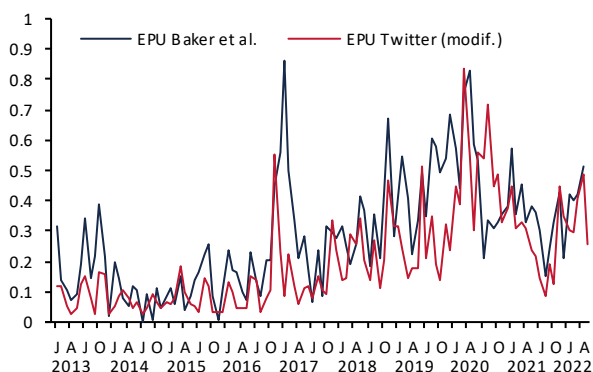
Data as of May 2022

Source: Banco de México.

1/ To calculate the Economic Policy Uncertainty based on tweets the authors use the methodology proposed by Baker et al. (2016). In particular, the authors calculate the total number of tweets that contain any term related to uncertainty, the economy or policy are calculated. This series is divided by the total number of tweets in the respective period and is normalized based on the period from January 2008 to February 2022. The Twitter accounts used are: @eleconomista, @El_Universal_Mx, @reformanegocios, @Milenio, @Reforma, @ElFinanciero_Mx, @lajornadaonline, @elsolde_mexico, @Reporte_Indigo, @LaRazon_mx, @Excelsior, @diario24horas, @sdpnoticias, @LaCronicaDeHoy, @CapitalMexico, @Forbes_Mexico, @elheraldo_mx and @EFEMexico.

Evolution of mobility and vaccinations

In the third week of January, social confinement or lockdown, measured as mobility in residential areas, reached its maximum level in the year and from then on, it reduced constantly. By June 10, it was just 3.4% above the levels observed before the pandemic (Graph 33), which seems to reflect the advances of vaccination campaigns and with it, the reactivation of the Mexican economy.

It is unknown if the levels of mobility currently observed reflect the new working from home schemes adopted and whether or not these will be maintained, at least partially, despite the reopening of the economy.

In this regard, a survey conducted by KPMG at the end of 2021 found that 57% of organizations had

implemented a hybrid working model and 21% will continue using the model developed as a result of the conditions imposed by COVID-19.[4] In other words, 78% of the companies surveyed identified a new labor reality based on working from home, either totally or partially. If so, the new equilibrium level of mobility in residential areas may remain above the levels seen prior to the pandemic.

Graph 33
(Confinement) Mobility in residential areas [1/]
Percent
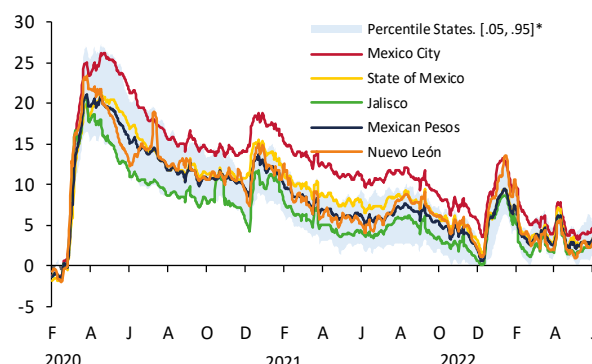
Data as of June 10, 2022.

Source: Google Mobility Reports

1/ The graph shows the moving average (7-day window) of the daily population movement trend based on the information detected by Google in terms of a reference base for residential areas. The reference base represents the median of high-traffic areas of people within a five-week period (from January 3 to February 6, 2020) for each day of the week.

*The shaded area shows the range between the percentiles .05 and .95 of the distribution of mobility at state level on each date.

In terms of vaccination progress in Mexico, a total of 208,765,211 doses had been applied by June 6, thus vaccinating 86% of the total population of 12 years of age and older.[5] Of the total amount of doses, 53,077,125 have been boosters provided to adults over 18 years of age, which represents 66% of the people in this age group (Graph 34). These indices of full and booster vaccination schemes shall support the sustained reactivation of economic activities.

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[4] KPMG Mexico (2022): "*Upper Management Perspectives in Mexico 2022*". A survey conducted at the end of 2021 of 1,383 business leaders in Mexico.

[5] The population projections halfway through 2021 of the National Population Board (CONAPO) are taken as a basis, with a total of 102,816,072 people over 12 years of age.

Graph 34
Vaccination in Mexico
Left axis: Millions of doses
Right axis: Millions of persons/doses
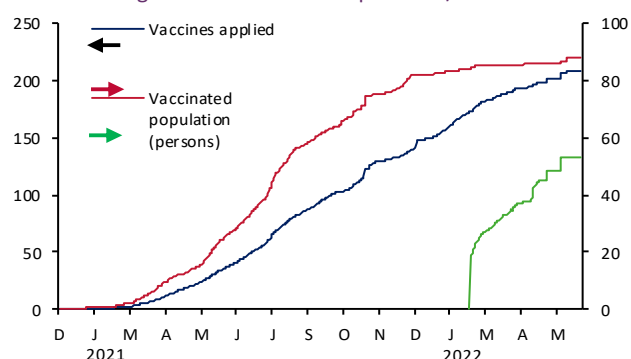
Data as of June 6, 2022
Source: Ministry of Health

In recent weeks, a peak has been observed in the number of COVID-19 cases confirmed by the Health Ministry (SSA). However, no increases have been detected in the number of hospitalizations or confirmed deaths, which may be interpreted as a positive result of the effects of vaccinating the country's population.

III.2. Analysis of the sectors affected by the geopolitical tensions between Russia and Ukraine

The military conflict between Russia and Ukraine has generated increases in the international prices of certain goods. This may reduce the profitability of the economic sectors that use them as supplies, thereby reducing companies' capacities to meet their credit obligations.

In this context, an analysis suggests that the exposure of the credit portfolio in the sectors that may be the most adversely affected by the increase in the prices of supplies. In order to conduct this exercise, one analysis was made at the bank level and another at the State level. To identify the sectors that could be affected, it first identified the supplies whose prices increased as a result of the conflict, and then the sectors that use these supplies in their production.[6]

For the total of the commercial banks, although the proportion of the corporate portfolio in the sectors exposed is small, there is heterogeneity among the banks. A group of these banks have a higher exposure to the military conflict, as a percentage of their total portfolio and capital. Nevertheless, the size of these brokers is medium or small (Graph 35a). Also, when the

analysis is restricted to *pymes*, the group of banks with higher exposure is smaller (Graph 35b).

Graph 35
Credit portfolio to Companies in Sectors Affected by the Geopolitical Tensions between Russia and Ukraine, by bank [1]
a) All companies
Percent
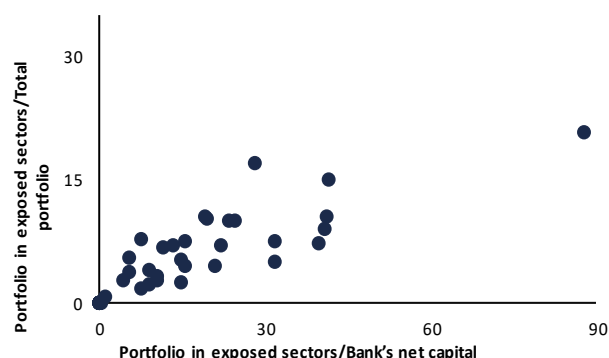
b) Medium and small companies
Percent
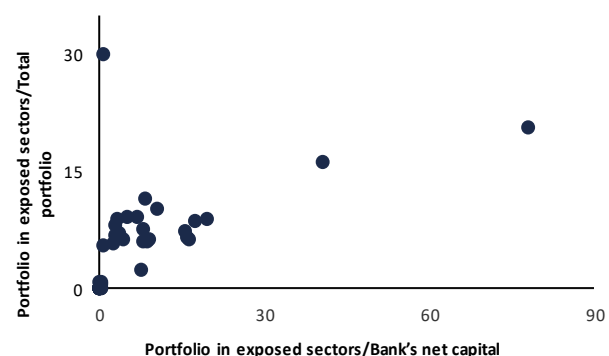
Data as of December 2021
Source: Banco de México

1/ The horizontal axis measures the corporate portfolio of a bank in exposed sectors as a percentage of its net capital. The vertical axis measures the corporate portfolio of a bank in exposed sectors as a percentage of its corporate credit portfolio.

In the analysis at the state level, it can be seen that states with a higher proportion of credit in exposed sectors have a higher concentration on retail fuel trade industries (Campeche and Coahuila), wholesale agricultural products (Tamaulipas and Zacatecas) and on industries of the secondary sector that use wood as supplies (Oaxaca), and iron and steel (Veracruz) (Graph 36a). When the analysis is restricted to *pymes*, the states that continue to be among the most exposed and

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[6] Sectors of economic activity up to five digits that may be affected by the increases in the prices of their suppliers as a result of the conflict between Russia and Ukraine are considered.

have the largest portfolios in this type of companies are Oaxaca, and Zacatecas (Graph 36b).

Graph 36

Credit portfolio to companies in sectors affected by the geopolitical tensions between Russia and Ukraine, by state [1]

a) All companies
Percent
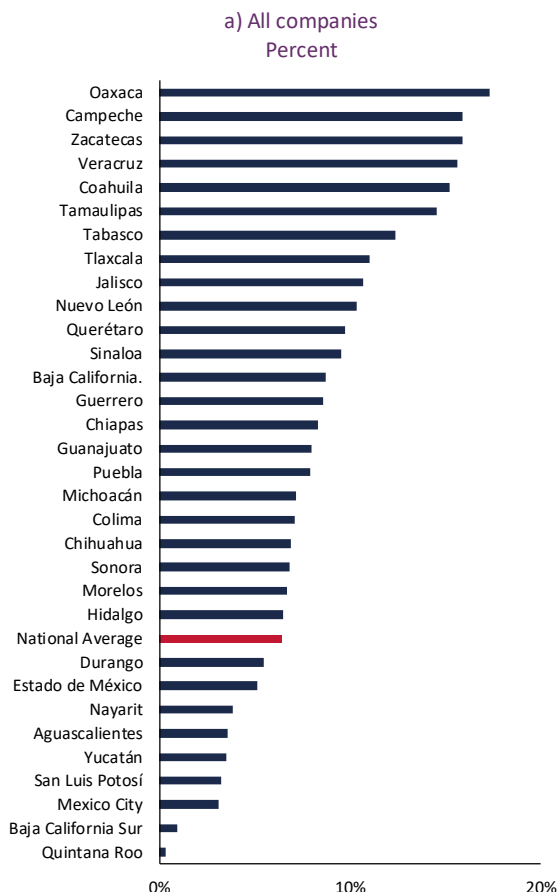
Data as of December 2021

Source: Banco de México

1/ Percentage of total credit granted by the commercial bank to non-financial companies in sectors exposed, by state, in December 2021. Medium and small companies are those with credit histories below 100 million pesos.

Credit portfolio to companies in sectors affected by the geopolitical tensions between Russia and Ukraine, by state [1]

b) Small and medium companies
Percent
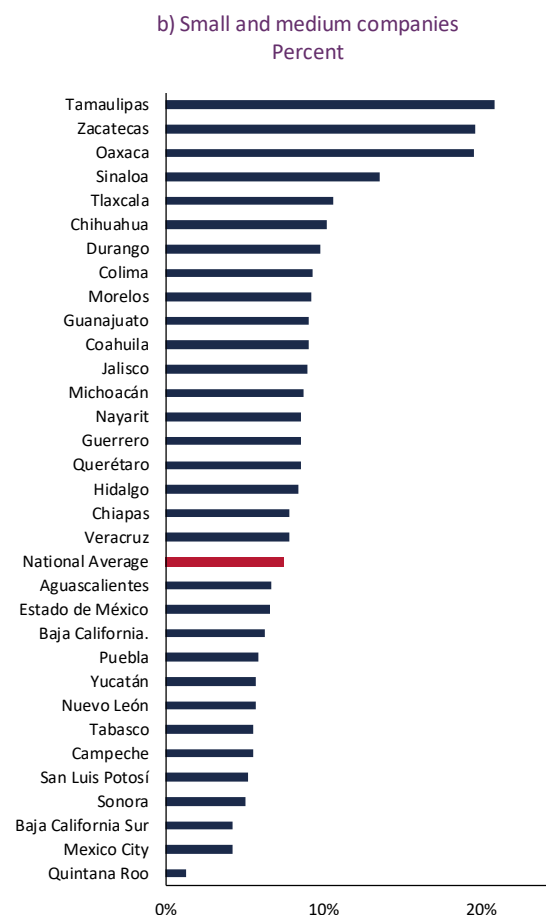
Data as of December 2021

Source: Banco de México

1/ Percentage of total credit granted by the commercial bank to non-financial companies in sectors exposed, by state, in December 2021. Medium and small companies are those with credit histories below 100 million pesos.

III.3. Challenges associated with the tightening of financial conditions

One of the main challenges faced by the Mexican financial system in the current situation arises from the tightening of financial conditions as a result of the withdrawal of the monetary stimulus in several economies faced with the highly persistent global inflationary pressures. Additionally, there remains a high level of uncertainty regarding the evolution of future financial conditions with respect to the tightening in the level and rate that may be observed. In particular, the challenge of a larger and more pronounced than expected tightening persists, which may result in a series of disorderly adjustments, manifesting itself in abrupt changes in the valuations of assets, liquidity pressures and in general, market

volatility, which in turn may have an impact on the financial system and its participants.

For example, from December 2021, fixed income funds showed an increase of 6.03%, whereas equity funds decreased by 9.03%. As can be observed in Graph 37, the recent increase in fixed income funds' assets under management (AUM) can be explained by the consistent increase in their capital gains added to inflows, whereas in the case of equity funds, most of the variation can be explained by losses in the valuation of their assets.

Graph 37
Monthly change in investment funds assets
Billions of pesos
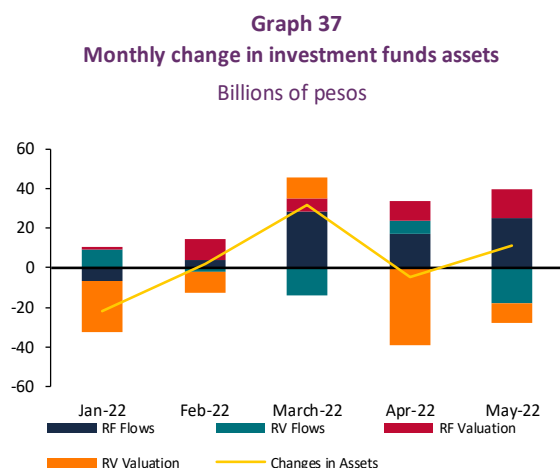
Data as of May 2022

Source: Banco de México using CNBV data

One of the effects on the financial system may be that pressures are being generated on the capitalization levels of financial institutions. In the first instance, a generalized increase in interest rates would be reflected in a decrease in the value of their securities portfolios. In particular, the capital losses of these securities in the first months of 2022 may partially reflect the higher level of interest rates that were observed in that period. As a secondary effect, the increase in rates may reduce the demand for credits, both by companies and consumers, which would be reflected in banks' brokerage income. These channels of impact would tend to reduce institutions' income statements and as a consequence, slowdown their rates of capital accumulation. Nevertheless, in addition to the steps that banking institutions may take to mitigate the aforementioned effects, in recent years an expansion of the capitalization levels has been observed, which will

enable them to face potential operating risks, and with which the Mexican financial system is in a favorable position to overcome this situation.

Also, another case worth mentioning is that of *siefores*. Although they continue to be the country's main institutional investors given the amount of funds they manage, they still face the risk that volatility in the international financial markets may affect their capital gains on these funds. In fact, these institutions showed a nominal capital loss of approximately 12.6% between December 2021 and March 2022 and 28% based on the latest available data in April of this year, this is largely the reflection of the volatility observed in the international financial markets conditions which affected *siefores* investments in foreign securities.

IV. Measures to promote and preserve the sound development of the financial system

During the period covered by this *Report*, the liquidity and financing measures implemented by the authorities in response to the COVID-19 pandemic concluded. These measures contributed to foster an orderly market behavior during the most critical period of the pandemic. Since their announcement, these measures granted resources and regulatory exemptions that provided additional support to financial intermediaries, fostering their orderly operation, even for those who did not use the facilities directly. In addition, the gradually unwinding of the measures, contributed to avoid abrupt adjustments in the behavior of financial institutions, reducing costs and risks for viable firms and preventing negative long-lasting effects on the confidence of the long-term economic performance.

Moreover, in order to maintain a robust regulatory framework that fosters the resilience of the financial sector, the financial authorities have resumed the implementation of standards that were postponed due to the pandemic[7]. The constant improvement of the regulatory framework, the adoption of international standards and best practices, strengthens and increases the resilience of the Mexican financial system.

It is important to emphasize that the regulations implemented were broadly and timely discussed with financial institutions. In addition, a proper implementation schedule, will allow an orderly

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[7] As part of the measures taken to face the pandemic, the financial authorities postponed the effective dates of certain standards, thereby providing financial institutions and the supervisory authorities additional operating capacity to cope with the pandemic. This decision was in line with the directives of the international coordination groups, such as the Basel Committee on Banking Supervision (BCBS), the

International Organization of Securities Commissions (IOSCO) and the International Accounting Standards Board (IASB). For further information about the implemented measures, please consult the June 2020 Financial Stability Report .

implementation, without causing any negative impact on financial activity.

With respect to the international standards implemented during the period, the following stand out. Regarding solvency risk as of December 31, 2022, banks will be required to comply with the 25% of the Total Loss Absorption Capacity requirement (TLAC)[8], as the total TLAC requirement of additional resources will be phased-in until December 31, 2025, with 25% annual increments to reach the total requirement of 6.5% of total risk-weighted assets of the institution, or 3.75% of the denominator of the leverage ratio.

Regarding liquidity risk, beginning March 1, 2022, institutions must comply, at the end of each month, with a requirement of a Net Stable Funding Ratio (NFSR) of at least 100 %. The purpose of this requirement is to ensure that institutions maintain liabilities whose characteristics are in line with those of their assets. In addition, the amendments to the regulation stipulate that banks should comply with a Liquidity Coverage Ratio (LCR) and NFSR, both in an individually and consolidated basis[9]. The later, in order to prevent institutions from performing transactions with financial entities of the same group to reduce their liquidity requirements, that do not necessarily reduce its liquidity risk.[10]

Regarding credit risk, the risk weights for consumer, micro, small and medium sized companies and mortgage loans were reduced. The new risk weights are aligned to the Basel standard and allow credit institutions to continue with their financing flow, while adequately reflecting the risk of unexpected losses.

Also, regarding credit risk, the parameters for determining the Loss Given Default (LGD) for the commercial loans' portfolio were changed for the internal ratings-based approach model. These changes are intended to better reflect the credit risk by moving from fixed percentage LGD for unsecured and subordinated positions to a scheme based on the number of months elapsed since the loan was classified

in stage 3, corresponding to past-due loans portfolio in accordance with the new international accounting standard (IFRS9) (See Box 5).

Aligned to the Basel standard, the standard method for the measurement of exposure to operational risk was implemented. The purpose of these modifications is to ensure that institutions use a more accurate and risk-sensitive method to assess their operational risk in order to determine their minimum net capital requirements. Credit institutions must calculate their capital requirements for operational risk based on the Business Indicator method as of January 1, 2023. However, they may opt to adopt it earlier subject to the authorization of the *CNBV*.

Likewise, the financial authorities have also incorporated into their policy tools some measures implemented during the pandemic. Banco de Mexico has permanently maintained the cost of the Additional Ordinary Liquidity Facility (*FLAO*, its acronym in Spanish) at 1.1 times the monetary policy target rate. On the other hand, the *CNBV* has also maintain some of their credit restructure facilities established during the pandemic, allowing banks to consider their total additional reserves as complementary capital.

Regarding the strengthening of the financial safety net, the Banking Deposit Insurance and Resolution Agency (*IPAB*, its acronym in Spanish) modified the guidelines that establish the programs and timetables for developing the resolution plans for commercial banking institutions.[11] Among several changes, one is the segmentation of requirements to be considered for systemic and non-systemic institutions. The determination of the requirements considers both, the *CNBV*'s determination and several operating aspects of the Institution (such as the volume of secured obligations, the number of secured instruments, the number and distribution of bank branches in Mexican territory and the importance of the Institution in specific geographical sectors). Likewise, the time for updating the Resolution Plans is also established according to the Institution´s operations. Consequently,

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[8] The requirement for Domestic Systemically Important Banks (D-SIB), requires them to have the capacity necessary to absorb losses and maintain adequate capitalization levels without interrupting their critical functions in the event of an adverse shock, without the need to use taxpayers' resources to do so.

[9] According to the *General Provisions on the Liquidity Requirements for Commercial Banking Institutions*, Entities subject to Consolidation for the calculation of liquidity coefficients are those financial entities subject to consolidation in accordance with the Accounting Criteria that are not subject to the prudential standards issued by an authority other than the National Banking and Securities Commission (*CNBV*, its acronym in Spanish) or are part of the same financial group,

consortium or business group and that the Board of Directors rules that they must be consolidated to better reflect the liquidity risk of the commercial banking institution.

[10] The implementation of the NSFR and the modifications to the liquidity regulation are aligned with the Basel Liquidity standards and Principles for the administration and supervision of the liquidity risk. In particular, Principle 6 stipulates that banks must adequately monitor their liquidity risk, both at individual and group level as a whole, as well as their exposure to liquidity risk.

[11] General GUIDELINES that establish the programs and schedules for developing the resolution plans for commercial banking institutions.

it was set at three years for systemic institutions, and from 2 to 5 years for the rest of the institutions.

Banco de México will continue to follow closely the evolution of the Mexican financial markets conditions and the correct functioning of the financial system. If necessary, it will continue taking the required actions within its responsibility in strict compliance with the legal framework.

V. Risks of the Financial System

V.1. Aggregate risk indicators

The Financial Markets Stress Index (*IEMF*, its acronym in Spanish) reduced slightly from the latest *Report* through to June 10, 2022. However, behavior has been mixed during this period. After a decrease related to lower concerns about the effects on the economy of the COVID-19 Omicron variant, the index increased since the commencement of the conflict between Russia and Ukraine in February and later by the more accelerated normalization process of the advanced economies' monetary policies (Graph 38). The index is above the level observed prior to the pandemic (February 20, 2020), but below the average recorded throughout 2020.

Meanwhile, the Financial Conditions Index (*ICF*, its acronym in Spanish) has reflected a tightening since December 2021 (Graph 39). Against this backdrop, new episodes of volatility in the financial markets, which may lead to further tightening of the financial conditions, cannot be ruled out (see section II.4.1).

The aggregate risk of the financial system, illustrated through the heat map, reduced compared to the risk observed in the previous *Report* and remained at moderate levels during the first quarter of 2022. The leverage risks of the financial sector reflected an upsurge due to the increased concentration of the credit portfolio. Similarly, the macro-economic risks remain at high levels and show an increase compared to the previous *Report* due to greater inflation expectations and increases in import prices, which are measured using the Import Prices Index based on National Institute of Statistics and Geography (*INEGI*, its acronym in Spanish) information. In turn, the market exposure risks reflected a reduction in the same period, although they remain at moderate levels. Finally, the leverage risks of the non-financial sector suffered a significant reduction and are at minimum levels due to a decrease in indebtedness of households as compared to their savings (Graph 40).

In terms of the Systemic Risk Perception Survey, the institutions indicated the disorderly change in foreign interest rates as the main external financial risk. Meanwhile, regarding domestic financial risks, the most mentioned one was the deterioration in the growth outlook of the country's economy. Lastly, within the non-financial risks, the political, geopolitical, and social risks stood out.

Graph 38
Financial Markets Stress Index (IEMF) [1]
a) Stress level 2005-2022
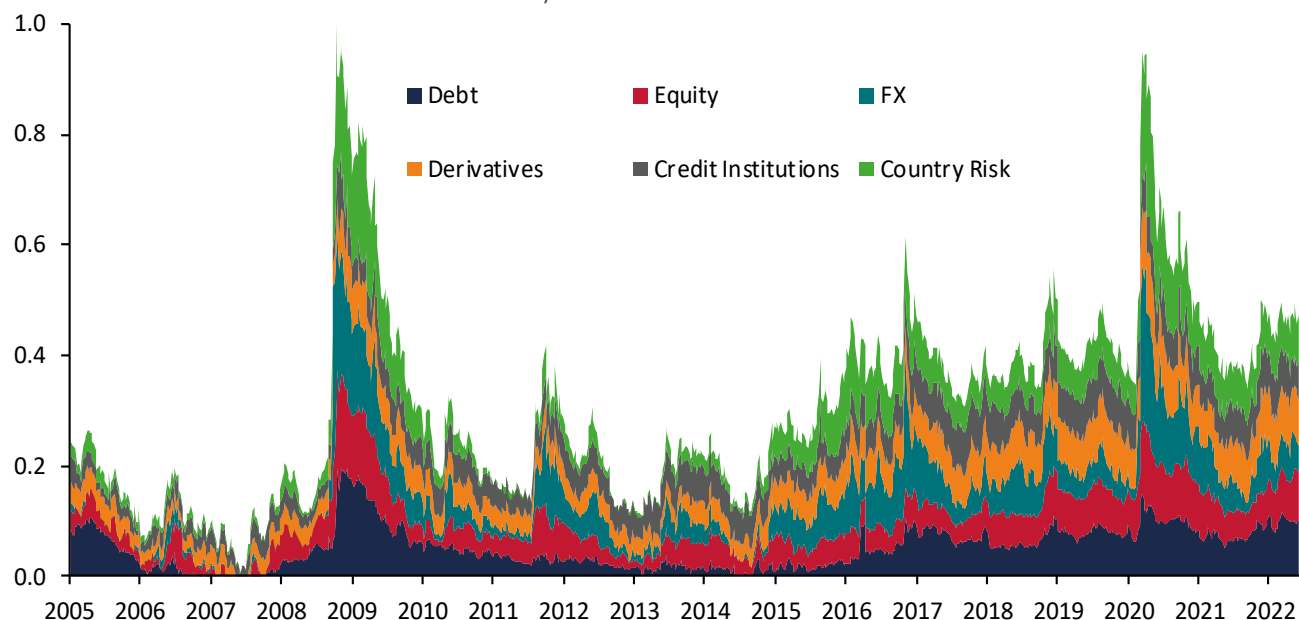
b) Stress level 2020-2022
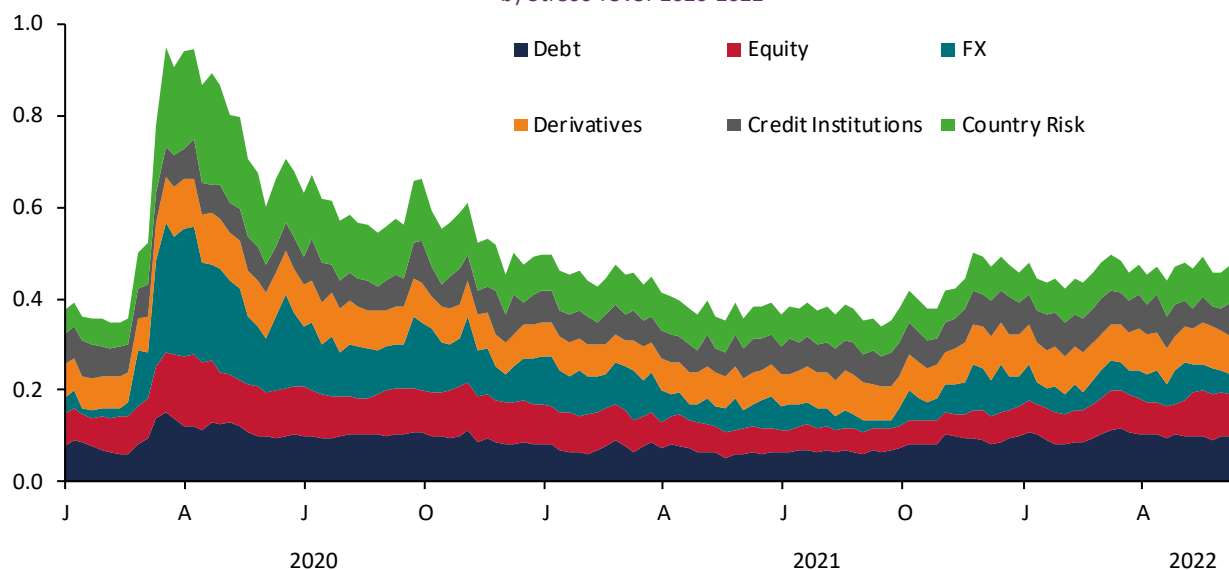
Data as of June 10, 2022

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 39

Financial Conditions Index (FCI) [1,2]

Standard deviations
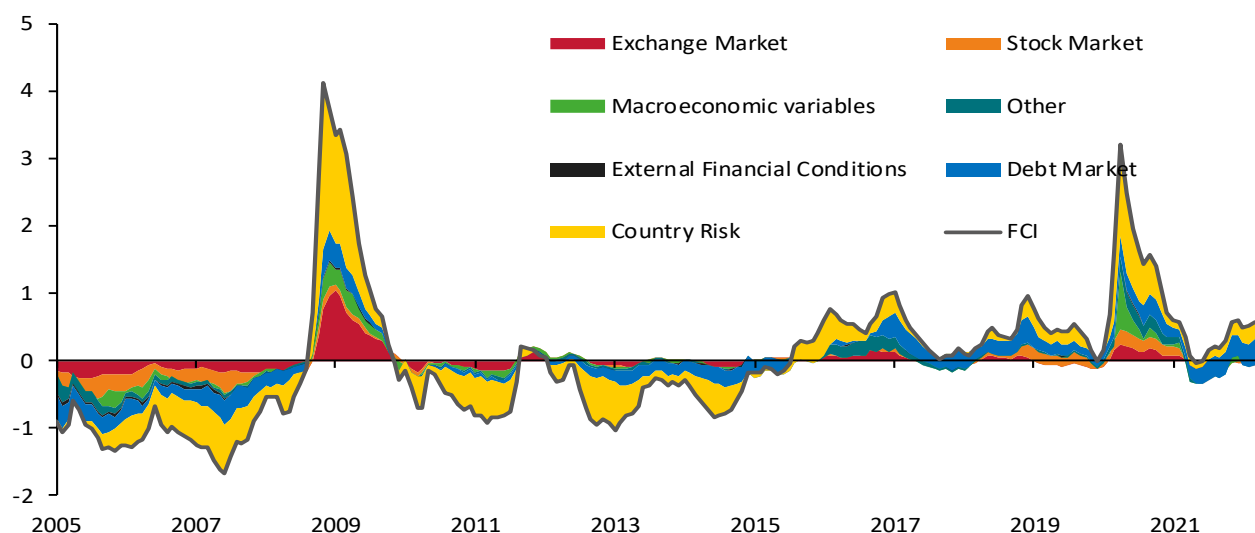
Preliminary data as of May 2022. For May data, preliminary information for IGAE was used.

Source: Banco de México

1/ For a description of the methodology see Box 2: Financial Conditions and Growth at Risk, Financial Stability Report, December 2019.

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

Graph 40

Heat map of risks of the Mexican financial system [1,2]
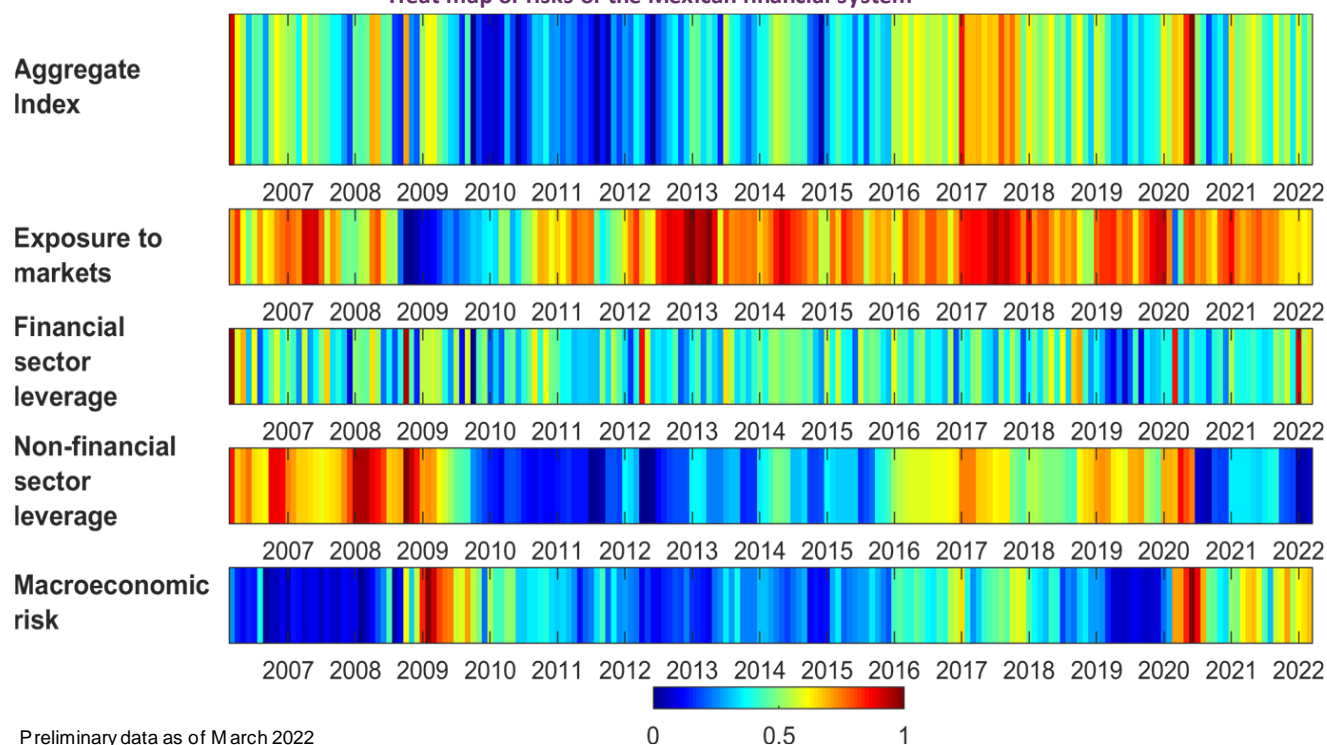
Preliminary data as of March 2022

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[12,13] emphasizes that in this edition of the survey, the risk of greater than expected inflation is among the five most mentioned risks both for foreign and domestic financial risks. Institutions also expect increases in all types of risks, except operational risk, over the next six months and a greater proportion of participants consider that the likelihood that a systemic event will occur in the short, medium and long-term is high, in comparison with the previous semester.

The following stands out in terms of the main sources of risk reported by the institutions (Table 1):

- In relation to the perception of foreign financial risks, the disorderly changes in foreign interest rates stand out in first place. In second place, institutions mention the deterioration in the growth outlook of the global economy, followed by the volatility in raw material prices. Greater inflation than expected is in fourth place, and finally, the fifth most-mentioned risk is the deterioration of foreign market conditions.
- In terms of domestic financial risks, the most-mentioned risk by the institutions continues to be the deterioration in the growth outlook of the country's economy. The deterioration in public finances is the second most-mentioned risk, followed by a sovereign risk rating downgrade. Fiscal, financial, and economic policies and the risk of inflation greater than expected are the next most-mentioned risks.

Table 1
Main sources of risk for the financial system
Percent of total of institutions

	May 2022[1]	November 2021[2]
External financial risks		
Disorderly changes in foreign interest rates.	70	56
Deterioration in the growth outlook of the global economy.	69	70
Volatile raw materials prices.	62	63
Greater inflation than expected.	60	43
Deterioration in foreign market conditions*	59	72
Internal financial risks		
Deterioration in the growth outlook of the country's economy.	68	79
Deterioration of public finances.	59	62
Downgrade of sovereign risk rating.	57	60
Fiscal, financial and economic policy.	54	59
Greater inflation than expected.	54	51
Non-financial risks		
Political, geopolitical and social risks.	89	70
Cybernetic and technological risks.	84	71
Insecurity and violence.	71	56
COVID-19 (new wave, prolongation of pandemic).	65	63
Deterioration of the rule or law and impunity.	56	38

1/ 112 institutions participated in the survey.
2/ 112 institutions participated in the survey.
* Exchange volatility depreciation and lack of liquidity.

- The three main sources of non-financial risks in this survey are political, geopolitical and social risks; cybernetic and technology risks, followed by risks of insecurity and violence. The risk associated with COVID-19 is now in fourth place and the deterioration of the rule of law and impunity is in fifth place. The survey emphasizes that 23% of the institutions that mentioned political, geopolitical and social risks, specifically mention the geopolitical conflict between Russia and Ukraine.

The survey includes a section that asks respondents to report their perception on the magnitude (high, medium, low or null) of the probability that an event occurring that will affect the stability of the financial system in the short, medium and long terms (0 to 6 months, 6 to 12 months, one year or more, respectively) and highlights the following (Graph 41):

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[12] This semester's survey was conducted from April 29 to May 25. For further information please refer to Box 6. Semiannual Survey on Systemic Risk Perception, *December 2019 Financial Stability Report*, Banco de México, pp 94-95.

[13] The survey consists of a series of questions grouped into four blocks: i) the main sources of financial risks (domestic and foreign) and non-financial risks, ii) the perception of the occurrence of a high-impact event that may affect the sound performance of the financial system in different terms, iii) institutions' expectations regarding the main idiosyncratic risks they face and iv) aspects related to their risk management. The survey was sent to 139 financial institutions (retirement fund managers, insurance companies, commercial banks, development banks, broker-dealers and investment funds).

Graph 41

Probability of a systemic event ocurring within the financial system

Percentage of responses
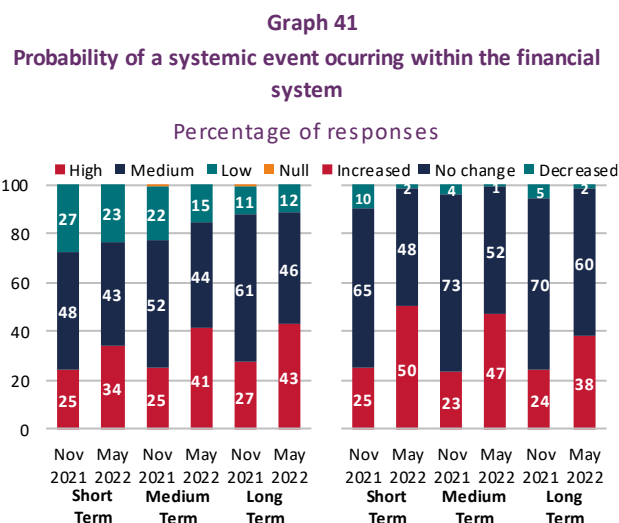
Source: Banco de México

Certain figures cannot add up to 100% due to rounding up.

- The proportion of institutions that consider a high likelihood of the occurrence of the event increased in the short, medium and long terms compared to the preceding semester.
- For all the terms considered, there was an increase in the percentage of institutions that consider that the probability that a systemic event will occur is greater.

Lastly, in terms of the institutions' expectations regarding the main risks they face, a diffusion index is calculated as the difference between the percentage of institutions that expect the risk to increase and the percentage of institutions that expect it to decrease. An increase in the level of the index is interpreted as the greater expectation of risk. The survey emphasizes the following (Graph 42):

- The level of the index regarding credit, market (equity), market (currencies), liquidity (funding), liquidity (market) and market (fixed income) risks increased compared to the previous semester. Notwithstanding this, with the exception of the latter, the risks are at levels below those recorded in 2020.
- The level of the index in terms of operating risk decreased compared to the previous semester.

Graph 42

Evolution of expectations in the main risks in the next six months [1/]
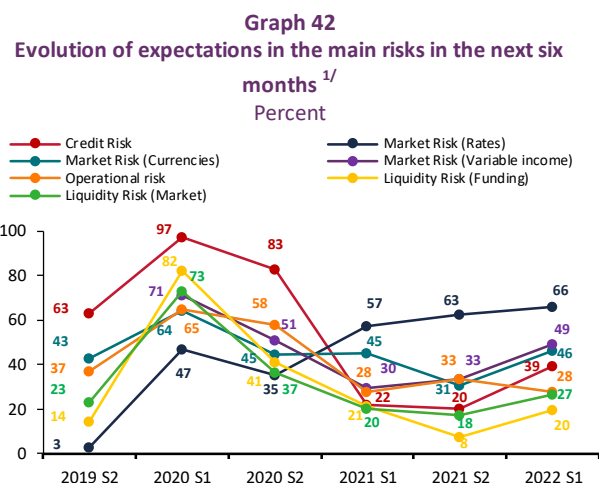
Percent

Data as of May 2022

Source: Banco de México

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

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

Total financing has shown a slow recovery and despite that, in nominal terms, it has shown a slight increase in recent quarters, as a proportion of GDP, it is practically at the same level as it was during the second quarter of 2017 (Graph 43a). The financing gap continues to decline, and has recorded negative figures in four straight quarters, reaching levels similar to those observed at the end of 2006 (Graph 43b).

Graph 43

Total financing to non-financial sectors of the Mexican economy [1/]

a) Proportion of GDP
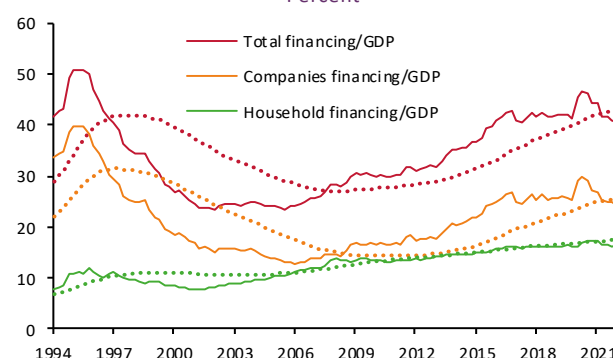
Percent

Data as of March 2022

Source: Banco de México

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

b) Financing gap [1/]
Percent
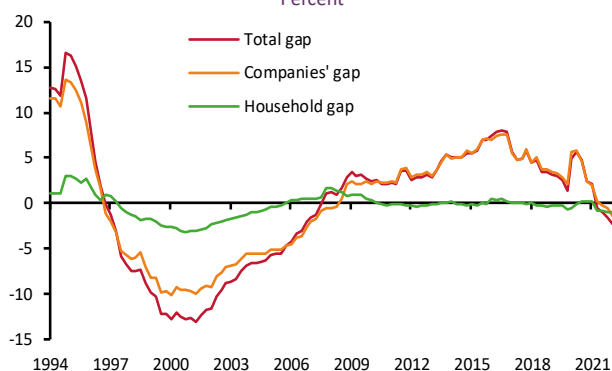
Data as of March 2022

Source: Banco de México

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

Total financing of the Mexican economy reduced during the first quarter of 2022. Although public-sector financing remained stable in real annual terms, financing to the non-financial private sector continued to decline (Table 2), although at a slower rate, mainly due to corporate and consumer financing. Consumer financing to households decreased in real annual terms over nine quarters, although it has shown a recovery throughout the second semester of 2021 and so far in 2022[14] (Graph 44).

Graph 44
Total financing to households [1/]
Real annual change in percent
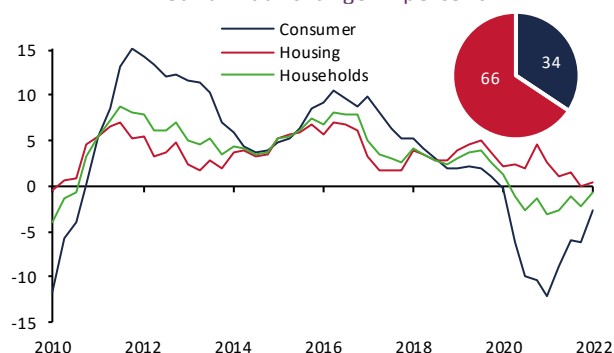
Data as of March 2022

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).

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[14] The data include, as well as regulated banking and multi-purpose financial company (Sofom) financing, the financing of financial entities not regulated in the country (non-regulated multi-purpose financial companies), the granting of financing by financial companies outside the financial system who regularly perform credit activities (for example, the financial arms of auto manufacturers, financial leasing and department stores that issue credit cards), as well as consumer credit granted by the National Workers' Consumption Fund Institute (*Infonacot*).

Table 2

Total financing to non-financial sectors of the Mexican economy

a) Data as of March 2022

	Billions of pesos	Percent of sector	Percent of GDP	Real annual change in % [Annual change of the balance in USD in %]				Per cent of financing denominated in pesos
				1Q22 vs 1Q21		1Q21 vs 1Q20		
Public sector [1]	**13,917**	**100**	**50.3**	**0.0**		**-1.8**		**67.4**
Securities	**12,255**	**88.1**	**44.3**	**1.4**		**-0.5**		**72.0**
Issued in Mexico	8,824	63.4	31.9	7.0		5.4		100.0
Issued abroad	3,430	24.6	12.4	-10.8	[-1.6]	-11.2	[6.7]	0.0
Bank credit	**413**	**3.0**	**1.5**	**-8.7**		**12.9**		**19.4**
Commercial banks	119	0.9	0.4	-9.0		-11.8		67
Foreign bankss	293	2.1	1.1	-8.5	[0.9]	27.5	[53.3]	0.0
Other [2]	**1,250**	**9.0**	**4.5**	**-9.3**		**-15.2**		**38.4**
Private sector	**10,633**		**38.5**	**-3.0**		**-10.5**		**73.8**
Non-financial companies	**6,205**	**100**	**22.4**	**-5.3**		**-15.4**		**55.2**
Securities	**2,232**	**36.0**	**8.1**	**-7.1**		**-12.0**		**26.2**
Issued in Mexico	559	9.0	2.0	-4.7		-5.2		97.6
Issued abroad	1,673	27.0	6.1	-7.8	[1.7]	-14.0	[3.4]	2.3
Bank credit	**3,798**	**61.2**	**13.7**	**-4.5**		**-17.6**		**76.4**
Commercial banks [3]	2,750	44.3	9.9	-2.6		-16.2		79.1
Development banks	423	6.8	1.5	-13.0		-7.4		58.3
Foreign credit [4]	625	10.1	2.3	-6.2	[3.4]	-28.4	[-13.9]	0.0
Other [5]	**174**	**2.8**	**0.6**	**-0.9**		**-8.6**		**98**
Households	**4,428**	**100**	**16.0**	**0.4**		**-2.2**		**100**
Consumer	**1,327**	**30.0**	**4.8**	**0.4**		**-11.7**		**100**
Commercial banks [3]	1,084	24.5	3.9	0.8		-12.9		100
Development banks	45	1.0	0.2	-10.8		-3.8		100
Other [5]	**198**	**4.5**	**0.7**	**0.6**		**-6.6**		**100**
Housing	**3,101**	**70.0**	**11.2**	**0.4**		**2.6**		**100**
Commercial banks	1,142	25.8	4.1	2.8		4.2		100
Development banks	12	0.3	0.0	-6.9		-8.0		100
Other [6]	**1,947**	**44.0**	**7.0**	**-0.9**		**1.8**		**100**
Memo: Non-regulated financial entities that grant financing by destination sector [7]	**1,541**	**100**	**5.6**	**-4.6**		**-9.0**		**89.4**
Non-financial companies	1,194	77.5	4.3	-0.9		-7.0		89.0
Consumer	301	19.5	1.1	-14.3		-13.7		99.5
Housing	10	0.7	0.0	-5.3		12.7		100.0
Public Sector	36	2.3	0.1	-26.4		-22.1		13.8
TOTAL	**26,091**		**94.4**	**-1.5**		**-6.1**		**71.3**

Data as of March 2022

Source: Banco de México (CF 297), CNBV, 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).

Total Financing to Non-Financial Sectors of the Mexican Economy
b) Historical data: real annual change 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 credit
  - Commercial banks
  - Foreign banks
- Other [2]

Private sector

Non-financial companies
- Securities
  - Issued in Mexico
  - Issued abroad
- Bank credit
  - Commercial banks [3]
  - Development banks
  - Foreign credit [4]
- Other [5]

Households
- Consumer
  - Commercial banks [3]
  - Development banks
  - Other [5]
- Housing
  - Commercial banks
  - Development banks
  - Other [6]

Memo: Non-regulated financial entities that grant financing by destination sector [7]
- Non-financial companies
- Consumer
- Housing
- Public Sector

TOTAL

GDP

Data as of March 2022.

Note: The heat map shows the percentiles of the distribution of the annual variations of the financing growth rate. The highest percentiles are shown in green and the lowest in red. The color of each indicator or caption is based on the history of each series, which covered from Jan 07 to Mar 22, with the exception of those shown in gray, whose history is not available.
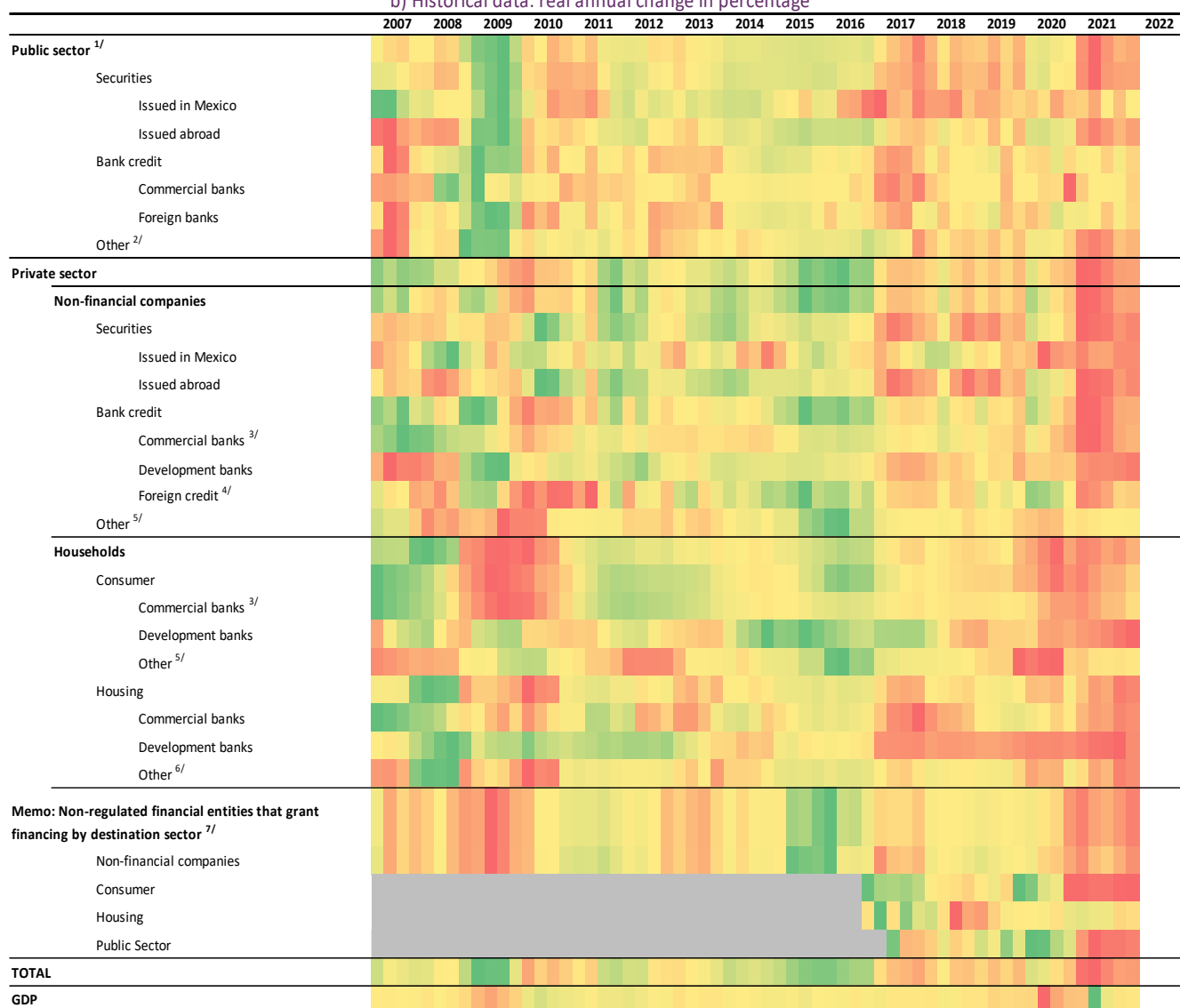
Source: Banco de México (CF 297), CNBV, SHCP, Condusef and BMV.

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, desposit 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., auto), credit granted by listed department stores to their customers and in the case of private non-financial companies, financing from suppliers (listed companies only).

V.2.1. Households

In March 2022, household savings grew slightly faster than indebtedness. This led the financial position of households to reach 42.6% of the GDP, 0.5% higher than the figure published in the previous *Report*. The financial position of households is 6.7 points above its pre-pandemic level (Graph 45).

Graph 45
Financial position of households
Percent of GDP
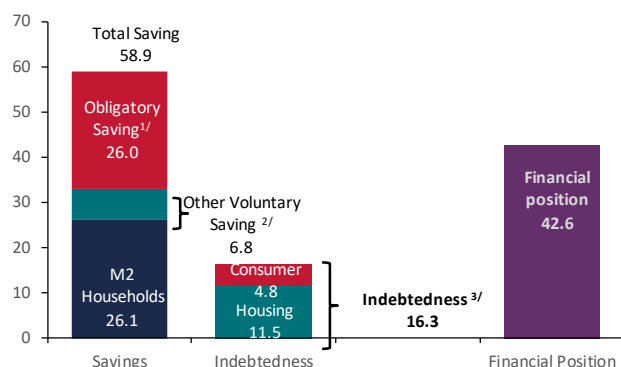
Data as of March 31, 2022

Source: Banco de México

Note: The sum of the items may not match the total due to rounding Figures expressed as a percentage of the average nominal GDP of the last four quarters.

1/ Includes housing and retirement savings funds.

2/ Includes public securities, private securities, securities issued by states, municipalities , OyEs and Fonadin and other banking liabilities held by households.

3/ Includes credit granted by the commercial bank, the development bank, savings companies and popular credit, credit unions and regulated sofomes.

According to a sample of borrowers registered with one of the Credit Information Companies,[15] their total debt balances, at constant prices, have remained at the same levels through March 2022 (Graph 46a). Moreover, the leverage as a proportion of monthly income allocated to the payment of debt has reduced in March 2022 compared to the percentages recorded in previous years, with the greatest levels of leverage being observed in borrowers with lower incomes[16] (Graph 46b).

[15] Estimated as a panel-type sample of Credit Bureau files that have at least one bank loan with historical information of all the loans by the person associated to the file sampled, the information includes the evolution of their balances and their payments due with sample sizes close to 5000, 5000, 16,000 and 19,000 observations for mortgage, auto loans, personal loans and credit cards, respectively. 96% of private loans are granted by the banks that report to the Credit Bureau.

Graph 46
Distribution of leverage of a sample of households

a) Monthly incomes of borrowers with at least one bank loan [1,2]
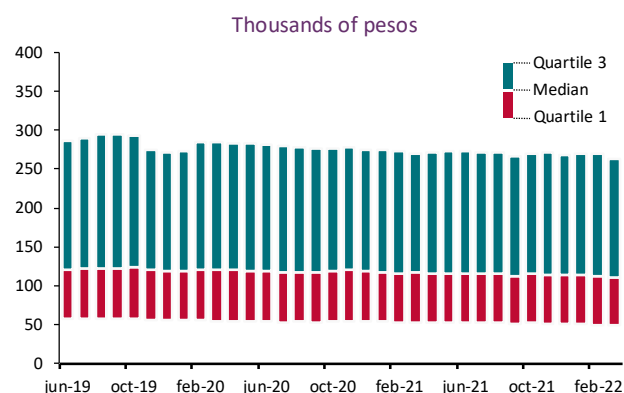
Thousands of pesos

Data as of March 2022

Source: Credit Bureau.

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

2/ Constant prices (March 2022 base).

b) Monthly payments between the monthly income of borrowers with at least one bank loan [1]
Vertical axis: percent of the number of borrowers
Horizontal axis: monthly payments as a percentage of income reported
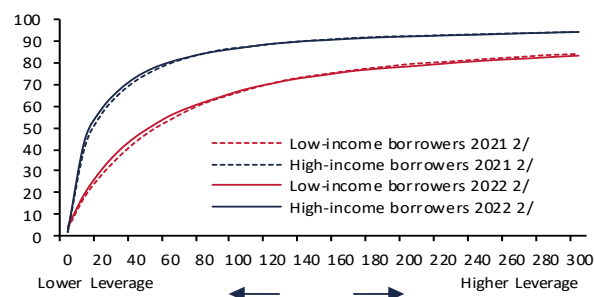
Data as of March 2022

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.

In terms of the borrowers' selection criteria, it has been observed that banking institutions' requirements for the granting of credit has been more flexible for certain employment segments. The average income registered

[16] Income is obtained from regulatory reports. A threshold of 20,000 Mexican pesos was used to separate the higher-earning borrowers from the lower earners, which is an amount close to the median monthly incomes reflected in the files sampled.

for new financial institutions' customers has decreased, both for people working in the public sector and the private sector, after having increased during the health contingency. However, income requirements continue to be high for self-employed workers. With this respect, there seems to be a balance between lower restrictions for the granting of credit and the risks associated with the type of borrower.

Borrowers with consumer loans other than credit cards have maintained an adequate payment pattern in the aggregate since 2019 and even public-sector workers show a tendency to pay amounts higher than those required (Graph 47).

Graph 47
Ratio between payment made and payment demanded on consumer loans other than cards[1]
Multiples
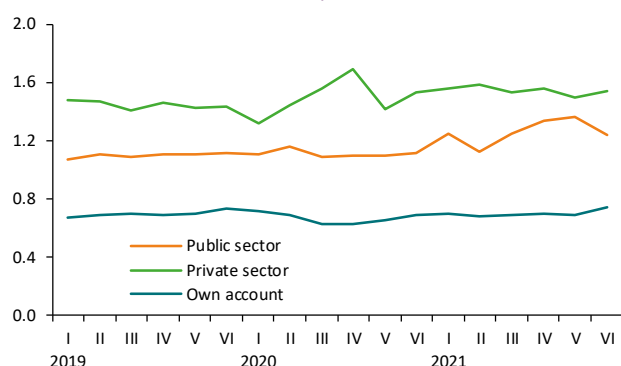
Data as of December 2021
Source: Banco de México
1/ Includes payroll, personal, and auto loans

Moreover, although borrowers with mortgage, personal or payroll loans could have taken advantage of the previous financial conditions to improve the financing cost of their loans, the current conditions may represent a risk for people who have to refinance their obligations and therefore, may translate into a decreased loan payment capacity. In this sense, as is the case with consumer credit other than cards, the income requirements for new mortgage borrowers in the public and private sectors reflected a decrease at the end of 2021. This fall contrasts with the upward trend of income requirements of borrowers that are self-employed, as well as in the evolution of real income of the total of workers in the economy. Thus, commercial

banks are monitoring the risks associated with the granting of mortgage loans.

Consumer Credit

In the period covered by this *Report,* the recovery of consumer credit granted by commercial banks and their subsidiary multi-purpose financial institutions (*sofomes*) continued and even registered positive annual growth for the first time since the onset of the pandemic in practically all its segments. The origination of auto credit is the only one whose portfolio segment has not yet recovered. Although this can be explained mainly by the greater level of economic activity in the period, the lag in originations of auto credit can be mainly explained by the disruptions in the supply chains prevalent in the sector, as well as the increasing prices of new vehicles (Graph 48).

Graph 48
Consumption portfolio of the banking system
Real annual change in percent
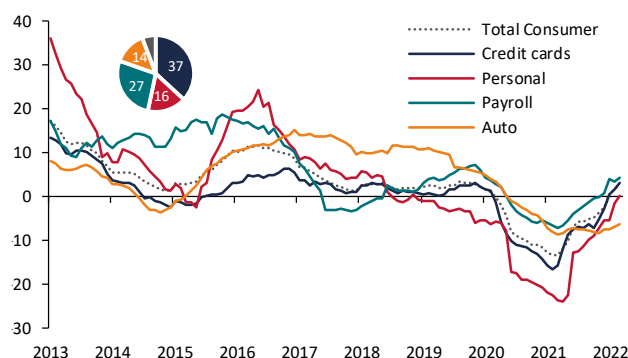
Preliminary data as of March 2022.
Source: CNBV

In this context, the "Best Practices for the Granting of Credit in Mass Transactions of the Mexican Banking Sector Code Model", announced by the Mexican Banks' Association in March 2022 is relevant.[17] The purpose of this Model is to guide and incentivize an improvement in the internal service culture of banks. This Model may act as support of banks' internal policies to ensure that credit products are offered in accordance with clients' needs.

The household leverage ratio of commercial banks' borrowers with consumer loans[18] recorded a shift towards lower levels in its main segments from February 2021 to February 2022 (Graph 49). These

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[17] The "Best Practices for the Granting of Credit in Mass Transactions of the Mexican Banking Sector Code Model" can be consulted at the following link.

[18] Household leverage ratio is measured as a proportion of income allocated to cover the repayments required of all loans registered to a

person 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 loans.

trends may reflect cautionary behavior by households by reducing their indebtedness in the last year, which would currently imply a lower vulnerability in repayments by borrowers in this segment if their income is to be affected.

Graph 49

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
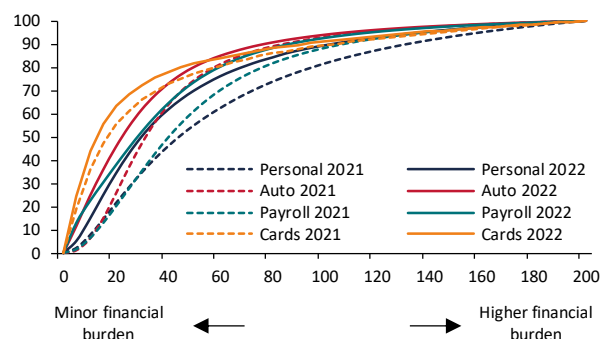
Preliminary data as of February 2022

Source: Banco de México.

In terms of non-performing loan ratio levels in the consumer portfolio of banks and their related multi-purpose financial companies (*sofomes*), it continues with the decline observed from the beginning of 2021 in all their portfolio segments, following the hike registered in the last quarter of 2020.

In March 2022, non-performing loan ratio levels in consumer loans in the banking portfolio are at lower levels than in the months prior to the outbreak of the pandemic for the different segments in the portfolio. The lower credit card non-performing loan ratio level explained by the general reductions in the past-due portfolio as an effect on the application of new international accounting standards (IFRS9) (see Box 5).

Although the decrease in the non-performing loan ratio of banking consumer loans was mainly explained by lower levels of past-due portfolio, it is also explained due to the gradual reactivation of the granting of credit via credit cards, personal and payroll loans. Moreover, the reduction of the past-due portfolio may also be due to lower leverage of borrowers in comparison with the previous year (Graph 50a). It must be pointed out that if the write-offs are included in the non-performing loan ratio through the Adjusted non-performing loan ratio (*Imora*, its acronym in Spanish), it can be observed that

the non-performing loan ratio levels of most portfolios at March 2022 is already below the levels prior to the pandemic, with the exception of auto loans (Graph 50b).

Graph 50

Non-performing loan ratio and adjusted non-performing loan ratio of consumer loan portfolio [1]

a) Non-performing loan ratio in percentage
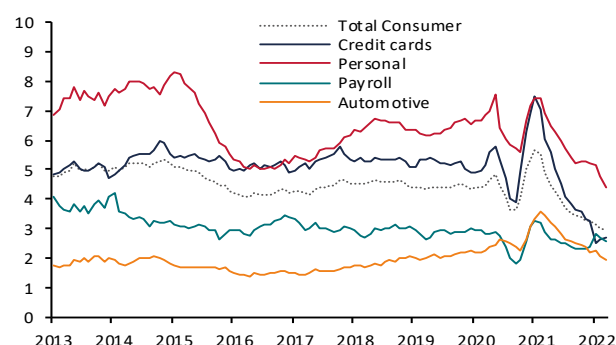
b) Adjusted non-performing loan ratio in percentage
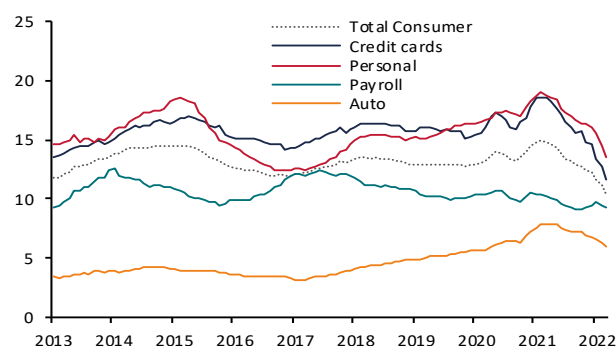
Preliminary data as of March 2022.

Source: CNBV

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

Non-performing loan ratio in the portfolio granted by non-regulated non-banking entities and the Institute for the National Fund for Employee Consumption (*Infonacot*, its acronym in Spanish) remains high and at levels greater than those observed before the pandemic, even though it has remained stable since the last *Report*. Following a slight decrease in the first quarter of the year, regulated entities showed stability in their non-performing loan ratio (Graph 51). Some of these financial intermediaries are the main source of formal financing for vulnerable households; therefore, the prolonged impact on their financial situation may undermine their origination capacity of this type of financing, thus, reducing the sources of credit available to these households.

Graph 51
Default index of consumer loans by type of granting entity
Percent
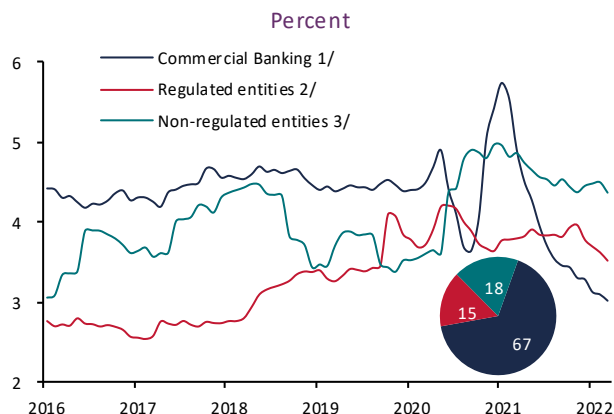
Preliminary data as of March 2022.

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 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 a regulated entity.

Mortgage Loans

At the end of the first quarter of 2022, total mortgage loans were slightly higher relative to the same period of the previous year, but growth has been at a slower pace since the last *Report*. By type of grantor, the rate of growth of the portfolio of the commercial bank and its related multi-purpose financial companies (*sofomes*, its acronym in Spanish) recorded a decrease, although it increased at the margin compared to the end of 2021. Moreover, the current mortgage loan portfolio granted in conjunction by the National Fund for Workers' 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 — registered 28 consecutive months of negative real annual growth rates, whereas the total portfolio accumulated six months in the same situation.

The non-performing loans ratio on bank mortgage loans has been declining since June 2021, after an upward period of a little more than two years. This was a reflection both of the increase in its current portfolio and a reduction in its past-due portfolio (Graph 52).

In terms of new mortgage credit granted by commercial banks, although the proportion of income allocated to the monthly payment (Payment-To-Income or PTI) of mortgage loans and the ratio of the amount of the loan to the value of the property (Loan-To-Value or LTV) have remained at the same levels over recent months (Graph 53), there is evidence of a lower portfolio deterioration in the most recent credit vintages. Additionally, the lower default rates of these vintages partially explains the decrease in past-due portfolio seen in recent months (Graph 54).

Graph 52
Non-performing loan ratio and adjusted non-performing loan ratio on bank mortgage loans [1]
Percent
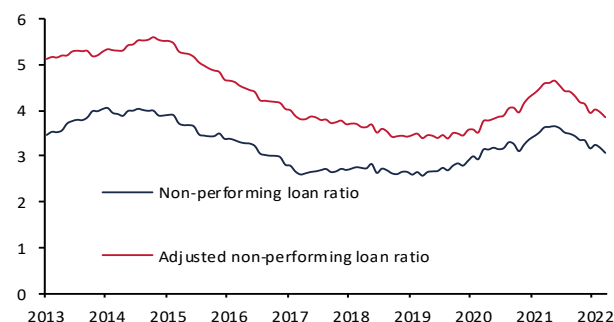
Preliminary data as of March 2022.
Source: CNBV.
1/ Total commercial bank mortgage loans.

Graph 53
Loan-To-Value (LTV) and Payment-To-Income (PTI) of Mortgage Loans [1, 2]
Percent
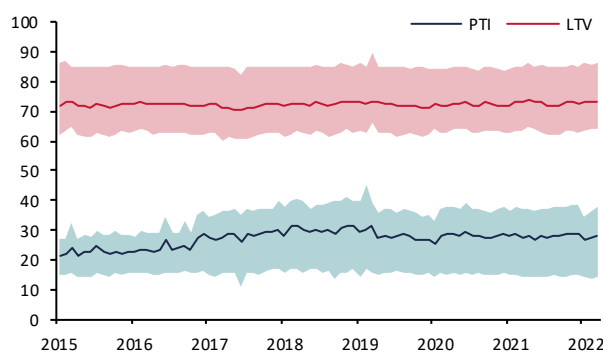
Preliminary data as of March 2022.
Source: CNBV.

1/ Recently- granted commercial bank mortgage loans.

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

Graph 54
Mortgage credit vintage [1, 2]

Vertical axis: Cumulative default rate in percent

Horizontal axis: Months elapsed
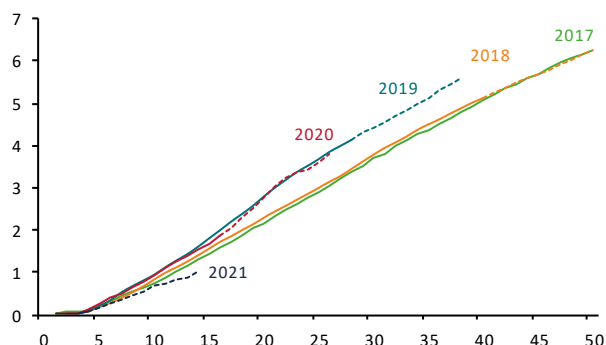
Data as of March 2022
Source: CNBV
1/ Commercial bank mortgage loans.
2/ The dotted lines represent an estimate based on the date of the latest available data.

Graph 55
Non-performing loan ratio of mortgage portfolio
Percent

Preliminary data as of March 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.
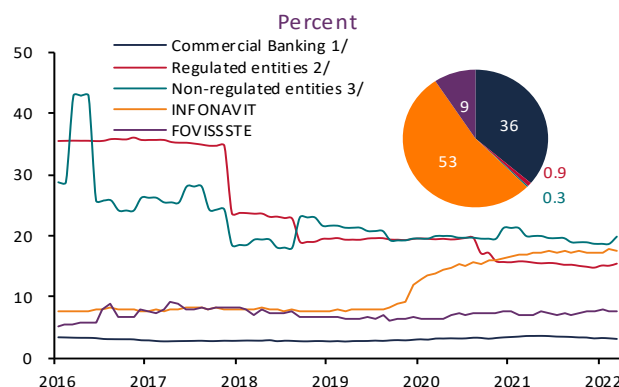2/ Includes the credit portfolios of the development bank and, of non-banking regulated financial entities, such as socaps, sofipos and sofomes regulated for issuing debt.
3/ Includes credit portfolio of non-regulated sofomes.

The non-performing loan ratio in the *Infonavit* mortgage portfolio increased since the last *Report*, recording 17.4% at the end of March 2022, after having recorded its highest level in February (17.7%) since records began (2007, Graph 55).[19] The increase from last September is explained by an increase in the past-due portfolio balance due to the maturity of extensions to loans due to loss of employment by borrowers that implied a reclassification of the current portfolio to past-due portfolio, added to which origination continues to reflect a contraction both in the amount and the number of loans granted since the last *Report*. Moreover, at the first quarter of 2022, the extended portfolio has reflected an annual contraction in real terms for 11 consecutive months, in line with the borrowers' return to work.[20]

Moreover, the non-performing loan ratio of the *Fovissste* mortgage portfolio, following a sustained increase from the last *Report*, decreased at the margin to reach a level of 7.6% at the end of the first quarter of 2022, just 0.6 percentage points higher than the level recorded in the last *Report*. This can be explained because the balance of the current portfolio decreased while the balance of the past-due portfolio increased — recording the highest figure since June 2021— at the end of March. The foregoing, despite the greater employment stability of the *Fovissste* borrowers compared to the *Infonavit* borrowers. The non-performing loan ratio of other financial intermediaries that grant mortgage loans, although with a very small total participation, remain at high levels at the first quarter of 2022, although with an increase at the margin.

[19] It must be borne in mind that, in December 2019, the Federal Housing Fund (*Infonavit*) reclassified loans in the current portfolio to past-due portfolio in a significant amount, and that increased the non-performing loan ratio, but without making the retroactive correction over time. In this manner, the levels of the non-performing loan ratio that would be consistent with this classification for the period previous to December 2019 is unknown.

[20] In the same vein, the portfolio in the ordinary amortization scheme – which is amortized through employer withholdings – continues with its annual positive growth in real terms from June 2021. Also, the portfolio in the special amortization scheme, – which records current or past due loans to unemployed borrowers who must repay them personally – continues to contract from August 2021 with the transfer of the portfolio to the Institute's ordinary amortization scheme (see the *Infonavit* section).

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Box 2: Comparison of co-financed and traditional mortgages: leverage and defaults

I. Introduction

For individuals who do not have formal employment or do not have the savings for a down payment, or lack liquidity, these factors can be limiting in their access to credit or result in obtaining credit at lower amounts or higher interest rates. These debt constraints are often one of the biggest barriers to homeownership. Mortgage products that alleviate such restrictions through increased borrowing capacity can expand credit affordability. However, increased leverage could increase the risk of individual default and, under certain conditions, could have negative implications for financial stability. This Box analyzes the effect of a product that allows you to increase the borrowing capacity of your customers.

II. Characteristics of *Cofinavit*

Cofinavit was introduced in 2004 and became the main co-financed mortgage scheme between a housing institute and banks in Mexico. Co-financing schemes seek to improve the profitability of housing funds by targeting clients eligible for a bank loan. In order to differentiate itself from traditional loans, *Cofinavit* promises to increase the creditworthiness and value of the house purchased and reduce the down payment. Achieving these goals will depend on the level of indebtedness that the bank is willing to approve, and on the households' preferences for liquidity versus better housing.

The financial product *Cofinavit* consists of two credits: one granted by the bank and the other smaller amount granted by *Infonavit*, contracted and administered separately but with the same house as collateral. The entire balance of the *Infonavit* housing sub-account is used to cover the down payment and, occasionally, other origination costs as well.[1] The *Infonavit* credit and, after its cancellation, part of the bank credit are paid through future employer contributions and salary discounts that are compulsory. In traditional mortgages, the bank provides all the financing, and the borrower covers

the down payment and the installments with private savings and their disposable income.

Given these characteristics, what factors promote the demand for *Cofinavit* versus that of a traditional mortgage? Colonnello and Dal Borgo (2022) (CDB hereinafter) provide evidence for a sample of credits originated between June 2016 and June 2019, granted to formal private sector employees, i.e., eligible for both types of mortgages. CBDs are more likely to choose a co-financed credit among younger, lower-income (i.e., with fewer savings, and therefore with greater debt constraints) and married or co-creditors (with the possibility of combining the savings of the *Infonavit* housing sub-accounts). More importantly, there is no self-selection of borrowers based on their risk profile.

III. Conditions of origin and performance

Taking traditional bank mortgages as a benchmark, CDB (2022) assesses the origination conditions of *Cofinavit* mortgages, as well as their performance, using traditional bank mortgages as a benchmark. Since these products are not randomly assigned, they adopt the coarsened exact matching methodology developed by Iacus, King, and Porro (2012). This approach makes it possible to reduce the bias of the estimates due to observable factors that influence the choice of products and the absence of overlap in their characteristics. Non-observable factors could still skew the estimates, so it is not possible to give them a causal interpretation.

The evidence shows that the total volume of credit increases by 15% on average under the *Cofinavit* scheme compared with traditional bank mortgages. It also indicates that the borrowers do not increase the value of the property acquired under *Cofinavit* but reduce the down payment by 7.6 percentage points (pp). Given the average down payment of 24% on a traditional mortgage, it could be a substantial reduction. Moreover, since borrowers can use their savings in the housing sub-account to cover the down

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[1] As of 2021, the sum of the two credits and the balance of the housing sub-account can no longer exceed the home value.

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payment, the portion of it paid with private savings is reduced by 15.9 pp. The differences in the cost of loans are smaller: *Cofinavit*'s combined interest rate is just 36 basis points (bp) higher than that of traditional loans. This premium is due to the *Infonavit* rate, since the rate of banks in co-financed loans is slightly lower (by 21 bp) than in traditional ones.

Despite the higher leverage - a lower down payment has a higher combined *loan-to-value* – CDB (2022) finds no evidence that *Cofinavit* credits result in higher delinquency over horizons of two, three, and four years. While the origination conditions are potentially riskier, their effect is offset by several factors that reduce the risk of default due to liquidity, such as a lower requirement of private savings to cover the down payment and payments, the *Infonavit* payment system through direct discounts, and a longer period to resume the payment of the *Infonavit* credit in case of unemployment.

IV. Concluding remarks

Evidence suggests that co-financing is an effective tool for expanding access to credit and thus easing debt constraints. Its limited impact on the value of the property suggests a lower latent demand for better housing than for greater liquidity when taking out a mortgage. These effects are more pronounced among low-income borrowers. It is worth mentioning that an expansion of leverage could have more negative consequences for credit risk in the absence of housing institutes and their operating rules. The fact that the credit is granted to workers with formal employment, with direct payroll discounts, and with a housing account are elements that could contribute to mitigate risk.

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Colonel, S., and M. Dal Borgo (2022): *"Raising Household Leverage: Evidence from Co-financed Mortgages"*. Working paper available at: http://dx.doi.org/10.2139/ssrn.3857163

Iacus, S. M., G. King, and G. Porro (2012): *"Causal inference without balance checking: Coarsened exact matching"*. Political Analysis 20:1–24.

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V.2.2.   Private non-financial companies

Total financing to the private non-financial companies in the country continues to reflect a real annual contraction both in its external and internal components, the latter descending in the six consecutive quarters, although its rate of contraction has moderated. At the end of the first quarter of 2022, external financing also decreased at a lower annual rate, compared to the previous quarter, mainly due to the lower issue of bonds on international markets (Graph 56). During the same period, internal financing to companies showed a decrease both in the debt issue portion in the local market and in direct internal credit, although at a lower rate compared to the same quarter of last year.

Graph 56

Total financing to non-financial companies[1/]

Real annual change in percent
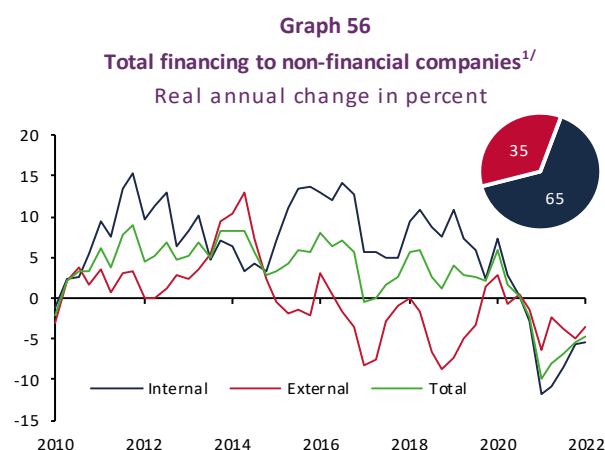
Data as of March 2022.

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 country's commercial banks are the main grantors of financing to companies and at the first quarter of 2022 it had showed decreases for seven consecutive quarters, although lower each time. During the first quarter of 2022, issuance of new loans to larger firms stabilized, registering a deceleration of the reduction of its portfolio, thus resulting in a milder deterioration of their portfolio size levels compared to that of smaller firms (Graph 57).
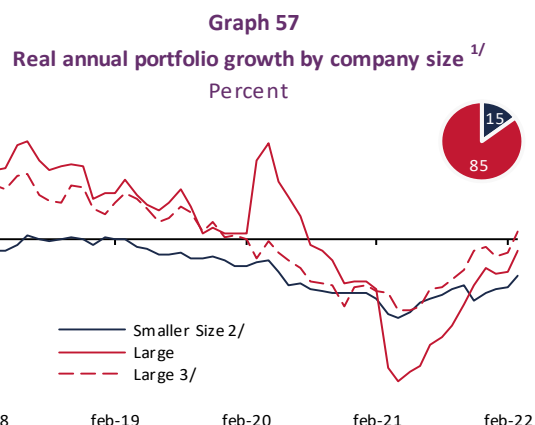
Graph 57

Real annual portfolio growth by company size [1/]

Percent

Data as of March 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.

3/ Large companies excluding those that had a monthly increase in their balances of greater than 15% in March 2020, which represent 30% of the balance and 16% of large companies' borrowers at the most-recent date.

The risks faced by companies include the decrease of their earnings and a relative increase the in-debt service, particularly of variable-rate loans. The foregoing is in a context in which the evolution of economic activity may still represent a factor of uncertainty in business sector planning. This uncertainty may contribute to inhibiting both recovery and the demand for credit, in particular in those sectors with lower rates of recovery.

Thus, the earnings reported by large private non-financial corporate borrowers showed a reduction in 2021 in real terms. Moreover, small corporate borrowers' earnings reflected reductions in 2020 and 2021 in real terms. At the same time, a decrease in the non-performing loan ratio of corporate loans has been observed during 2021, accompanied by an increase in large companies' payment ratio (payments made relative to payments-due). In this context, this ratio for smaller companies has stabilized after displaying a new fall at the beginning of 2021 (Graph 58).

Graph 58

Ratio between payment made and payment demanded of bank loans of private non-financial companies [1]

Percent
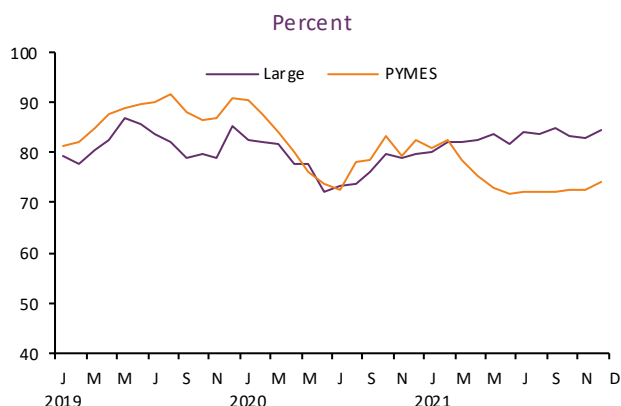
Data as of December 2021

Source: CNBV

1/ 3-month moving average

With regard to non-performing loan ratio level of the corporate portfolio, in the case of the commercial banks' portfolio, although in the last quarter of 2021, there was a marginal reduction in their non-performing loan ratio of the portfolio granted to companies, with the enactment of the IFRS9 accounting standards in January 2022,[21] its non-performing loan ratio increased considerably to its highest level in the last six years (Graph 59). This effect only occurred in loans granted to large companies, with an almost-zero effect for smaller companies[22] since the latter continued to decrease their non-performing loan ratio levels from the second quarter of 2021 (Graph 60).

Graph 59

Non-performing ratio of corporate loans portfolio
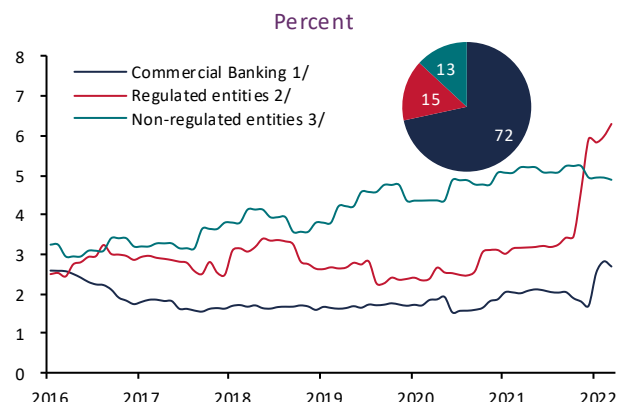
Percent

Preliminary data as of March 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 socaps, sofipos, credit unions and sofomes regulates to issue debt. The recent behavior of this series is due exclusively to the development bank.

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.

Graph 60

Non-performing ratio by company size [1]
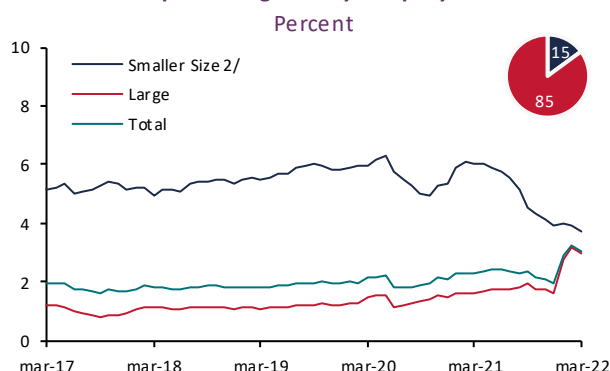
Percent

Preliminary data as of March 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.

It is also emphasized that the non-performing loan ratio levels of credit portfolios granted to companies by non-banking financial intermediaries remain relatively stable as a whole. Nevertheless, the recovery of credit portfolios continues to be irregular: some types of

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21 Please refer to Box 5 for further detail on the IFRS9 standard.

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

entities have managed to reduce their levels of non-performing loan ratios, whereas others, on the contrary, have increased them at the margin. Moreover, only some of them have been impacted from January 2022 by the application of the new IFRS9 accounting standards.

Listed private non-financial companies[23]

The gradual recovery process of the economy has contributed, in general, to an improvement in the generation of operating flows (EBITDA, earnings before interest, taxes, depreciation, and amortization) of listed private non-financial companies in the first quarter of 2022. The foregoing continues to favor the performance of the indebtedness and debt service capacity indicators in such a manner that they are lower than those that prevailed at the beginning of the pandemic (Graph 61). In addition, companies' debt balances have remained stable, although their relative composition has changed towards long-term debt issues and short-term bank loans. Also, the spreads paid for their debt issues on international markets and for their bank loans reflect increases at the margin in line with the increase in reference rates. The cash and equivalent reserve of companies' liquidity remain high and increased in comparison with the last quarter of 2021. Moreover, the cash flows allocated by listed companies' fixed investments has reduced in the last two quarters despite the recovery of companies' operating flows (Graph 62).

Graph 61
Listed private non-financial companies' indebtedness and debt service [1]
Left axis: Multiples of EBITDA
Right axis: Percent of EBITDA
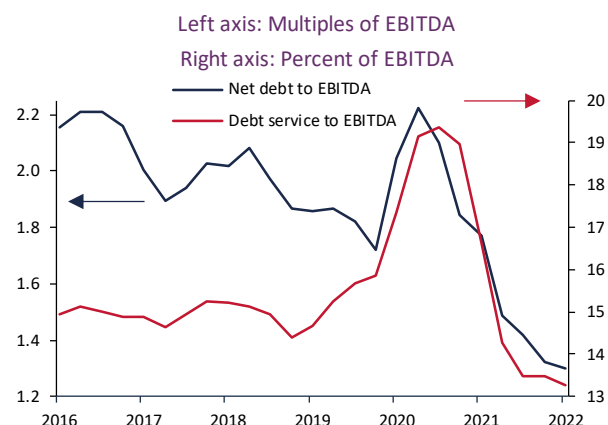
Data as of March 2022
Source: BMV and BIVA

1/ EBITDA refers to income before financing, taxes, depreciation and amortization.

Graph 62
Investment Expenditure (CAPEX) and EBITDA of Private-Non-Financial Companies Not Listed on the Mexican Stock Exchange
Percent of total assets
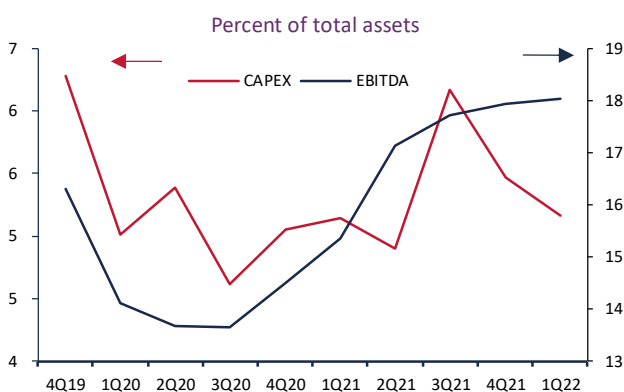
Data as of March 2022
Source: BMV

V.2.3. Public Sector

V.2.3.1. Federal Government

The Public Sector balance showed a deficit at year-end 2021, as planned in the 2021 Economic Package. Within this balance, the Public Sector budget income and expenditure were greater than foreseen in the Federal Income Law (LIF, its acronym in Spanish) 2021 and in the Federal Expenditure Budget (PEF, its acronym in Spanish) 2021, respectively. Thus, at year-end 2021, the Public

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[23] Includes information on companies listed on the Mexican Stock Exchange (BMV, its acronym in Spanish) and Institutional Securities Exchange (BIVA, its acronym in Spanish).

Sector Financial Requirements (*RFSP,* its acronym in Spanish) recorded a deficit of 996.6 billion Mexican pesos, equivalent to 3.8% of the GDP (Graph 63). Moreover, the Historical Public Sector Financial Requirement Balance (*SHRFSP*, its acronym in Spanish) was 13.1 trillion Mexican pesos, equivalent to 50.1% of the GDP (Graph 64).

Graph 63
Public sector financial requirements [1/]
Percent of GDP
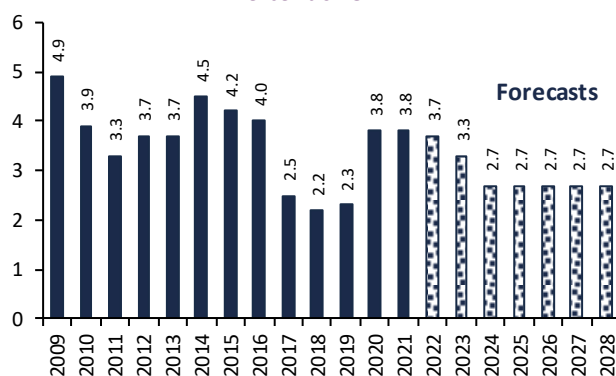
Data as of April 2022
Source: SHCP

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

Graph 64
Historical balance of public sector financing requirements [1/]
Percent of GDP
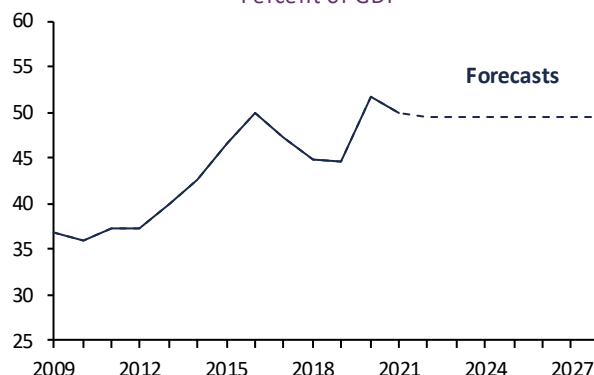
Data as of April 2022
Source: SHCP

1/ Corresponds to the historical balance of RFSP without a Banco de México operating surplus. The data observed for 2009-2021 is taken from the Report on the Economic Situation, Public Finances and Public Debt for the first quarter of 2022 and for the other years the estimate of the General Economic Policy Pre-Criteria for the year 2023 is used.

In the first quarter of 2022, the Public Sector balance showed a deficit lower than expected in the 2022 Economic Package. In this balance, budgetary income was above the amounts planned in the *LIF* 2022 and budgetary expense was lower than foreseen in the *PEF* 2022. Moreover, the RFSP recorded a deficit of 112.8 billion Mexican pesos and the *SHRFSP* amounted to 13.1 trillion Mexican pesos.[24]

At year-end of 2022, the Federal Government anticipates a public balance deficit of 3.1% of the GDP. To achieve it, the budgetary income in 2022 was foreseen as being greater than the amount provided in the LIF 2022 at 328.7 billion Mexican pesos and that budgetary expense in 2022 greater than the amount established in the *PEF* 2022 at 336.2 billion Mexican pesos. Thus, the RFSP is estimated to represent 3.7% of the GDP and that the *SHRFSP* is expected to equal 49.6% of GDP (Graph 63 and Graph 64).

V.2.3.2. State owned companies

Pemex

At the end of the first quarter of 2022, Pemex's quarterly earnings reflected a significant increase, which contrasted with the loss observed in the previous quarter, placing it as the best for any first quarter since

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[24] At the end of April, the Public Sector balance was -13.1 billion Mexican pesos. Budgetary income was 2274.4 billion Mexican pesos and the net total expenditure was 2,294.1 billion Mexican pesos. Moreover, the RFSP was -54.5 billion Mexican pesos, whereas the SHRFSP was 13,

125.3 billion Mexican pesos. Please consult "Public Finances and Public Debt information, January-April 2022". https://www.finanzaspublicas.hacienda.gob.mx/work/models/Finanzas_Publicas/docs/congreso/fp/2022/FP_202204.pdf

2011. Pemex's earnings increased due to greater oil exports caused by the hike effect in its price as a result of the world geopolitical situation, as well as greater domestic fuel sales, whereas the cost of sales and the financial expense reduced (Graph 65).

Graph 65

Pemex's total income and price of Mexican crude oil

Left axis: thousands of million Mexican Pesos

Right axis: US Dollars per barrel

Data as of March 2022 for income and at June 10, 2022, for crude oil price.

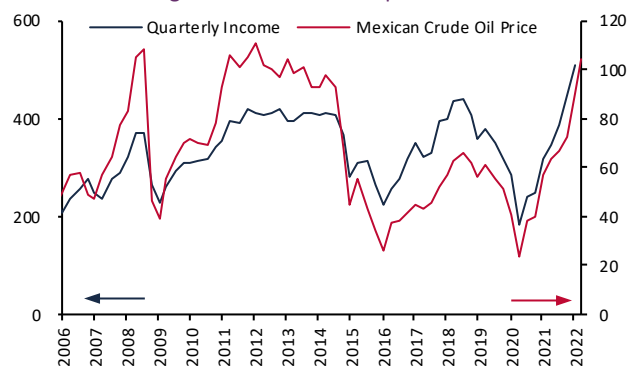Source: Banco de México

At the same date, Pemex's total debt balances decreased by 3% compared to the previous quarter, mainly due to the maturities and international debt payments. Moreover, the debt due in the next 12 months increased in the last quarter, mainly due to a greater balance in short-term bank loans, which represents a third of the company's debt. The amount of short-term debt is at its highest level since 2011. In this regard, at the beginning of December 2021, the company announced a series of measures coordinated with the Mexican government to improve its financial position, the implementation of which concluded in January 2022.[25] More recently, at the end of May, Pemex announced an invoice refinancing operation, in which suppliers and contractors will be able to exchange commercial liabilities for Pemex's financial liabilities in the amount of 2 billion US dollars.[26]

Moreover, the investment made by the company during the first quarter increased notably. The company's credit ratings granted by different rating agencies remain unchanged, maintaining the investment grade with two of the four agencies.[27]

The commercial banks' exposure to Pemex reflected an increase during the second semester of 2021, both in its

direct exposures and through the exposures to the suppliers of this state-owned company. In this context, in the last six months of 2021, the non-performing loan ratio of Pemex's suppliers showed a downward trend and sits at less than 2%.

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

At the end of March 2022, the *CFE* recorded quarterly earnings that contrast with the loss observed in the previous quarter, which can be explained to a great extent by lower operating and financial costs. Moreover, the company's debt balances increased by 8% compared to the previous quarter, which can be explained by increases in financing with the domestic banking system, debt issued abroad and financial leasing. Nevertheless, the *CFE* maintains sufficient liquidity levels to face its short-term financial obligations.

Additionally, at the beginning of April 2022, the rating agency S&P downgraded the company's individual credit profile from "B+" to "B" due to expectations of greater restrictions on its margins over the next 12 to 24 months in the context of high fuel prices. It must be mentioned that the company's overall rating is equal to the sovereign rating due to its close link to it, which has also not been downgraded.

In the second half-year of 2021, the commercial banks' exposure to the *CFE* reduced, insofar as the exposure to the private electricity sector has remained relatively stable, after having shown a downward trend from March 2020. Additionally, at the end of 2021, *CFE*'s suppliers' non-performing loan ratio recorded an increase to place it at levels below 1%.

In this context, development banks continue to be a strong source of financing for the electricity sector. Indeed, in December 2021, financing from development banks represented almost 8% of credit financing to the *CFE* and 18% of the loans granted to the suppliers of this state-owned productive company. At the same time, it granted approximately 53% of banking and multi-purpose financing companies' financing to the private electricity generation and transmission sector.

V.2.3.3. States

The sub-national governments have maintained financing structures mainly with long-term profiles,

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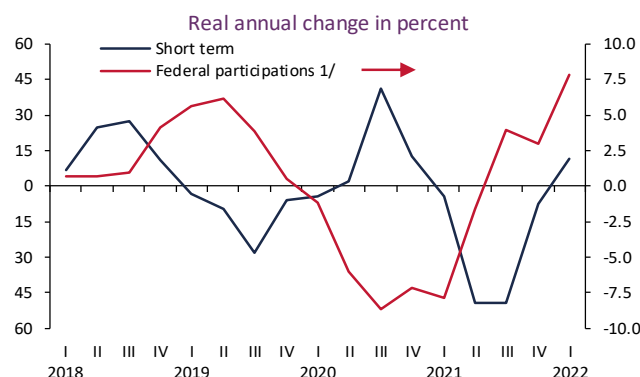[25] See Quarterly Report, October-December 2021 (page 61).

[26] See Pemex Press Release 32 of May 31, 2022.

[27] It maintains investment grade with S&P and HR Ratings.

which limits the risks resulting from the variable nature of Federal income participations, as well as being in line with the legal nature and aspects of their financing.[28] In particular, a reduction in the growth of short-term debt was observed during 2021, a trend that was interrupted in the first quarter of 2022, while at the same time maintaining the relative increase in Federal participations (Graph 66). The development banks continue to increase its participation in the financing granted to the state governments (Graph 67).

Graph 66
Short-term debt and federal participations of subnational governments
Real annual change in percent

Data as of March 2022

Source: SHCP

1/ Considers the monthly cash flows per share accumulated over a 12-month period.

Graph 67
Financing of subnational governments
Right axis: Balances in billions of pesos
Left axis: Percent
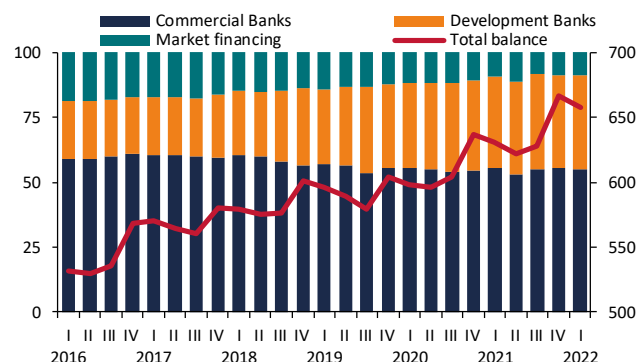
Data as of first quarter 2022

Source: SHCP

Added to the foregoing, the financing conditions through a competitive scheme to obtain funds by the state governments have allowed the states to access credit at better relative costs associated to new financing, which allows them to overcome possible pressures deriving from more expensive financing (Graph 68).

Graph 68
Weighted average rate of bank credit offers to state governments [1]
Percent
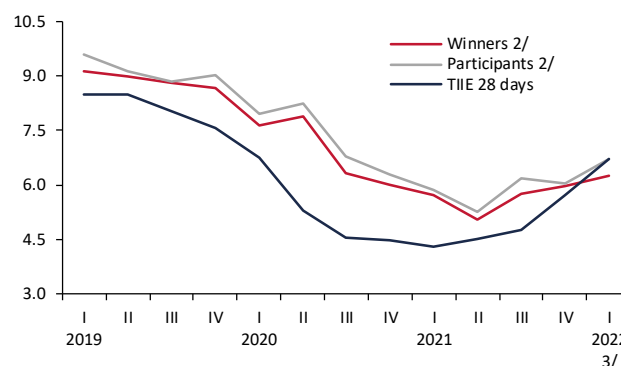
Data as of first quarter 2022

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/ The winning bid rate is weighted with the amount allocated, whereas the participating bid rate is weighted with the amount offered.

3/ With information published as of May 31, 2022 from state governments, no competitive processes are observed in March 2022.

In this manner, rating agencies have maintained stable their risk perception with regard to the financial health of the subnational governments to the extent that they consider that they have maintained or implemented prudent financial policies. In this context, only one state's credit rating was downgraded, mainly as a result of the recurring late payments of short-term loans. However, its long-term debt service has been maintained with prompt payments.[29]

Thus, according to the information state governments' indebtedness alerts information system of the *SHCP*, at the first quarter of 2022, the number of states that recorded sustainable levels of debt have remained relatively stable, although in the margin, the number of state governments that had debt levels in observation decreased slightly and one state reflected a high level of

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[28] The Federal States' and their Municipalities' Financial Discipline Law stipulates that state governments may only contract long-term obligations or financing when the funds are allocated to productive public investments or to financing or restructures. Moreover, the Law

stipulates that these governments' short-term debt may not exceed 6% of the total income approved by the Income Law of each Federal state.

[29] Fitch Rating Action Commentary "Fitch Downgrades the State of Durango's Rating to 'RD(mex)' from 'BB(mex)'" October 25, 2021.

indebtedness (Graph 69a and Figure 1a). Notwithstanding that the great majority of municipal governments registered in the SHCP's indebtedness alerts system have maintained sustainable levels of debt, at the end of 2021, an increase was observed in the number of municipalities whose debt levels are in observation (Graph 69b and Figure 1b).

Graph 69
Debt Sustainability of subnational governments [1]
Number of entities
a) Municipal governments, quaterly information [2]

b) Municipal governments, half-yearly Information
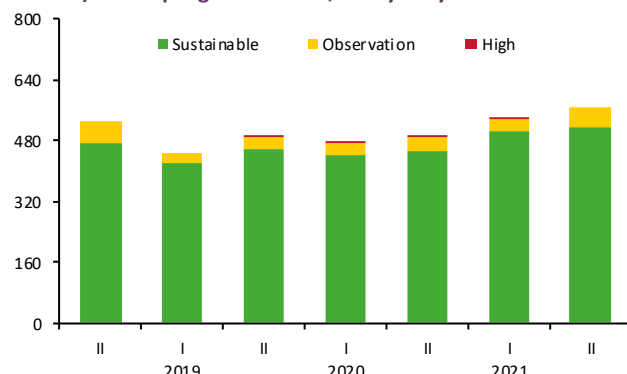
Data as of March 2022 for state governments, and as of December 2021 for municipal governments.

Source: SHCP

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

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

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

2021-1	2022-1

SUSTAINABLE DEBT

26 entities [1]	24 entities [1,2]

DEBT UNDER OBSERVATION

Coahuila, Chihuahua, Durango, Nuevo León and Quintana Roo	Coahuila, Colima, Chihuahua, Nuevo León, and Quintana Roo

HIGH INDEBTEDNESS

No entity	Durango

b) Municipal governments, semiannual information

2020-2	2021-2

SUSTAINABLE INDEBTEDNESS

452 municipalities [3]	515 municipalities [3]

DEBT UNDER OBSERVATION

39 municipalities	52 municipalities
Baja California Sur, Coahuila, Durango (4), Jalisco (3), México (5), Morelos (3), Nayarit, Nuevo León (2), Puebla (2), Quintana Roo (3), San Luis Potosí, Sonora (6), Tlaxcala, Veracruz (6)	Baja California Sur (2), Coahuila (4), Durango (6), Guerrero, Jalisco (4), México (3), Michoacán (3), Morelos (7), Nayarit (2), Nuevo León, Puebla, Quintana Roo (3), San Luis Potosí, Sonora (5), Tlaxcala, Veracruz (7), Zacatecas

HIGH INDEBTEDNESS

1 municipality	No municipality
Agua Prieta (Sonora)	--

Data as of first quarter 2022 for state governments, and as of second half of 2021 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 San Luis Potosi is not rated for the first quarter of 2022.

3/ As of the second half of 2020, 296 municipalities did not submit information, while as of the second half of 2021, 205 municipalities did not submit information and 16 entities were not qualified.

In this respect, the state and municipal governments' debt levels have remained at in sustainable conditions.

V.2.4. Foreign sector and capital flows

Capital flows allow emerging economies to attract foreign financing, which increases funds available and can therefore increase investment, the accumulation of capital and foster long-term growth. Capital flows also enable certain sectors with foreign financing, such as the public sector, to use this financing and thus reduce their use of internal bank credit. In the fourth quarter of 2021 and the first of 2022, capital flows recorded outflows and inflows lower than their historical averages, respectively, thus continuing the dynamic that, in general, had been seen from the beginning of the pandemic. Therefore, compared with its historical behavior, during that period the public sector substituted very little foreign financing for internal banking credit. Notwithstanding the foregoing, the funds available for other sectors, such as *pymes* (which showed better performance than in the first stage of the pandemic) did not reduce so much compared to previous quarters (Graph 70).

Graph 70
Contribution of net capital flows to real domestic financing growth of larger companies and the Public Sector [1]
Percentage points
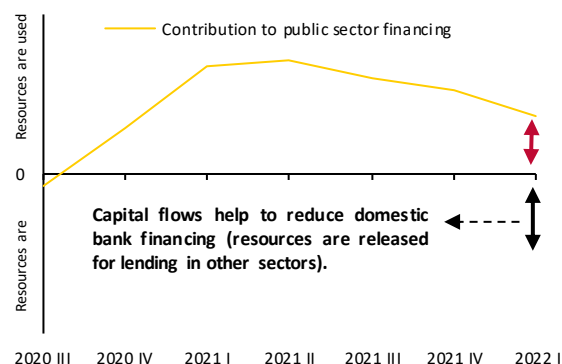
Data as of first quarter 2022
Source: Banco de México, and CNBV
1/ The contribution of capital flows to financing is obtained as the difference between the annual growth rate of real financing and the rate that would have been observed in the absence of these flows. The latter rate is obtained by assuming, in a vector autoregressive (VAR) model, that the coefficients associated with capital flows and the shocks to them are equal to zero. The model uses data from Q1 2010 to Q1 2022 and a moving window of 31 quarters. Capital flows are defined as the sum of net direct, portfolio and other investment flows

Box 3: Remittances, retail deposits and gender

I. Introduction

Remittances generate a range of benefits for the economies that receive them. This analysis studies the relationship between remittances and retail deposit-taking of the banking system in Mexico due to the importance of these resources and their possible effect on the financial system. In particular, the Box shows the relationship between changes in the receipt of remittances and demand deposits for the different municipalities of the country, distinguishing between natural and legal persons, as well as between women and men. In low- and middle-income countries, remittances complement domestic savings by expanding consumption and investment possibilities. These resources have been found to reduce poverty, child labor and school dropout, as well as foster economic growth.[1] Remittances can also have a positive impact on the financial system through alternative channels.

Evidence suggests that remittances help families meet their debt obligations, thus decreasing delinquency and contributing to financial stability.[2] Remittances increase the resources available in the localities that receive them, helping to pay current expenses.[3] In addition, if some of these resources remain in recipients' bank accounts or are used to transact with banked people, remittances could increase retail uptake. In particular, they could increase deposits from local banks on a more permanent basis.

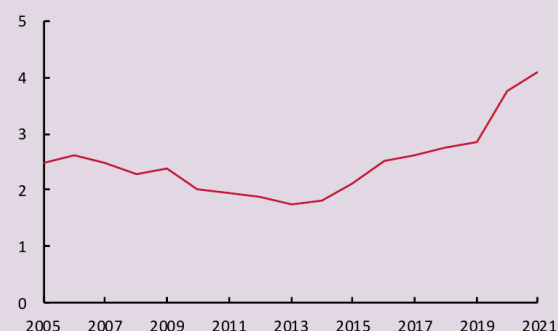In Mexico, remittances have been increasing as a percentage of GDP since 2014, increasingly becoming an important source of resources for Mexican families (Graph1).

Graph 1
Remittances as percent of GDP [1/]
Percent

Data as of year-end 2021
Source: Banco de México, and INEGI
1/ Ratio of accumulated remittances per year divided by GDP

II. Effect of remittances on retail deposits uptake

This analysis uses information on the balances of demand deposits from the financial inclusion database of the National Banking and Securities Commission (*CNBV,* its acronym in Spanish). The advantage of this database is that it disaggregates deposits by gender and the legal personality of the account holder. This information is complemented by remittances data disaggregated at the municipal level from the Banco de Mexico.

The relationship between a municipality's remittances and the balance in its demand deposits is estimated, using a panel data model for the period from the first quarter of 2018 to the third quarter of 2021 and the following statistical specification:

$$Balance\ per\ capita_{mqa} = \gamma_{sqa} + \omega_{mq} + t_{ml}$$

$$+\beta\ Remittances\ per\ capita_{mqa} + \epsilon_{mqa}$$

where $Balance\ per\ capita_{mqa}$ is the balance of the deposits per capita of municipality "*m*" in quarter "*q*" of year "*a*"; γ_{sqa} are state-time fixed effects; ω_{mq} are municipality-quarter fixed effects ; t_{ml} are linear trends of the municipalities; and

---

[1] See Adams Jr. (2011), Page and Plaza (2006), Cuadros-Menaca and Gaduh (2020), Alcaraz et al. (2012) and Clemens and McKenzie (2018).

[2] In relation to the effect of remittances on domestic credit and, in general, on the financial system in the country, evidence found by Heres, Jaume, Téllez and Tobal (2021) indicates that remittances complement the outstanding debt balances. In addition, they emphasize that the effects of remittances can vary between different types of consumer credit, either

because they act as a complement or substitute for the same credit. For example, remittances could increase access to credit with better credit conditions, while they could avoid late payment of credit with worse conditions.

[3] Like buying food, clothing, and rent. See BBVA (2020).

$Remittances\ per\ capita_{mqa}$ are the remittances per capita of municipality "m" in quarter "q" of year "a".[4]

Once these fixed effects have been incorporated, the strategy is based on relating the changes in remittances per capita of a municipality over time with the changes in deposits of the same municipality during the same period. In addition, time fixed effects controlled for other factors that affect the deposits of all municipalities in the same state and that, if not included, could bias the results of the estimate.[5] In this regression, β captures the increase in the per capita balance associated with the increase in remittances.

III. Results

The results show that more remittances are associated with higher deposits uptake. The municipalities of the Mexican Republic where remittances increase the most are those where deposits of immediate enforceability also increase the most (Table 1, Column (1)).

In particular, an increase of 1 peso in remittances per inhabitant is related to an increase of 13 cents in deposits per inhabitant of local banks. This may be due to an increase in deposits from the recipients of remittances or from other banked persons with whom they negotiate.

Table 1

Effect of remittances on bank accounts

	Balance per capita in bank accounts				
	By legal personality of the account holder			Natural persons, by gender of the account holder	
	Total	**Legal persons**	**Natural persons**	**Women**	**Men**
	-1	-2	-3	-4	-5
Remittances per capita	0.13***	-0.01	0.12***	0.07***	0.05***
P-value	0.003	0.776	0	0	0.006
R²	0.98	0.94	0.98	0.98	0.98

Source: Banco de México and *CNBV*

Note: Standard errors grouped at the municipality level are used.

*** indicates that the coefficient is significant at the 1% level.

The results also suggest that the effects are differentiated, depending on the legal personality of the account holder (Table 1, Columns (2) and (3)). Also, they show that remittances are not related to the deposits of legal persons, but to the deposits of natural persons. Since natural persons are precisely the recipients of these resources, this result emphasizes the importance of increasing the deposits of direct recipients.

Also, the results suggest that, among natural persons, the effects are differentiated depending on the gender of the account holder (Table 1, Columns (4) and (5)). Hence, remittances have a stronger relationship with demand deposits of women than of men. This may be because women represent a higher proportion of the direct recipients of remittances.[6]

Given that women in Mexico have a smaller proportion of the deposit balance than men (Graph 2), the result also suggests that, in the absence of remittances, the gender gap in this regard would be even greater.

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[4] The balances of demand deposits correspond to the amount observed at the end of the quarter, while for remittances the average observed during the corresponding quarter is used. Balances and remittances are used in real terms. To obtain both variables in per capita terms, the totals are divided among the municipal population. The bank accounts used are all transactional accounts, distinguishing by the legal personality of the holder (i.e., natural or legal person) obtained from the financial inclusion data (*CNBV*).

[5] In particular, a deterioration in a municipality's economic activity could increase demand for remittances, whereas economic contraction would reduce deposit-taking by financial institutions.

[6] In Mexico, women receive 71.7 per cent of the number of remittance transfers, which represents 67.4 per cent of the total amount of remittances. In contrast, men receive only 27.7% of remittances with 31.9% of the balance. Source: *CEMLA* (2015).

Graph 2
Demand deposits per genre
Percent
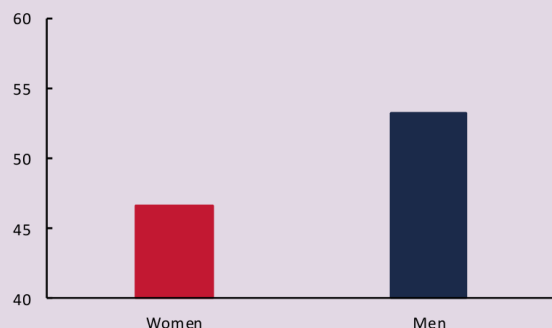
Data as of September 2021
Source: CNBV: Financial inclusion database, genre indicators

IV. Final considerations

The results indicate that an increase in remittances in a municipality is associated with an increase in deposits of local banks. The ratio is stronger for the deposits of direct recipients of remittances, that is, for those of natural persons and women.

This suggests that greater inclusion in the banking system may enhance the beneficial effect of remittances on retail deposits. In particular, a higher percentage of the Mexican population with bank accounts could increase the proportion of remittances that local banks would receive in the form of retail funding. In addition, because the ratio is stronger for women, their share of the deposits' balance could be higher, which could end up narrowing the gender gap.

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The current account showed a surplus of 0.9% of the GDP in the last quarter of 2021 and a deficit of 1.9% of the GDP in the first quarter of 2022 (Graph 71a). Within this account, there was a change in the commercial non-oil trade balance with a surplus in the fourth quarter of 2021, whereas the balance decreased in the first quarter of 2022. A deficit was observed in the commercial oil trade balance in both quarters, although balance decreased in the first quarter of 2022 (Graph 71b). The financial account recorded capital outflows in the fourth quarter of 2021 for net loans to the rest of the world and inflows for net indebtedness in the first quarter of 2022.

Information from the Institute of International Finance (IIF) indicates that the portfolio flows of non-residents showed greater outflows than in other EMES from September to November 2021, but that this behavior was reverted with greater inflows into Mexico in December. Mexico's portfolio flows resumed their downward trend in 2022 but began to recover in March and April 2022 (Graph 72).

Graph 72
Cumulative non-resident portfolio flows to Mexico, and EMEs[1]
Percentage of 2019 GDP

Data as of April 2022
Source: Institute of International Finance (IIF)

[1] The measure of portfolio flows of emerging economies included those countries considered in the monetary policy and international financial markets sections of the Quarterly Report January-March 2021 for which information was available in the IIF. This measure was obtained by adding the flows of all these economies and dividing the total by the sum of their GDP in 2019. The flows were accumulated from September 2021.

Graph 71
Current account and trade balance
a) Current account
Percent of GDP
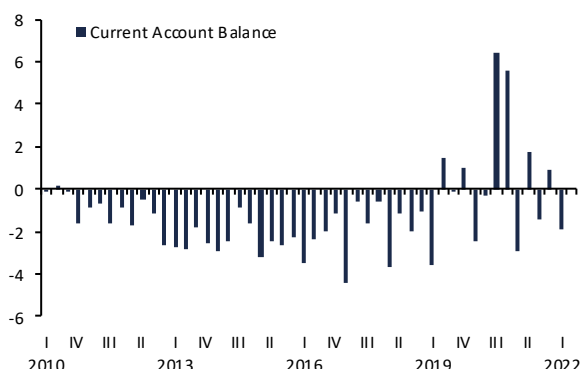
Current Account and Trade Balance
b) Trade balance
Millions of dollars

Data as of first quarter 2022
Source: Banco de México, and INEGI

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Box 4: Global financial conditions, risk premiums and external financing

I. Introduction

This Box shows how a reduction in the balance sheet of the Federal Reserve could reduce the capitalization of US financial intermediaries and, therefore, their willingness to lend. This may reduce the supply of external financing in emerging market economies (EMEs).

In EMEs, where savings rates tend to be lower than in advanced economies, external financing is more important for economic growth. This financing allows EMEs to obtain credit at lower costs and complement domestic savings, which expands their consumption and investment possibilities.[1] In addition, external financing is of particular importance in EMEs for sectors that find it difficult to finance themselves in the domestic market.[2]

The ability of an economy to finance itself abroad depends on both idiosyncratic characteristics and global factors. EMEs with a strong macro-financial framework tend to generate more confidence among international investors, pay lower risk premiums and thus face lower financing costs.[3] Likewise, global factors that decrease risk appetite tend to increase the cost of credit for EMEs.

One of the global factors that is crucial for the supply of financing and the stability of the global financial system is monetary conditions in the United States, which are largely determined by the Federal Reserve (FED).[4] Thus, the policy announced by the FED to reduce the size of its balance sheet may have effects on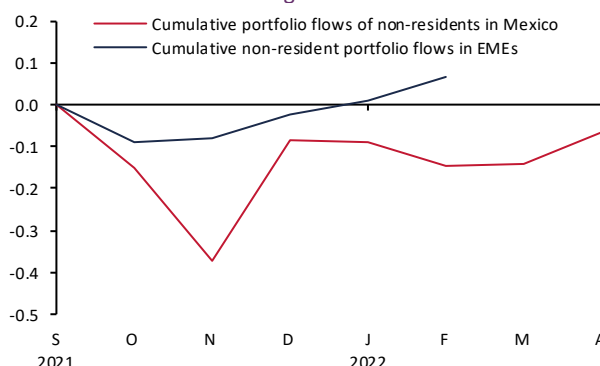 the supply of global financing and, in particular, on the ability of EMEs to finance themselves at lower costs abroad.[5]

The analysis of the impact of a reduction in the balance sheet of the FED is relevant for Mexico. The dynamics of external financing in Mexico, in fact, is tied to that of the growth rate of Gross Domestic Product (GDP) (as shown in Graph 1). Therefore, this box analyzes the potential effects of a change in the balance sheet of the FED on both Mexico's external financing and the growth rate of private investment.

Graph 1
External funding contribution to GDP [1/]
Percent
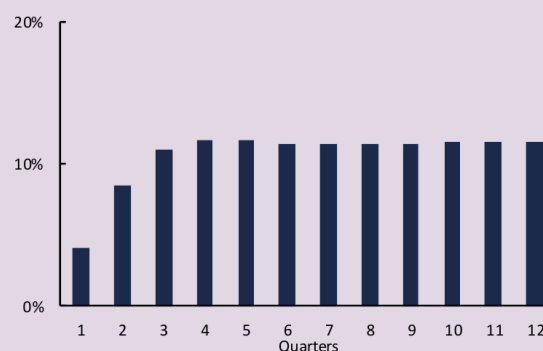
Data as of third quarter of 2021
Source: Banco de México
1/ It is the decomposition of the variance of GDP calculated from the estimation of a VAR model. The decomposition of the variance indicates the percentage of the variance of the forecast error in GDP that is explained by an exogenous shock to external financing. The variables considered are GDP, inflation, the 28-day Cetes rate, and external and internal financing. The generalized identification method of Pesaran and Shin (1998) is used to identify crashes. The number of lags was chosen according to the Bayesian Information Criterion (BIC). The sample covers from the second quarter of 2002 to the third quarter of 2021.

II. Balance sheet, willingness to lend and risk taking

The Federal Reserve buys and sells both corporate and government securities. This can cause the price of these securities to change, resulting in capital gains or losses for US financial intermediaries that hold them on their balance sheets. For example, the sale

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[1] Lower savings rates and institutions that are less prepared to face asymmetric information problems imply that, in general, the financing conditions provided by the domestic market are better in advanced economies than in EMEs. See D'Amato, Sangiácomo and Tobal (2020).

[2] In addition to being able to improve the conditions for sectors with direct access to external credit, this financing can contribute to the granting of credit to other sectors in the domestic market. This is because external financing can increase the available resources of domestic financial intermediaries and release resources that could be destined to sectors with direct access.

[3] In this case, the evidence suggests that there is a relationship between the sovereign risk premium (CDS) and the cost of financing in the domestic market. See box 5 "Relationship

between sovereign CDS and financing costs in the national banking sector", in Financial Stability Report, December 2020.

[4] The economic literature has documented that the monetary policy actions of this Central Institute are related to the returns of assets perceived as less risky, risk premiums, indebtedness and leverage, as well as the offer of external financing in other countries. See Box 1 of the Financial Stability Report, Second Half of 2020.

[5] In its most recent monetary policy statement, in May 2022, this Central Institute emphasized that it would begin to reduce asset holdings on its balance sheet from June this year.

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of government securities can cause a decline in the capital of US financial intermediaries (see evidence supporting the financial accelerator mechanism).[6]

This decline may reduce their willingness to lend and take risk through different channels. With a decrease in capitalization, financial intermediaries may need to reduce their credit supply in order to meet target capitalization levels. In addition, they can be perceived as riskier, which could increase their borrowing cost. Higher borrowing costs can then also decrease their credit supply and risk-taking.

This, in turn, leads US financial intermediaries to charge a higher risk premium. For this reason, this Box uses the US bond excess premium measure developed by Gilchrist and Zakrajšek (2012) (Excess Bond Premium, EBP) to capture this dynamics.[7] The EBP captures the part of the risk premium that is not associated with borrower characteristics or macroeconomic conditions, but reflects changes in the willingness to lend and take risk of financial intermediaries due to changes in their balance sheet.[8] The measure has been used in various studies, including notes and research from the Federal Reserve, to analyze the impact of private financing on US macroeconomic variables.

III. Model and results

To estimate the statistical model, we obtained the EBP measure of Gilchrist and Zakrajsek (2012) from the database of the Federal Reserve's technical notes[9], the CEMBI corporate bond index for Mexico from Bloomberg, US macroeconomic variables from FRED, Mexico's private investment from *INEGI*, and two components of external financing to the non-financial private sector from the Banco de Mexico's database. These two components are bonds issued by Mexican companies in international financial markets and foreign credit, which refers to the

financing provided directly by banks and non-banking institutions abroad. Data frequency is quarterly and the sample covers the period from 2002 to 2021. With this information, the following vector auto-regression model (VAR) is estimated[10]:

$$Y_t = \alpha + \beta\, Y_{t-1} + B\, \varepsilon_t$$

where Y_t is a vector that includes, for the US, consumption, investment, GDP and GDP deflator growth rates, the federal funds rate and the excess bond premium (EBP) and, for Mexico, the CEMBI corporate spread index and the growth rates of bonds issued abroad, of external credit to the non-financial private sector and of gross fixed capital formation.

Graph 2 shows the effect of an increase in the excess bond premium, which reflects a lesser willingness to lend and take risks on the part of US financial intermediaries. This increase generates higher risk premiums (the CEMBI spread increases) and higher financing costs in Mexico, as well as a reduction in bonds issued abroad (Graph 2a and Graph 2b).[11] These effects occur in the same quarter in which the willingness to lend and take risks of financial intermediaries decreases.

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[6] See, for example, Gertler and Kiyotaki (2015) and Gerali et al (2010), which extend the financial accelerator models of Bernanke et al (1999) and Kiyotaki and Moore (1997) to the banking sector.

[7] Gilchrist and Zakrajšek (2012) show that EBP is correlated with the average CDS of financial intermediaries that can trade government bonds directly with the New York Federal Reserve. These intermediaries are particularly important because of their size and ability to flexibly adjust their leverage over the business cycle.

[8] In particular, EBP is the residual of a regression of the yield differential between corporate and government bonds against macroeconomic determinants and at the issuing company level.

[9] See https://www.federalreserve.gov/econres/notes/feds-notes/updating-the-recession-risk-and-the-excess-bond-premium-20161006.htm.

[10] In particular, an extended version of Gilchrist and Zakrajšek's (2012) self-regressive vector model is used, adding Mexican macroeconomic and financial variables. Following these authors, an excess premium shock is identified using a Cholesky decomposition, under the assumption that this does not have a contemporary impact on consumption, investment, GDP, and inflation in the USA, but could have it on the USA 10-year rate, the CEMBI, the placement of bonds abroad, foreign credit, and private investment in Mexico. A lag was selected with the Bayesian Information Criteria.

[11] A shock of 22.27 basis points to the excess premium is considered, equivalent to the change observed between December 2021 and February 2022. This period corresponds to the increase in the excess premium when the FED announced the possibility of reducing the asset purchase scheme in December 2021.

Graph 2

Reactions to an increase in excess premium from USA banks[1]

a) Companies
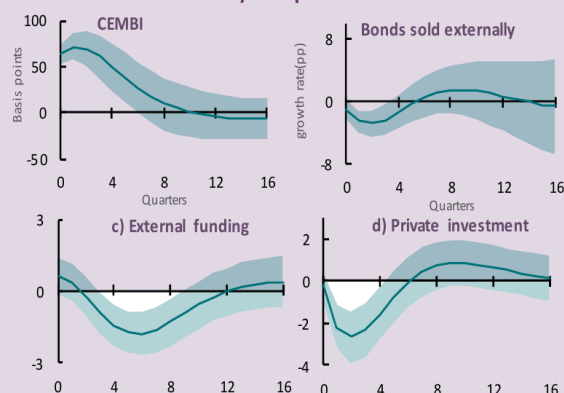
Source: Federal Reserve, Banco de México, INEGI, and Markit IHS

1/ The orthogonalized impulse-response functions and their respective 90% confidence intervals are shown. Cholesky reduction is used to identify clashes. The push is on the excess premium on US corporate bonds. The magnitude of this impulse is equivalent to the change in excess premium that occurred between December 2021 and February 2022 (an increase of 22.27 basis points).

In addition, over time, lesser willingness to lend and risk taking ends up reducing Mexico's external credit, that is, the financing that the non-financial private sector obtains directly from banks and non-banking institutions abroad (Graph 2c). This reduction in external credit as well as the higher risk premium and reduction in bonds issued abroad, end up reducing private investment in Mexico (Graph 2d).

Final considerations

The results of this Box suggest that, by affecting the balance sheet of US financial intermediaries, a reduction in the balance sheet of the FED may increase risk premiums in Mexico and reduce the supply of external financing. In particular, such a policy could slow down the bond placements of Mexican companies abroad and external credit.

A decrease in the FED's balance sheet, combined with the reduced risk appetite caused by the conflict between Russia and Ukraine, may further tighten global financial conditions. It is crucial that Mexico works to keep the trust of international investors in order to mitigate the effects of this complicated global situation on its external financing conditions. Additionally, it is important for the country to prioritize investment in order to minimize the negative impact of reduced external financing.

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The (debit) net international investments position of Mexico increased in the fourth quarter of 2021 compared to the same quarter of the previous year.[30] On the foreign assets side, investments of residents in Mexico increased by 7.2%, and on the liabilities side, investments from abroad increased by 9.7% (Graph 73).

Graph 73
International investment position [1/]
Billions of dollars
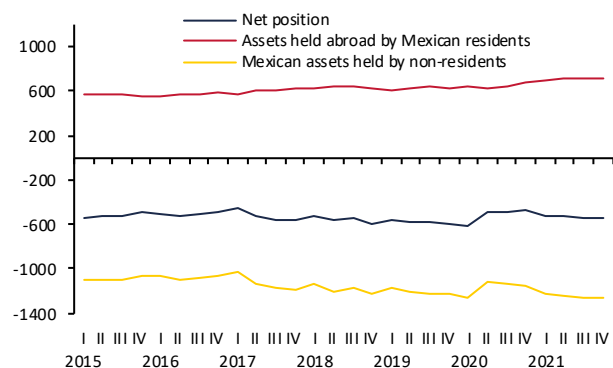
Data as of fourth quarter 2021
Source: Banco de México

1/ Refers to the international investment position at the end of the period. The net international investment position is obtained by subtracting liabilities from assets and then adding the international derivatives position. The sign of Mexican liabilities of non-residents is changed in terms of how it is measured in the international investment position statistics of the balance of payments to obtain the calculation of the country's net creditor position.

Recently, a series of worldwide risks have emerged, such as the military conflict between Russia and Ukraine and a more accelerated normalization process of the advanced economies' monetary policies. If these risks intensify, the risk appetites of international investors may be reduced and thus imply increases in the costs of external financing and/or reduce their availability for the EMEs. In this context, Mexico needs to try to continue maintaining a solid macrofinancial framework. This, among other things, will allow it to distinguish itself from other EMEs and minimize the global impacts on the costs and availability of its external financing.

V.3. Institutions

Table 3 illustrates the detail of the financial intermediaries that are part of the financial system in Mexico, their participation in the total of assets and their growth, as well as the concentrations of the main participants in each sector. It is noteworthy that total assets decreased for several of the financial intermediaries, such as broker-dealers, development

institutions and multi-purpose financial companies (*sofomes*).

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[30] The net international investment position refers to the difference between the balances of the country's external financial assets and liabilities at a specific moment.

Table 3
Institutions that form part of the Mexican financial system

	Number of entities [1]	Participation of total assets in		Annual growth rate of assets in real terms (%)	Concentration of the five largest entities (%) [2]
		in the financial system	in GDP (%)		
	1Q22	1Q22	1Q22	1Q22	1Q22
Commercial banks[3]	50	44.8	42.9	-0.5	69
Siefores (Retirement Fund Managers) [4][5]	118 (10)	19.6	18.8	1.0	75
Investment funds (operators) [6]	618 (30)	10.6	10.1	-1.4	66
Development institutions [7]	9	9.6	9.2	-6.4	89
Insurance and Bonds	112	7.8	7.5	1.2	42
Broker-dealers	35	3.6	3.5	-7.0	61
Regulated Sofomes [8]	29	0.9	0.9	-7.0	69
Non-regulated Sofomes [9]	1,052	1.9	1.9	-9.5	27
Savings and Loan Cooperatives (socaps)	153	0.8	0.8	2.2	54
Popular Finance Corporations (sofipos)	36	0.1	0.1	0.6	66
Credit Unions	76	0.2	0.2	-5.0	49
Memo: Infonavit, Fovissste and Infonacot	*3*	*8.4*	*8.1*	*2.2*	*n/a*

Preliminary data as of March 2022.

Source: CNBV, CNSF, CONSAR, and CONDUSEF

1/ Refers to the number of entities effectively in operation and may differ from the number of entities authorized to operate.

2/ The five entities with the greatest concentration of assets within their respective sector are:
   Commercial Bank: BBVA, Santander, Banorte, Citibanamex and HSBC.
   Retirement Fund Managers: XXI Banorte, Profuturo, Citibanamex, SURA and Coppel.
   Investment funds 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 SHF.
   Insurance and Bonds: Grupo Nacional Provincial, Pensiones Banorte, Citibanamex Seguros, Seguros BBVA Bancomer and Seguros Monterrey New York Life.
   Stockbrokers: Banorte-Ixe, Goldman Sachs, Finamex, Inversora Bursátil and Intercam.
   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 Financiera Inspira.
   Socaps: Caja Popular Mexicana, Caja de Ahorro de los Telefonistas, Caja Morelia Valladolid, Coopdesarrollo and Creano.
   Sofipos: Libertad Servicios Financieros, Consejo de Asistencia al Microemprendedor (CAME), Te Creemos, Financiera Sustentable and Crediclub.
   Credit Unions: FICEIN, Unión de Crédito para la Contaduría Pública Unión de Crédito Industrial, Unión de Crédito Agricultores de Cuauhtémoc, Agropecuario de la Laguna and Unión Crédito Alpura.

3/ The total assets of the commercial bank include those of the regulated Sofomes that consolidate with the respective bank, if they are subsidiaries.

4/ The set of pension funds managed by the 10 Retirement Fund Managers amounts to 118 Siefores.

5/ An increase in the number of Siefores has been observed since January 2020 due to the Siefores' new Investment System based on Generational Funds, in accordance with the modifications to the rules issued by the Consar on December 13, 2019. Please see press release in the following link. http://www.dof.gob.mx/nota_detalle.php?codigo=5581034&fecha=05/12/2019

6/ The investment funds operators (30) manage a total of 618 investment funds.

7/ Includes the development bank and development funds (FIRA, FOVI and Fifomi).

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

9/ The data referring to the number of non-regulated sofomes is taken from the Commission's Registry - RECO (Condusef). Thedata refer to the total credit portfolio granted by the entities and reported to the Condusef. The figures refer to the total credit portfolio granted by the entities and reported to the Condusef. The credit portfolios of non-regulated Sofomes that only grant credit to related or affiliated entities are not considered on their not being credit brokers in the strictest sense.

V.3.1. Commercial banking

Faced with the risks that emerged due to the economic contraction generated by the COVID-19 pandemic, commercial banks reconfigured their balance, which has been maintained in view of the fact that the economic situation still represents a factor of uncertainty that may be limiting the scope of recovery of the credit portfolio.

Thus, commercial bank's assets stabilized at the beginning of 2022, after a reduction starting in 2020. This behavior partly reflected the improved performance shown in the credit portfolio from the end of 2021.

As part of the balance reconfiguration, the commercial bank's funding has been focused on shorter-term resources, which have a more volatile nature. In particular, between September 2021 and March 2022, demand deposits continued with the upward trend shown starting in March 2020, driven to a great extent by large depositors. Moreover, although term deposits have stabilized, no sustained recovery has been recorded, as a result of the stagnation of deposits by small investors.

The possible risk arising from a decrease in banking revenue has remained in check. In particular, the conditions faced by the banks have allowed the financial margin to remain relatively stable, and in the first months of 2022, increase in relation to the level observed in 2021. Indeed, although interest expense has shown an increase between September 2021 and March 2022 as a reflection of greater funding costs, this trend is accompanied by greater interest income of the credit portfolio.

The implementation of regulatory changes by the CNBV in order to adopt the best international practices regarding accounting criteria, brought with it the possibility that institutions reclassify their portfolio should there be elements that indicate a greater level of risk than that resulting from the previous criteria. This is reflected in adjustments in certain financial indicators, such as the non-performing loan index of the credit portfolio, without this implying a deterioration of the conditions of stability of the financial system (See Box 5).[31]

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[31] The modifications introduced in the accounting criteria as part of the adoption process of the international IFRS9 standard adjust, among other aspects, the classification of the credit portfolio according to the perception of risk and the level of deterioration of loans, as well as the constitution of reserves relative to the remaining terms of the obligations that present certain deterioration.

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Box 5: Adoption of IFRS9 Accounting Criteria

I. Introduction

One of the problems identified during the Global Financial Crisis was the potentially insufficient and late recognition of credit losses as envisaged in the current accounting standards. In particular, it was identified that a reserve model based on incurred losses delayed the timely recognition of the risks of the credit portfolio until its materialization, so that said, reserves did not adequately reflect the true risk of the portfolio, generating procyclicality. Also, some of the assets of financial institutions were recorded at nominal value and therefore did not reflect prevailing market price conditions. In response, the G20 agreed in April 2009, as part of the measures taken to strengthen the global financial system, that the various international accounting associations, in coordination with regulatory and supervisory authorities, should develop an agenda to improve valuation and reserve standards, seeking a common framework of high-quality accounting standards.[1]

II. Main elements of the IFRS9

The above initiatives resulted in a new version of the International Financial Reporting Standards (IFRS). Thus, on July 24, 2014, the International Accounting Standards Board (IASB) issued the final version of the IFRS9 standard "Financial Instruments", which contemplated its application from January 1, 2018.[2] The main topics addressed by this standard include:

i) The classification of the credit portfolio in stages, according to the level of risk and impairment of the same.[3]
ii) The calculation of reserves under an expected loss approach, which considers both the full life of the instrument and the stage of impairment.[4,5]

iii) Criteria are established for the classification and valuation of certain financial instruments that may entail an increase in the volume of financial instruments valued at fair value, depending on the associated business model.[6]
iv) Other topics are included, such as the review of the hedge accounting record.

III. IFRS9 in Mexico

In March 2020, the National Banking and Securities Commission (CNBV) issued amendments to the regulations applicable to banking institutions in order to incorporate adjustments to the accounting criteria aligned with the international standard IFRS9, which would enter into force on January 1, 2021.[7] In December 2020, derived from the reduction in operational capacity and human resources in the face of the health measures adopted by the COVID-19 contingency, as well as the economic impacts that banking institutions may have, the CNBV postponed its adoption by one year, until January 2022.[8] Likewise, other types of institutions, such as general warehouses of deposit, regulated sofomes, brokerage houses and exchange houses began in January 2022 the application of accounting criteria aligned with the IFRS9 Standard. It should be noted that this standard had already been implemented during 2021 in other jurisdictions, including: Australia, France, Spain, Poland and South Africa.[9]

Thus, in terms of its implementation, the accounting criteria issued by the CNBV, including the latest amendments published in December 2021, contemplate:[10]

1. Classification of the portfolio in three stages, which depend on the level of impairment of the credits. In general terms, stage 1 incorporates those credits with less than 30 days of delay,

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[1] G20 Leaders' statement, London Summit (2009).

[2] IASB (2014)

[3] The Impairment stage refers to the classification of the portfolio based on the level of credit risk.

[4] The expected loss represents the amount that, on average, could be lost over a certain time horizon as a result of the non-payment of credit obligations.

[5] The full life of a credit is the period from the date of rating of the portfolio to the theoretical maturity date of a credit.

[6] Fair value refers to the price of an asset or liability determined by the market.

[7] DOF (2020a).

[8] DOF (2020b).

[9] Caruso et al. (2021) mention that, according to the survey carried out at the beginning of 2020, 53 out of 91 jurisdictions, of which they had responded, already declared to have adopted the IFRS standard 9.

[10] DOF (2021).

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stage 2 includes those with a delay of between 30 and 89 days, while stage 3 corresponds to those credits with 90 days or more of delay. In the case of the credit card portfolio, the number of days of non-payment was increased from 60 to 90 to be classified as stage 3 (previously overdue portfolio), which would tend to decrease the number and amount of credits previously classified as overdue portfolio.

2. Additionally, if institutions have some element to determine that a loan should be classified at a stage of greater impairment, they may do so using their own criteria, which may include subjective factors such as actual or expected significant changes in the borrower's operating results, and adverse changes in the economic environment. In this way, the incentives to prudently assess the risks of your portfolio are increased.

3. In the case of the commercial portfolio, the possibility of reclassifying it to lower levels of impairment was incorporated under certain conditions. It is worth mentioning that this possibility does not apply to the retail portfolio, given the reduced availability of information and other elements that allow an adequate assessment of its economic conditions.

IV. Impact on financial indicators

With the entry into force of the amendments to the accounting criteria in January 2022, the financial institutions that so decided, carried out a reclassification of their credit portfolio to stages of greater impairment, in order to better reflect the possible risks of it. Thus, there was an increase in the corporate portfolio with a greater deterioration as a result of the application of this reclassification, which resulted in an increase in the non-performing ratio. However, this result does not necessarily reflect a higher level of default by companies, but rather a better recognition of the risk of such a portfolio. In this way, this increase is expected to represent a one-time change in the level of delinquency in the business sector, but not in its trend, so it does not represent a change in the risk perception of the financial system. In fact, in February and March 2022 there was a decrease in the amount of business loans compared to the level observed in January of the

same year (Graph 1a). On the other hand, although the non-performing ratio of consumer and housing loans did not show significant changes in the first months of 2022 (Figure 1b), the non-performing ratio of credits granted by credit cards showed a decrease, as the number of days late to be classified in the stage with the greatest deterioration increased.

Thus, as a reflection of the better recognition of the risk associated with the credit portfolio, consolidated multiple banking increased the preventive reserves associated with said portfolio, in particular with regard to business and consumer loans.

Graph 1
Non-performing loan ratio for commercial banks [1]
Por ciento

a) Business   b) Housing and Consumption
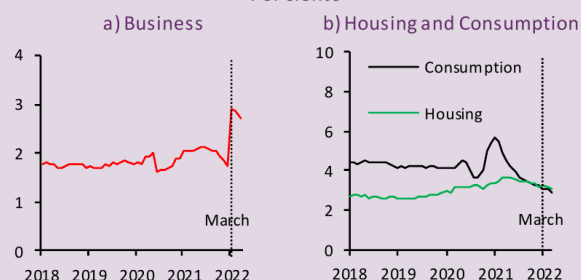
[1] The dotted line indicates the adoption date of the IFRS9 standard in January 2022

V. Final considerations

The implementation of the IFRS9 standard represents a profound change in the accounting criteria that are applied in the Mexican financial system. While this has entailed significant adjustments in the accounting of the institutions, this effort is aimed at strengthening the stability of the financial system by better recognizing the possible risks of the credit portfolio and other financial instruments whose classification and measurement will depend on the contractual cash flows and the business model within which the asset is held, such as the securities portfolio, thus motivating the establishment of more prudent levels in the preventive reserves associated with the credit portfolio by the institutions.

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https://www.dof.gob.mx/2020/SHCP/Resolución_Instituciones_Credito.pdf

Solvency

Commercial banks have registered an adequate level of capitalization, which has enabled them to face possible risks arising from the current situation. Thus, from September 2021 to March 2022, commercial banks' level of capitalization registered an increase greater than the one in its risk assets. Increases in Tier 1 capital were observed within net capital as a result of the dynamism of the capital provided by the institutions and, to a lesser extent, in Additional Tier 1 capital, insofar as Tier 2 capital showed a reduction (Graph 74).

Graph 74
**Structure of banks' Capital Adequacy Ratio (CAR)** [1]
Percent
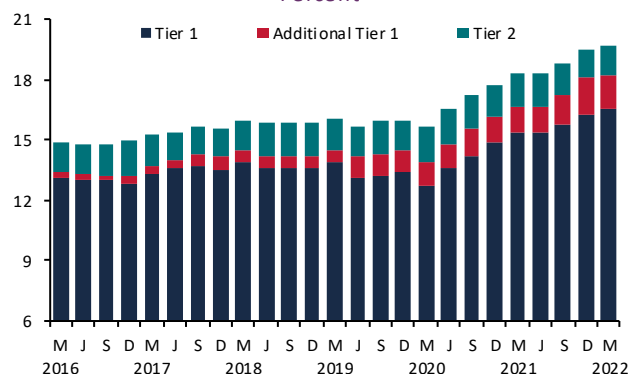
Data as of March 2022

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.

Moreover, the expansions observed in the requirement for market risk and operating risk resulted in the hike in total assets subject to risk, given that the requirement for credit risk showed a decrease (Graph 75). In this context, in 2021, the weighting factors used to determine the capital requirements applicable to consumer micro, small and medium-sized business and mortgage loans were modified. These changes were Incorporated ahead of the recommendations provided in the Basel III international standard, which are scheduled to take general effect in January 2023.

Graph 75
Risk-Weighted Assets [1]
Trillions of pesos
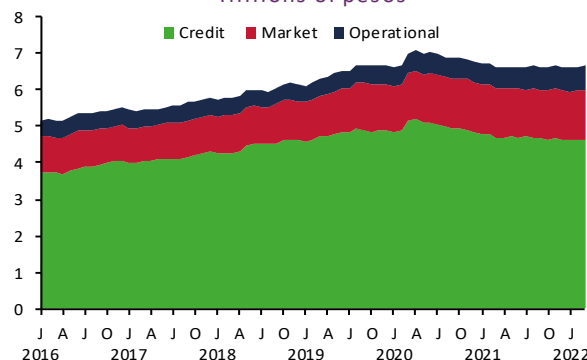
Data as of March 2022

Source: Banco de México

[1] Sum of the capital contributed and capital earned, less investments, reserves, intangibles, deferred taxes, results of asset valuation and translations with relevant related parties.

In January 2022, Citigroup announced its intention to leave the consumer and retail banking segment in Mexico, Asia and Europe in order to concentrate on the corporate and institutional client segments in these markets. Its exit from the segment is intended to strengthen its position in the payment, credit and retail banking businesses in the United States, and it has already begun the transition process to complete its exit.[32] As has been mentioned in other Banco de México publications, if this transaction materialize, it is foreseen that the sale of the institution's aforementioned business lines would not have any relative impact on the stability of the Mexican banking system, of which it would continue to be an important participant.

The banks' profitability, measured using the twelve-month return on stockholders' equity (ROE) has seen a recovery for the system as a whole, reaching a level of 15.6% in March 2022, which is slightly above the level observed at year-end 2019. This recovery has not been homogeneous. The improvement in profitability is associated with the gradual decrease seen over the last five quarters of the expense in the creation of credit provisions arising from regulation requirements relating to the portfolio credit quality. It is also associated with the gradual release of additional reserves withheld during 2020 and 2021 to overcome the potential credit losses related to the effects of the pandemic. In addition, an increase in trading profit and a slight reduction in administrative expenses, both favoring

[32] The transition process to complete this exit is subject to several conditions, including the regulatory approvals applicable both in the United States and in Mexico. It must be clarified that although Citi

would leave Citibanamex's consumer banking and business banking businesses, the company will continue operating its institutional client business with a local banking license.

profitability, were recorded at the end of the first quarter. Also, the cumulative 12-month flow of the interest margin also recorded higher levels since the last *Report* and the stockholder's equity has also increased the creation of credit provisions arising from regulation requirements relating to the portfolio credit quality. (Graph 76) (See Box 6).

Graph 76
Commercial banking profitability component
Percent of 12-month average capital
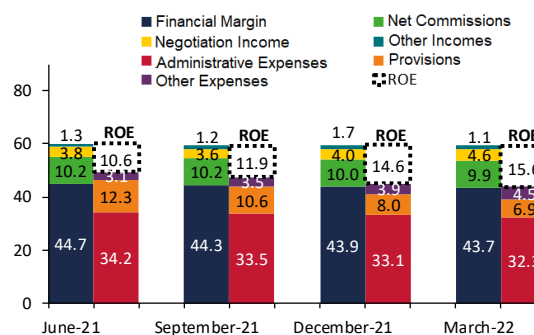
Preliminary data as of March 2022
Source: CNBV

Box 6: Risk metrics for banking and credit indicators

I. Introduction

A useful tool for the early identification of risks to the financial system, as well as for analyzing and constructing forecasts, is the monitoring of some financial indicators of the banking sector and their evolution. If, in addition to their central trajectory, it is possible to estimate the distribution of these indicators, relevant information on potential extreme events can be extracted. The objective of this Box is to identify these risks for a number of relevant variables in advance. For this, following González-Holden et al., (2022), macroeconomic and financial variables are used, as well as some characteristics of banks, for the estimation of the future conditional distribution of these banking indicators.

The conceptual framework of this exercise is similar to that of growth at risk (Adrian et al., 2019 and Prasad et al., 2019), which evaluates the association of different current macro-financial variables with the future growth of economic activity.[1] This analysis has been widely used in different countries.[2]

II. Methodology

The banking indicators analyzed in this box are: (i) annual change in the ROE, (ii) annual change in the financial margin as a proportion of assets, (iii) real growth in the total credit portfolio and (iv) annual change in the adjusted NPL ratio.

To analyze the evolution of these banking indicators, their future distribution is modelled as a function of the value to date, of a set of macroeconomic, financial, and banking variables, using a quantile regression.

Macroeconomic and financial variables include annual growth of the IGAE, annual change of inflation, annual growth of the exchange rate, annual yield of the Mexican Stock Exchange, annual change of the

28-day Cetes rate, the slope of the sovereign curve and the federal funds rate of the United States.

The banking variables comprise the annual change of variables commonly used in the banking literature and that allow to characterize the balance sheet and income statement of banks: liquid assets as a proportion of total assets, capital-to-assets ratio, deposits-to-assets ratio, other non-financial income-to-assets ratio, cost-to-income ratio, loan loss provisions coverage index, risk-weighted asset to total assets ratio, in addition to the ROE, the financial margin, the real growth of the credit portfolio and the IMORA (excluding them from the specifications in which these variables are the dependent variable). The data used have a monthly frequency and the sample used is from January 2006 to March 2022.[3]

To project the distribution of future banking indicators, a quantile regression is used to estimate and analyze the indicators over a future horizon (1, 3, 6 or 12 months).[4] The specification is given by:

$$Y_{t+h}^q = \alpha^q + \rho^q Y_t + \gamma^q M_t + \beta^q X_t + \varepsilon_t^q,$$

where q is the quantile being evaluated, h is the future horizon to be predicted, Y_t it is the dependent variable, M_t, the macroeconomic and financial variables and X_t, the set of banking variables.

Estimates make it possible to identify those periods in which the distribution of future banking indicators implies a greater risk (measured from the amplitude of the interquartile ranges and the tail quantiles). It also allows predicting the conditional distribution for future horizons and can be used as an early indicator of risks and probable trajectories. Subsequently, using the estimated values for each quantile, it is possible to adjust a probability distribution[5] which makes easier comparing the evolution of these indicators over time, as well as the calculation of

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[1] See Box Growth in Risk and Financial Conditions in Mexico of the Financial Stability Report - Second Half of 2019, Box 2, pp. 27 - 30, December 2019.

[2] For example, Ukraine (Ivanova et al., 2021), Peru (IMF 2018a), Portugal (IMF 2018b), Singapore (IMF 2018c) and 13 developed economies (Plagborg-Møller et al., 2020).

[3] As a test of robustness, it was verified that the predictive capacity of the model was not affected by the COVID-19 crisis or by the application of the special accounting criteria, limiting the sample to February 2020.

[4] This Box presents only the results for the three-month horizon.

[5] Biased Student T of four parameters (Azzaalini and Capitanio, 2003).

other probabilistic indicators, such as the 5% Conditional Value at Risk (*CVaR*).

III. Results

The results show that the out-of-sample forecasts are very accurate for the different financial indicators[6]. There is a recovery and less uncertainty in some profitability indicators, such as ROE (Graph 1) and financial margin (Graph 2). Likewise, the change in the *IMORA* is consistent with conditions of lower uncertainty (Graph 4). The only indicator whose forecasts maintain high levels of uncertainty is the growth of the credit portfolio (Graph 3).

It is worth mentioning that, although in times of extreme conditions the realized values may fall outside the predicted interquartile range, in all cases the trend and trajectory of the realized values is adequately predicted.
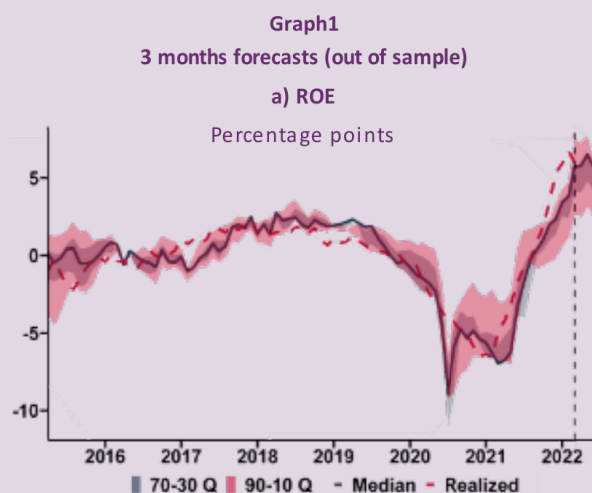
Graph 2
3 months forecasts (out of sample)
b) Financial margin
Percentage points

Data as of March de 2022, and forecast up to June 2022
Source: Banco de México

Graph 3
3 months forecasts (out of sample)
c) Credit growth in real terms
Percentage points

Data as of March de 2022, and forecast up to June 2022
Source: Banco de México

Graph1
3 months forecasts (out of sample)

a) ROE
Percentage points
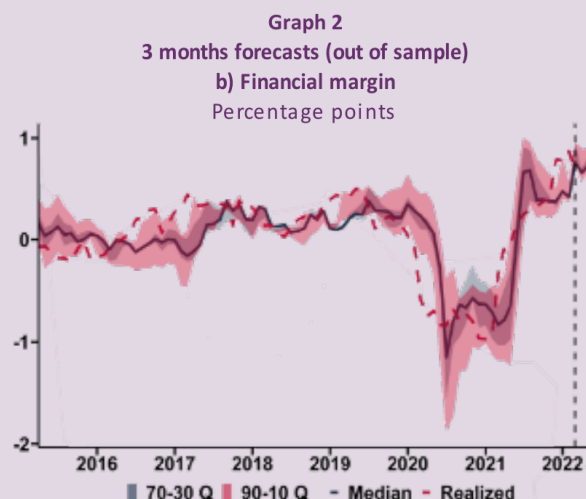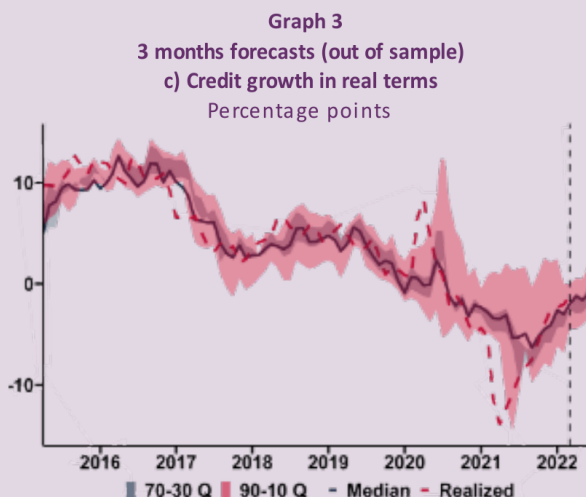
Data as of March de 2022, and forecast up to June 2022
Source: Banco de México

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[6] To identify the contribution of each macroeconomic and banking variable in the model, the marginal contribution of each variable on the pseudo R^2 of all quantiles of the quantum regression was calculated. It was found that for the model whose dependent variable is the ROE the largest marginal contribution is from the US federal funds rate, for the model whose dependent variable is the financial margin the largest marginal contribution is the IMORA, for the model whose dependent variable is the real growth of credit the largest marginal contribution is the annual performance of the Mexican Stock Exchange and for the model whose dependent variable is the IMORA the largest marginal contribution is annual inflation.

Graph 4
3 months forecasts (out of sample)
d) Adjusted non-performing ratio
Percentage points
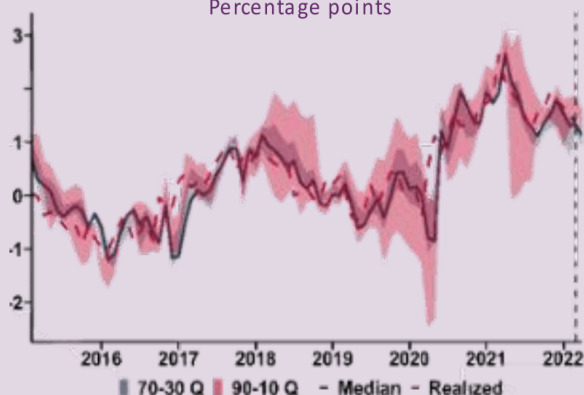
Data as of March de 2022, and forecast up to June 2022
Source: Banco de México

To analyze relevant periods, such as those in which a recession was recorded, the distribution is adjusted with these estimates using the methodology previously described.

Graph 5
Distribution of the indicators under a 3-months horizon
a) ROE
Horizontal axis: Percentage points
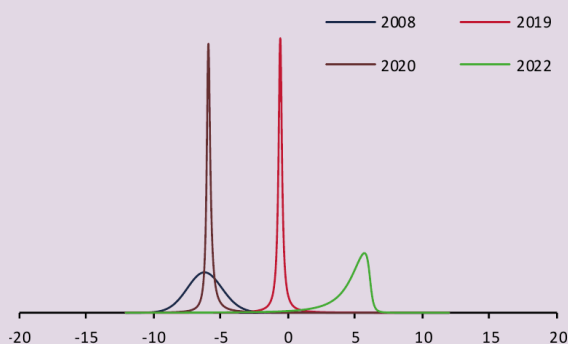
Data as of March de 2022, and forecast up to June 2022
Source: Banco de México

Comparing these distributions, it can be observed that in those years where there was a recession, such as 2008 and 2020, distributions follow patterns consistent with the recessive environment, although with some differences. For example, the magnitude of the 2020 shocks means that the extreme values of the distributions are more concentrated than in the

2008 distribution. For example, the distribution of the ROE (Graph 5) and financial margin (Graph 6) have negative value averages and are concentrated in values to the left of zero, which means that annual decreases in the profitability of the banks are more likely; likewise, in these years the distribution of the imora maintains a positive value average, which implies a greater probability of increases in delinquency (Graph 8). On the other hand, the growth results in the credit portfolio (Graph 7) show that in 2022 the risks of decreases in the growth of the credit portfolio remain latent.

Finally, from the estimated distributions it is possible to calculate the Conditional Value at Risk, *CVaR* at 5% level. Consistent with the previously reported results, the tail risk has decreased for ROE, financial margin and *IMORA*, while for portfolio growth the reduction has been lower, and is at levels far removed from its pre-pandemic level.

Graph 6
Distribution of the indicators under a 3-months horizon
b) Financial margin
Horizontal axis: Percentage points
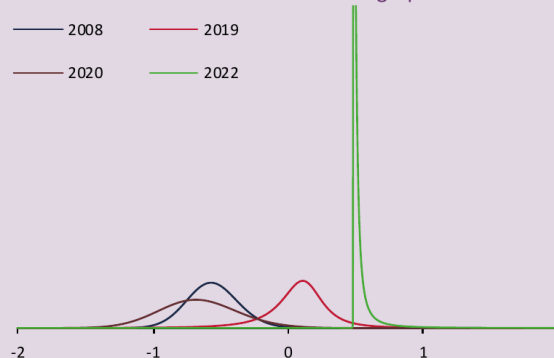
Data as of March de 2022, and forecast up to June 2022
Source: Banco de México

Graph 7

Distribution of the indicators under a 3-months horizon

c) Credit growth in real terms

Horizontal: Percentage points

—— 2008   —— 2019   —— 2020   —— 2022
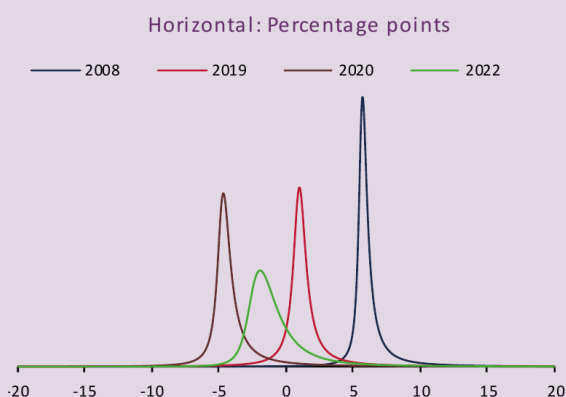
Data as of March de 2022, and forecast up to June 2022
Source: Banco de México

Graph 8

Distribution of the indicators under a 3-months horizon

d) Adjusted non-performing ratio

Horizontal axis: Percentage points

—— 2008   —— 2019

—— 2020   —— 2022
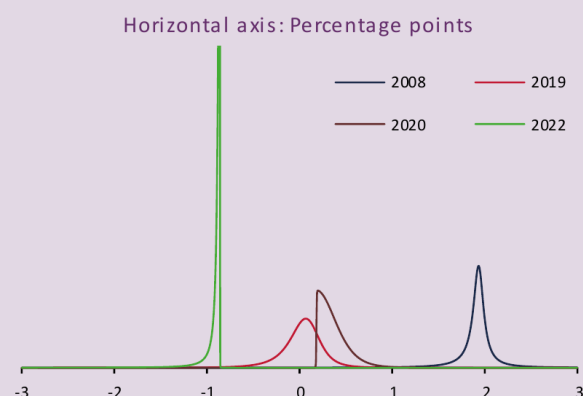
Data as of March de 2022, and forecast up to June 2022

Source: Banco de México

IV. Final considerations

This Box presents a model that allows analyzing and forecasting the future conditional distribution of a set of banking indicators using macroeconomic, financial, and banking variables. The results suggest that the recovery of the variables analyzed with respect to the levels observed during the beginning of the pandemic has been heterogeneous. There has been an improvement in the performance of some indicators, for which risks, and uncertainty have been mitigated, but for others, such as credit growth, risk reductions are smaller. This methodology allows regular monitoring of the evolution of these indicators in order to identify tail risks in the short and medium term and how these could increase in a complex and highly uncertain macroeconomic environment.

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Credit Risk

The banking credit risk, measured by the conditional value at risk (CVaR) as a proportion of the credit portfolio, decreased during the fourth quarter of 2021 and the first quarter of 2022, falling from 11.5% in September 2021 to 9.4% in March 2022 (Graph 77a).[33,34] This behavior can mainly be explained by the decrease in the credit risk of the three portfolios (corporate, consumer and mortgage) as a result of the decrease in the probabilities of default, and to a greater extent, due to the important decreases in the default correlations during this period (Graph 77b).[35] The evolution of the credit risk will continue to be linked to the country's economic performance.

Graph 77

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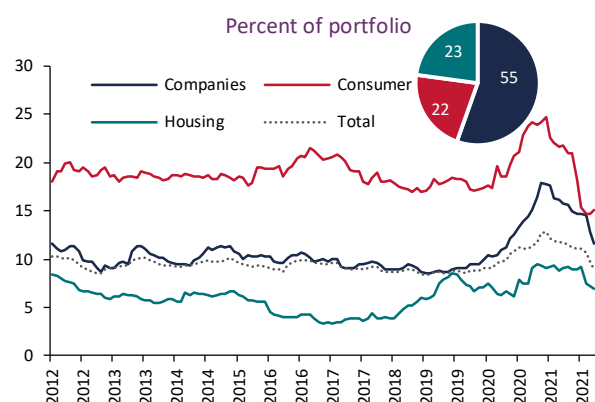
Percent of portfolio

Data as of March 2022 (preliminary data of portfolio used in the estimate)

Source: Banco de México, CNBV, and Credit Bureau

1/ Using a time period of one year and a level of confidence of 99.9%. The pie chart shows the total percentage of the current balance for each portfolio segment.

b) Portfolio concentration, probabilities and default correlation[1/]
Percent
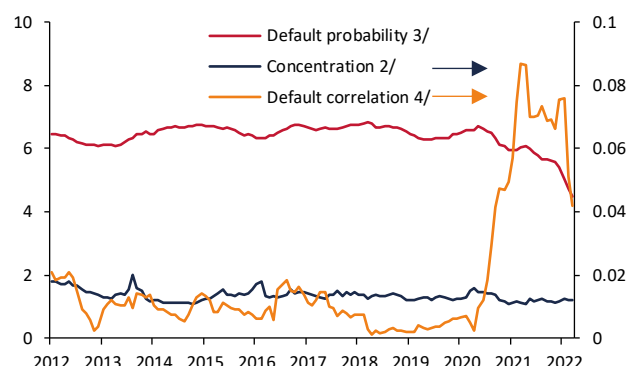
Data as of March 2022 (preliminary figures of portfolio used in the estimate)

Source: Banco de México, CNBV and Credit Bureau

1/ Components used as main elements to calculate the CVaR of the portfolio

2/ Portfolio concentration measured using the Herfindahl-Hirschman Index

3/ Average of default correlation of portfolio on annual horizon

4/ Correction of average default of portfolio on annual horizon

A distribution of potential credit losses can be generated by considering all the exposures of the commercial banks' credit portfolio (see Table 7). This distribution presents a bias to the right due to the existence of relatively large exposures in the corporate portfolio that may generate substantial losses. Moreover, although the consumer portfolio is more granular, there is the possibility of relatively high levels of default. The corporate portfolio represents 55% of the total portfolio amount; however, its contribution to the CVaR is 59%, whereas the consumer portfolio amount represents 22% of the total portfolio with a contribution to the CVaR of 31%. Finally, the participation of the mortgage portfolio is 23% of the

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[33] The value in conditional risk (CVaR) allows the analysis of losses in the tail of the distribution because it represents the expected value of the loss when it is greater than the VaR, which in turn, represents the percentile that relates to a specific level of confidence in the distribution of the probability of losses of an asset portfolio subject to credit risk.

[34] The credit VaR is calculated using a capitalization and credit risk model. The main elements of this model are the probability of default on each loan, the structure of variances and co-variances of the potential

defaults, and the structure and level of concentration of the loans that make up the portfolio. An explanation of the model can be consulted in the Banco de México *Financial System Report* 2006 (May 2007), on pages 64-67, and in insert, *A New View of Credit Risk* by Javier Márquez Diez-Canedo, Limusa (2006).

[35] The probabilities and correlations of default used in this model are estimated by applying the historical default rates observed in loans, the reference of which may be consulted in the Banco de México *Financial System Report* 2006 (May 2007), Box 10.

total portfolio and its contribution to the CVaR is 10% (Graph 78).

Graph 78
Simulated credit loss distribution of the system
Horizontal axis: Percent of portfolio[1/]
Vertical axis: Percent
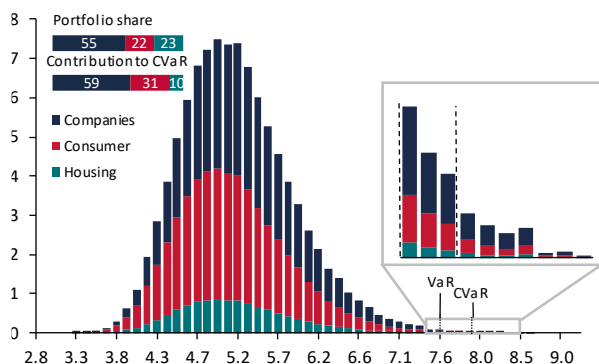


Data as of January 2022 (preliminary data of portfolio used in the estimate)

Source: Banco de México, CNBV and Credit Bureau

1/ The percentage of loss for each portfolio is relative to the total loss, within each interval. The VaR and CVaR levels are 99.9%.

In this context, given that the loan portfolio's risk has remained in check and the capital levels high and above the minimum regulatory levels, by maintaining adequate origination criteria, there is a margin for the loan portfolio to potentially increase without the risks for the system increase disproportionately.

Box 7: Loan portfolio credit risk metrics using Monte Carlo simulation

I. Introduction

This Box presents a methodology to estimate the loss distribution of a loan portfolio through Monte Carlo simulation techniques.[1] This methodology is sufficiently general and can be applied in the measurement of portfolio credit risk of an arbitrary number of borrowers with heterogeneous exposures, contemplating different correlation structures between them, allowing to generate the loss distribution in a reduced time.

From the distribution of credit risk losses, the model estimates different risk measures such as the mean and variance of losses, the Value at Risk (VaR) and the Conditional Value at Risk (CVaR), and serves to analyze the portfolio credit risk sensitivity to changes in their risk components as[2] well as a tool for carrying out stress tests.

The methodology combines the current computational power with some statistical properties that make the calculation of credit risk efficient. In addition, one of the advantages is that it allows to identify both the impact of large exposures and the high concentration on the risk metrics of the portfolio.

The credit risk measurement paradigms are classified in structural models and reduced-form models.[3] Within the reduced-form models, some make assumptions about the shape and parameters of the loss distribution, which simplifies the modeling; others, resort to simulation techniques, which eliminates restrictions, but require greater computational power. The methodology of this Box is in the latter category.

Description of the methodology

The methodology is based on Vasicek (2002), who models a borrower default through an unobservable variable, which can be interpreted as the value of the borrower's assets. The borrower´s default in this model is presented if the assets are below a certain level. On the other hand, the dependence between the defaults arises by incorporating a common variable that affects the value of the assets of all the borrowers.[4] Given the above, the portfolio credit risk loss corresponds to the sum of the exposure of the delinquent borrowers.[5] Although the loss distribution can be estimated via Monte Carlo simulation, for portfolios with a large number of borrowers, the estimate may become unfeasible since a large number of default combinations from borrowers have to be considered.

The contribution of this work is to use a *collective aggregate loss model*[6] that allows simulating the total number of defaults of the portfolio without having to analyze the credit situation at the individual level.[7] This approach significantly reduces the number of

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[1] A technique that allows approximating the distribution of a random variable through a representative sample of its multiple outcomes.

[2] Credit exposures, such as probabilities of default and the structure of dependence between defaults, as well as recovery rates are considered.

[3] See Jarrow and Protter (2004) for more details.

[4] Under the Vasicek (2002) model, credit default $i = 1, \dots, N$, is modeled through the unobservable variable of a credit (X_i) with the following indicator variable:

$$I_i = \begin{cases} 1 \ if \ X_i \le u \\ 0 \ \text{in other case} \end{cases} \text{ with } X_i = \sqrt{\rho}Z + \sqrt{1-\rho}\varepsilon_i$$

and $Z \sim N(0,1)$, $\varepsilon_i \sim N(0,1)$ independent among them. Where Z represents the common component, ε_i represents the idiosyncratic component, u represents the non-compliance threshold and ρ the correlation between the unobservable variables. These last two are obtained with the probability and correlation of the portfolio defaults. This model has a multifactorial version, which allows to model losses when there are several homogeneous portfolio segments with specific probabilities and correlations of default for each of them and between them. For more details see Rutkowski and Tarca (2015).

[5] The loss associated with the breaches of the portfolio, under the individual model of aggregate loss, is expressed as follows: $L = \sum_{i=1}^{N} I_i f_i$ where L represents the total portfolio loss, I_i the default indicator previously defined and f_i the credit balance $i = 1, \dots, N$. For more details see Klugman et al. (2012).

[6] In the collective aggregate loss model, the defaults are modeled so that, conditional to the realization of these, the total aggregate loss is determined.

[7] Under the proposed collective model of aggregate loss, the portfolio loss (L) is obtained by conditioning the number of breaches (K) with the realization of the common component (Z), obtaining it as follows: $L = \sum_{j=1}^{K} f_j$ where f_j is the balance of the j-th credit that defaulted on the portfolio, with:

$$K|Z \sim \text{Binomial}(p(Z), N) \text{ with } p(Z) = \Phi\left(\frac{u - \sqrt{\rho}Z}{\sqrt{1-\rho}}\right)$$

where $p(Z)$ represents the conditionally probability of default given Z and $\Phi(\cdot)$ is the cumulative distribution function of a standard normal random variable. Finally, the selection of the defaulted credits is made with a sampling of K elements on the population of credits.

simulations to the number of non-compliances. For a more detailed description see De la Vega et al. (2022).

II. Examples of the implementation of the model

To illustrate the capacity of the model, an example of two simulated distributions is presented, using one hundred thousand scenarios, under an annual risk horizon and taking the loss relative to the value of the portfolio. The first distribution corresponds to 5.5 million loans, contemplating eleven portfolio segments[8] with a correlation structure among them. The second corresponds to the portfolio of all personal and payroll loans in the banking system.

The results of the simulation show how the first portfolio has a relative risk to its larger portfolio, which is reflected in a greater weight in the right tail of the distribution (i.e., extreme losses with greater probability), while in the second portfolio extreme losses can occur with a lower probability (Graph 1). While the expected losses in both examples are of similar magnitude, the metrics of VaR and *CVaR* are different. The results indicate that for the first portfolio the *VaR* is 120% higher than its expected loss and the *CVaR* is 140% higher, which contrasts with the second portfolio whose *VaR* is just 44% higher than its expected loss while the *CVaR* is 49% higher.

With this tool, it is possible to estimate more accurately the potential losses of the different credit portfolios of the system, either by type of credit, by institution, or even by segment of economic activity. In addition, the dynamics of macro-financial variables can be associated with some of the parameters, such as the default probabilities and default correlation of noncompliance. If the estimation is possible, it could be estimated the system´s credit risk sensitivity to possible changes in such variables.

III. Concluding remarks

This box presents a methodology to model the credit risk losses distribution of a portfolio, which is based on Vasicek (2002) and the collective models of aggregate loss. These models, together with Monte Carlo simulation techniques, allow the loss distribution to be generated more efficiently. The

methodology combines the current computational power with some statistical properties that make the calculation of credit risk efficient, particularly in the case of large portfolios with low probabilities of default. In addition, it allows to identify the impact of the portfolio´s large exposures, as well as the impact of high concentration on risk metrics.

Graph 1
Simulated credit loss distributions
Horizontal axis: portfolio percent
Vertical axis: percent
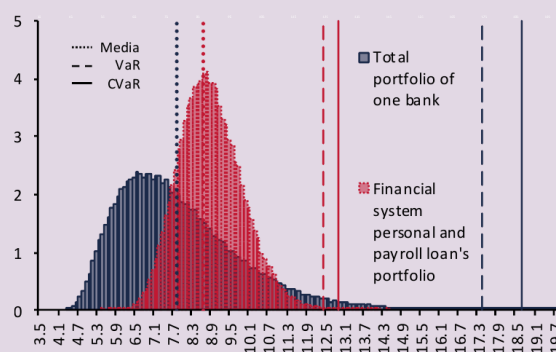
Data as of January 2022
Source: Banco de México, CNBV and Credit Bureau

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[8]Segments: Agriculture, Commerce, Construction, Communications & Transportation, Industry, Services, Credit Cards, Personal & Payroll, Automotive, Other Consumer Credit, and Housing.

Banks' exposure to changes in formal employment and economic activity

Economic growth and the dynamics in formal employment constitute important factors for the credit risk faced by the bank. Two indicators are constructed in order to evaluate the importance of these factors. These indicators illustrate how a fall or a lower growth of economic activity and formal employment may affect corporate, payroll, mortgage and auto loan portfolios.

Exposure of the corporate portfolio to changes in economic activity lies in: (i) the size of the fall or lower growth of the economic activity in aggregate terms, and (ii) how each fall or lower growth is distributed among the different sectors of the economy. Thus, an economic contraction generates more risk for the bank if it is concentrated in the sectors of the economy that have more weight in the corporate credit portfolio.

Therefore, the indicator is constructed as the sum of the economic growth in the different sectors. In this sum, the weight attributed to the growth of each sector is equal to its participation in the corporate credit portfolio. In this manner, the indicator captures the risk of aggregate changes and sectorial changes in economic growth.

The greatest risk levels can be observed in May 2020, precisely when the most negative effects of the pandemic were felt in economic growth measured through the variation of the Global Economic Activity Index (*IGAE*, its acronym in Spanish) (Graph 79), but deteriorated even more than the IGAE, reflecting that the economic contraction was concentrated in

economic sectors with more weight in the corporate credit portfolio rather than in the production portfolio.

Graph 79
Exposure index of corporate credit to economic activity [1]

Annual variation in percent
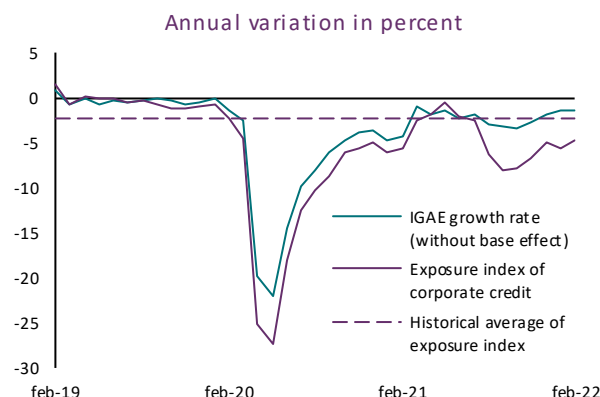
Data as of February 2022.
Source: Banco de México, and INEGI
[1] Interannual changes from March 2021 consider the base effect at February 2020.

In February 2022, the last month with available information, the indicator had not yet reached its pre-pandemic level or its historical average. Nevertheless, it improved from the last quarter of 2021 party reflecting a lower risk because the professional, scientific and technical services, temporary accommodation and food and beverage preparation and the industrial manufacturing sectors showed a certain amount of recovery during that period.

Following a similar process, an indicator was constructed for payroll loans as the sum of growth in formal employment in the different labor markets in Mexico. In this sum, the weight attributed to the labor market relating to a state, gender or low or high salary levels is equal to its participation in the payroll credit portfolio.[36]

The indicator explains the greatest risk levels in August 2020. Therefore, unlike corporate credits, on this occasion the greater risk is observed two months after the most negative effects of the pandemic were felt (this was in June 2020 for formal employment) (Graph 80). A similar trend is observed for mortgage and auto loans.[37] Also, for these portfolios, the indicator behaved better than formal employment, reflecting that the pandemic had a lesser effect on borrowers with a high

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[36] The threshold is defined for the payroll portfolio to determine formal employment portfolio of high-salaried employment pursuant to the historical salary distribution observed among borrowers. In particular, high salaries are those considered to be above of the average of the distribution. A similar process is followed for mortgage and auto loans.

[37] As with the payroll credit portfolio (Graph 79), the indicators for auto and mortgage credit portfolios showed more positive values than the fall in formal employment portfolio.

participation in these types of loans than the rest of the population.

Graph 80

Exposure index of payroll credit portfolio [1/]

Annual change in percent
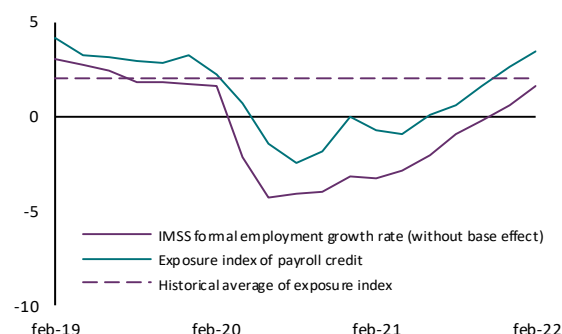
Data as of February 2022
Source: Banco de México, and IMSS
1/ Interannual changes from March 2021 consider the base effect at February 2020.

The index improved from the last quarter of 2021 and is already showing a better performance than its pre-pandemic level and its historic average. This is because the recovery up to February 2022 was concentrated on labor markets with more participation in the payroll, mortgage and auto loan portfolios than in formal employment, such as those of high-income employees in Mexico City, Tabasco, Nuevo Leon, and the State of Mexico.

Market risk

The commercial banks' market risk, measured using the market CVaR as a proportion of net capital showed an increase over the value observed in December 2021,[38] from 4.04% to 4.45% in April 2022 (Graph 81). This increase is due mainly to adjustments in banking institutions' positions in the debt instruments component of the portfolio, where holdings of fixed-rate bonds decreased at the beginning of the year but has shown a gradual increase over the first months of 2022.

Graph 81

99.9% CVaR for commercial banks' market risk

Net capital percent
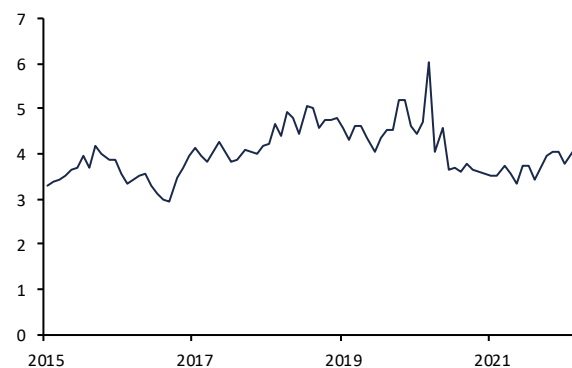
Data as of april de 2022
Source: Banco de México, CNBV, BMV, Bloomberg, and Valmer

The sensitivity of debt instruments portfolio to changes in interest rates, measured throughout the duration based on market information, showed a downward trend between December 2021 and April 2022, decreasing from 1.52 to 1.39 years, respectively (Graph 82), due mainly to the reduction in the long-term position in debt instruments and private issuances.

Graph 82

Average monthly duration of commercial banks' position

Years
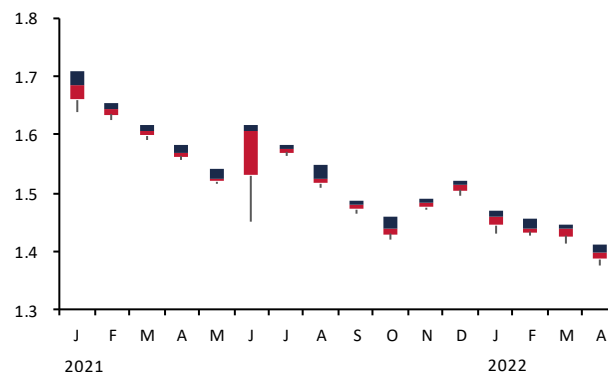
Data as of April 2022
Source: Banco de México and Valmer

Liquidity risk

Since November 2021, few changes have been observed in the liquidity position of the Mexican banking system. In general, the banking system has liquidity levels above

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[38] It must be pointed out that the CVaR, on being an indicator estimated under historical conditions observed, constitutes a reference and not a forecast of the potential losses that may be observed in market portfolios in the current situation.

the minimum regulatory requirements, and a low level of liquidity risk is perceived (Graph 83).

Graph 83

Daily LCR of the banking system and group of banks by size

Left axis: billions of Mexican Pesos

Right axis: percent
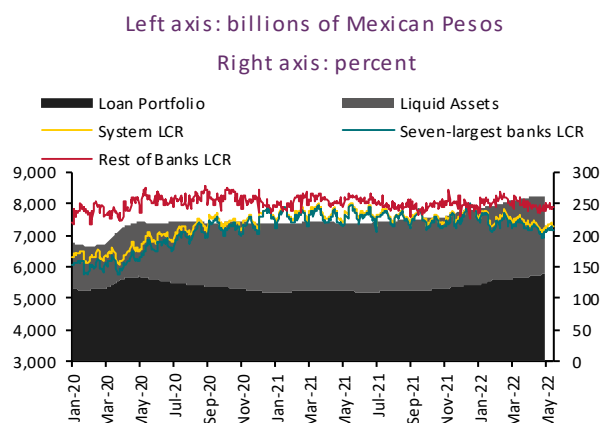
Data of credit portfolio and liquid assets as of April 30, 2022. Data of daily LCR as of May 15, 2022.

Source: Banco de México and CNBV

Since the second quarter of 2020, banking institutions, particularly the largest, increased their liquidity levels to stabilize in 2021 at levels above those observed before the pandemic. The high levels of liquidity observed to date can be explained by the relatively low recovery of new loans in comparison with the growth of deposits. However, it is highlighted that those banks that increased their credit portfolio in contrast to the levels recorded before the beginning of the pandemic, were mainly those that had greater liquidity compared to their peers (Graph 84).

Graph 84

Variation in granted credit[1] and February 2020 relative median LCR[2]

Percent
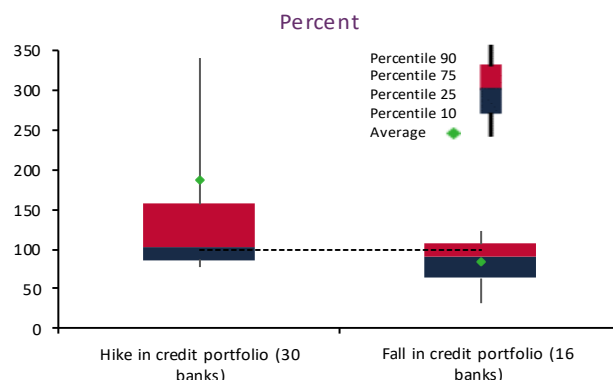
Data as of March 2022

Source: Banco de México

1/ The variation in the credit portfolio is calculated as the change from February 2020 to March 2022.

2/ The relative median LCR of February 2020 is the ratio of the median of the daily data (of February 2020) of the LCR for each bank, divided by the median of the LCRs of the banking group to which the bank belongs. The banks are grouped based on the CNBV banks classification. For example, if a bank has a median LCR of 240% and it belongs to a group of banks with a median LCR of 200%, its relative median LCR is equal to 120%.

During the first quarter of 2022, all the commercial banking institutions maintained an average Liquidity Coverage Ratio (LCR) above 100% (Graph 85).

Graph 85

LCR of commercial banking institutions [1]

Percent

Banregio
Bancrea
Ve por Mas
Bankaool
Mifel
Bajio
Invex
Scotiabank
Sabadell
Autofin
Bansi
BofA
JPM
HSBC
Actinver
Banco Base
Santander
Barclays
Mizuho
Multiva
ICBC
Banorte
Citibanamex
Monex
BBVA
Credit Suisse
Inmobiliario
Banco S3
Afirme
MUFG Bank
Forjadores
CI Banco
Intercam Banco
Consubanco   492
Coppel   723
Inbursa   764
Azteca   906
Bank of China   1,197
Shinhan   1,262
BI Afirme   1,431
ABC Capital   1,542
VW   1,577
Covalto   1,580
Deutsche   1,592
Compartamos   2,540
Donde   7,959
Pagatodo   12,105
Keb Hana   35,932
BNP Paribas   256,764
Amex   Inf

Data as of March 2022

Source: Banco de México and CNBV

1/ The graph shows the quarterly average of the LCR consolidated for each bank from January to March 2022. In accordance with the current regulation, in March 2022, banks marked in dark blue must meet a minimum LCR of 100%, banks marked in red as minimum of 90%, banks marked in green a minimum of 80%, banks marked in orange a minimum of 70%, banks marked in yellow a minimum of 60%, and banks marked in turquoise a regulatory minimum of 0%.

Moreover, the structural liquidity requirement, known as the Net Stable Funding Ratio (NSFR) which complements the LCR requirement, was effective as of March 1, 2022. This indicator has been reported by banks since January 2017. At the end of March 2022, all the banks maintained NSFR levels above 100, which have remained stable with marginal upward changes in contrast with their levels before the pandemic (Graph 86).

Graph 86

NSFR Distribution

Percent
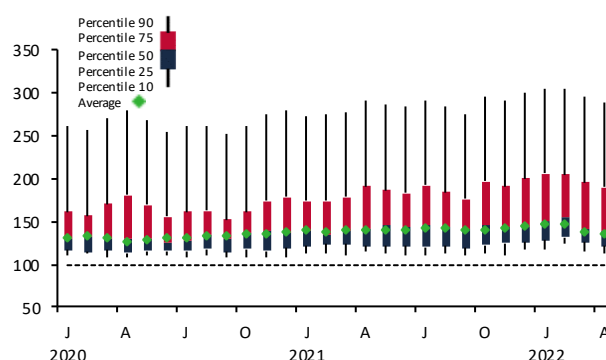
Data as of April 2022

Source: Banco de México

While, in general, the banking system has ample liquidity, some small and medium-sized banks present greater risks due to the concentration of their funding sources and the lower stability of some of them. This can be seen in the proportion that the ten largest funding counterparts represent of the short-term funding (less than 30 days), as well as, the proportion they represent of their total liquid assets (Graph 87).

Graph 87
Funding concentration of the 10 largest counterparts that fall due within 30 days [1, 2]

Vertical axis: proportion of total assets of the system

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

Label: Number of banks
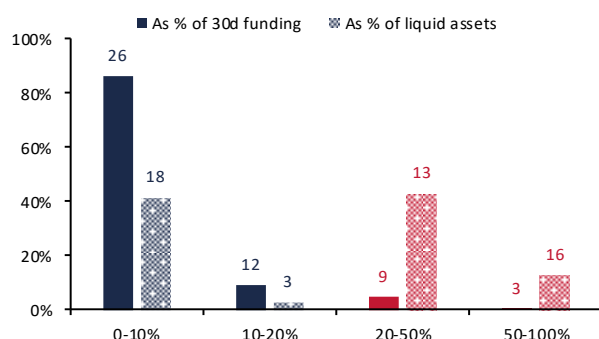
Data as of April 2022.

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. The label refers to the number of banks in each category.

Banks maintain foreign currency liquidity levels above the regulatory minimum and above the pre-pandemic level (Graph 88).

Graph 88
Liquidity requirement in foreign currency and liquid assets
Millions of USD
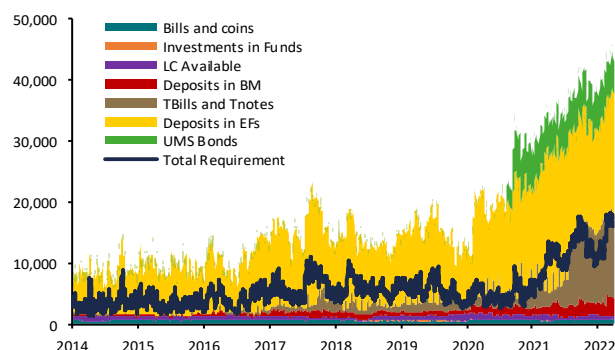
Data as of May 31, 2022

Source: Banco de México

Capitalization Index and Liquidity at Risk

By jointly evaluating the results of the liquidity at risk and the net risk capitalization rate exercises for commercial banking institutions, it is possible to identify those institutions that could be more vulnerable in times of stress, by not having the necessary solvency or liquidity.

The results suggest that the majority of institutions have sufficient liquid resources and capital to cope with periods of stress, by meeting the two requirements. At the end of March, in accordance with the liquidity at risk and the net risk capitalization index, very few institutions, representing approximately 2% of the assets of the banking system, would be at levels below the minimum regulatory level of both requirements with these stressed measures (Graph 89).

Graph 89
Commercial banking liquidity and solvency at risk [1]
weighted average, March 2022
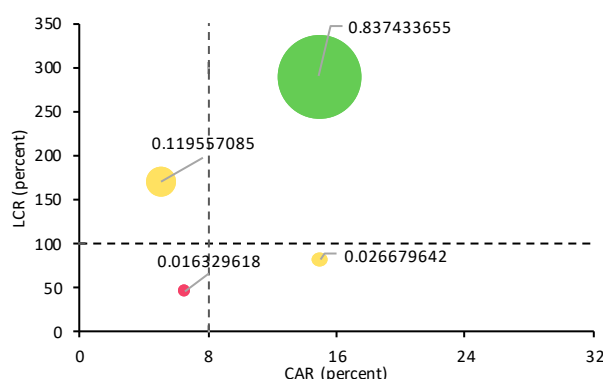
Data as of March 2022.

Source: Banco de México

1/ The lines show the regulatory minimums for the liquidity requirements (LCR = 100%) and the minimum capitalization requirement (CAR=8%). The bubbles represent the assets of the group of institutions within each quadrant and the percentage of the proportion in terms of the commercial bank's total assets, where the centroid is the average, weighted by assets, of the respective observations. The colors red, yellow and green denote the institutions that would not meet either requirement, would not meet any of the two requirements and meet both requirements, respectively.

On the one hand, the net risk capitalization rate, which is estimated as the capital adequacy ratio that results from losses in the portfolio equivalent to the credit CVaR at 99.9%,[39] evaluates whether or not bank's capitalization levels are adequate to cope with unanticipated losses in its credit portfolio.[40] A significant increase was observed in this indicator during the first

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[39] This is assuming that these losses are absorbed directly with the banks' capital without affecting their reserves and that the portfolio has a weighting of 100% for the determination of its capital requirement.

[40] The regulatory capital of a banking institution allows it to overcome the unexpected losses of its credit portfolio, whereas its reserves allow it to cope with expected losses caused by default from its borrowers.

quarter of 2021 and the first quarter of 2022, by increasing from 11.89% in September 2021 to 14.18% in March 2022 (Graph 90). The foregoing is the result of the increase of the CAR and the reduction of the CVaR recorded during the period. The levels of the CAR for the banking system continue to be significantly greater than the regulatory minimum, showing the banks' capacity to absorb unexpected losses arising from credit default of their portfolios.[41]

Graph 90

CAR net of risk [1/]

Percent

Data as of March 2022 (preliminary figures of portfolio used in the estimate)

Source: Banco de México, CNBV and Credit Bureau

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

Further, the liquidity at risk exercise evaluates if the banking institutions have sufficient liquid assets (cash, cash equivalents and high-quality debt instruments) to cope with its cash outflows net of cash inflows in periods of stress of 30 days, according to historical scenarios. The estimations of cash outflow factors are calculated based on the historical information of each institution's deposits (CVaR of 95%) and the impact on the value of liquid assets is also considered to reflect the three historical scenarios and the four macro-economic scenarios described in section VI.1.[42]

Despite the increase in cash outflows and the two different shocks applied to liquid assets, the results suggest that most of the institutions have sufficient liquid resources to cope with periods of stress for at least 30 days (Table 4).

Table 4

Banking groups by liquidity at risk [1/]

Group	Criterion	Assets of the banks in the group as a proportion of the commercial bank's total assets
1	LCR ≤ 65	1.8%
2	65 < LCR ≤ 100	1.7%
3	LCR > 100	96.5%

Data as of March 2022

Source: Banco de México

1/ The data of total assets for commercial Banking institutions is taken from information published by the CNBV at the end of March 2022.

Additionally, by completing the same exercise at the banking system level, the results suggest that the system has sufficient liquid resources to cope with periods of stress associated with cash outflow factors relating to the CVaR at 95% of the historic distribution of deposits in the system.

The foregoing is relevant because, given that the liquidity is maintained within the system, certain banks facing liquidity pressures caused by idiosyncratic factors may obtain financing through channels such as the inter-bank markets. For example, if the month with the greatest reduction in the total amount of deposits for each bank is considered, it can be observed that on average, banks increase the amount of secured financing (repurchase agreements) by 41% and unsecured inter-bank financing by 52%, compared to the previous month.[43]

Contagion Risk

This section presents the results of the contagion risk[44] analysis through the network of exposures among financial institutions in the inter-bank market. This

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[41] On being estimates made under the historical conditions observed to date, this indicator constitutes a reference and not a forecast on the potential losses that may be observed in the current situation.

[42] For further information about this methodology, please refer to the December 2020 Financial System Report.

[43] These data relate to the period from January 2006 to March 2022. The amount of secured financing relates to all the counterparties and all

collateral amounts, whereas unsecured financing considers the banking counterparties.

[44] The risk of inter-bank contagion refers to the possibility that the problems faced by one bank to meet its financial commitments may be transmitted to other banks, whether directly or indirectly.

approach, which uses information from all the exposures observed daily within the domestic financial system, as well as foreign financial institutions,[45] allows the analysis, using the interconnectivity of the Mexican financial system network, of the mechanisms through which certain risks and weaknesses may spread throughout the entire financial system.

The structure of the inter-financial exposures network was identified as having undergone changes from the beginning of the pandemic. The most significant was a lower density, i.e., the network became less interconnected (Graph 91). Equally, the interconnections were observed to have become more concentrated in important financial intermediaries in the network (greater levels of disassortativity[46]) and tighter relationships between the various brokers already interconnected (greater reciprocity)). This caused some systemic risk measures to be lower. The reason for this is that the importance in the network of the largest and best capitalized intermediaries increased, which reduced the possible transmission of shocks in the network.

Graph 91
Changes in the measures of the interfinancial exposure network [1/2/]
Percentage
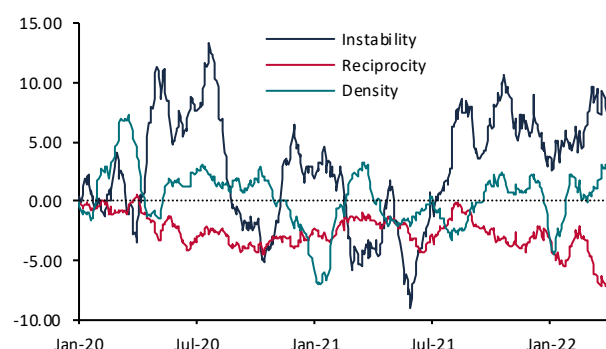
Data as of March 31, 2022
Source: Banco de México

1/ The graphed series relate to the simple 21-day moving average of the original series.

2/ The initial values are 0.2, 0.6 and 0.1 respectively.

These risk measures continue to show levels below those observed at the beginning of the pandemic, and

although in some cases they seem to have stabilized (Graph 92), in others, they have been observed to have slightly increased in recent months (Graph 93). Indeed, it can be seen that the number of intermediaries who would end this counterfactual exercise with capitalization levels below the regulatory minimum is greater than the number observed some months ago. These changes are consistent with the recent evolution in the network structure, where certain indicators have returned to levels closer to those that prevailed before the pandemic (Graph 91).

Graph 92
Percentage of banks' and brokerage firms' assets in the worst contagion chains
Percentage

Data as of March 31, 2022

Source: Banco de México

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[45] The analysis considers information of exposures in the inter-financial network caused by (i) the trade of securities, (ii) deposits and loans, (iii) market transactions, such as derivatives and repos, and (iv) foreign currency sale and purchase transactions.

[46] Disassortativity is defined as a greater propensity that financial intermediaries, in general those poorly interconnected, seek more

relationships with better connected intermediaries thereby suspending interrelationships with other less interconnected intermediaries.

Graph 93

Number of banks affected in the worst chains of contagion by final CAR Levels [1/]
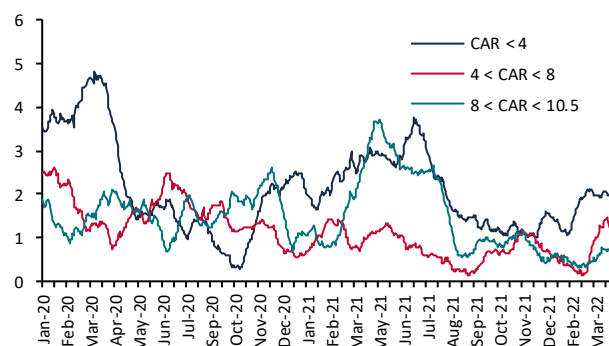
Number

Data as of March 31, 2022

Source: Banco de México

1/ The graphed series relate to the simple 21-day moving average of the original series.

The loss distributions throughout all the contagion chains has shifted to lower levels.[47] In fact, at the end of the first quarter of 2022, losses would only be registered in 2.2% of the chains, compared to 3.2% in the first quarter of 2020 or 2.6% in the first quarter of 2021 (Graph 94).

Graph 94

Distribution of Asset Losses by Quarter

X axis: Percentage; Y axis: Frequency

Data as of March 31, 2022

Source: Banco de México

V.3.2. Development banks and other development financial institutions

As of March 2022, development banks and other financial development institutions (the development banking system)[48] report a solid financial situation, a growing capitalization index, and a net income greater than the previous year's level, in a context of a lower financing balance and a greater constitution of preventive reserves.[49]
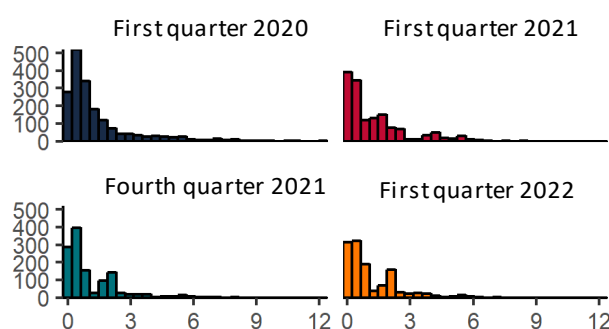
In March 2022, the development bank institutions as a whole registered a CAR of 24.2%, which is 266 basis points greater than the one registered in March 2021. The foregoing can be explained mainly by the 4% increase in net capital, which is concentrated in some institutions such as the *Banco del Bienestar,* and by a 7% decrease in the total assets subject to risk due to a lower level of economic dynamism. Within this last item, the reduction of assets subject to credit risk stands out (Graph 95). In turn, the level of capitalization allowed room to increase their financing activity and/or withstand unexpected losses should they materialize.

Graph 95

Development Banks' CAR

Left axis: Billions of pesos

Right axis: Percent
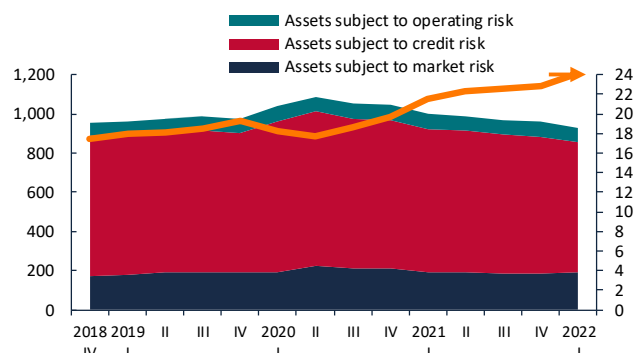
Data as of March 2022

Source: CNBV

In March 2022, the development banking system recorded a direct and induced financing balance[50] of 1,753 billion Mexican pesos, which is in line with the downward trend that began during the third quarter of

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[47] For example, in the first quarters of both 2020 and 2021, 10% and 9%, respectively, of the losses in the worst contagion chains were greater than 3.5% of the system's assets, whereas in the last two quarters, only 5% exceeded the level of 3.5%.

[48] This refers to the six development banks, the Agricultural Trusts (*FIRA,* its acronym in Spanish), and the National Funds for Farming, Rural, Forestry and Fisheries Development (*FND,* its acronym in Spanish).

[49] Notwithstanding the foregoing, the situations of *Banco del Bienestar* and the *FND* stand out because both institutions are reflecting unfavorable levels in some of their financial indicators.

[50] The development banks and development institutions comply with their mandates through a) granting financing through first- and second-

2020, and the annual contraction was at a real rate of 9.2%. This balance is equivalent to 27.4% of the banking sector's total financing and 6.34% of GDP (Graph 96). On the same date, the total financing granted by the development banks and development institutions consisted of 70% direct credit and 30% net-induced credit. Financing to the private sector accounted for 76.0% of the total (Figure 2).

Graph 96

Evolution of direct and induced credit balances of the development banks and development institutions

Left axis: billions of pesos

Right axis: percent
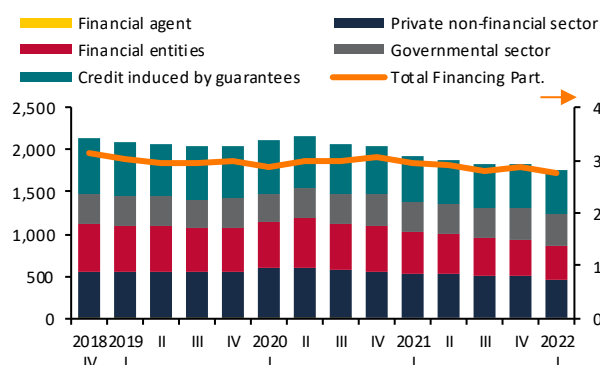
Data as of March 2022

Source: CNBV

The current contraction rate of second-tier credit in the last year was 17%, whereas first-tier credit decreased by a real rate of 8%. Credit balances decreased in all the institutions (Graph 97). It must be mentioned that following an increase in financing of certain institutions at the beginning of the COVID-19 pandemic, commercial banks reduced the demand for second-tier credit and the guarantees of the development bank. Faced with the pandemic, development institutions adopted several measures to support their service sectors and mitigate the deterioration of their portfolios. Most of the programs had concluded by March 2022.

Graph 97

Growth in credit portfolio balance by institution

Index (December 2018=100)
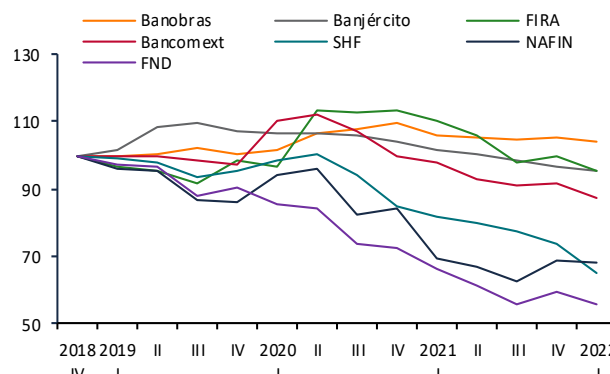
Data as of March 2022

Source: Banco de México, and CNBV

The placement of credit and guarantees in March 2022, defined as the amount dispersed in the last 12 months, reflected a real decrease of 22% (Graph 98). This variation was the result of the generalized fall in placements in the development banking system compared to the previous year, with *Banobras* standing out on recording a real decrease of 41%, followed by the *FIRA* with a contraction of 37%, *FND* of 22%, *Bancomext* of 11%, and *Nafin* of 10%.

Graph 98

Placement flows of credit and guarantees of the development banks and development Institutions (12M)

Billions of pesos
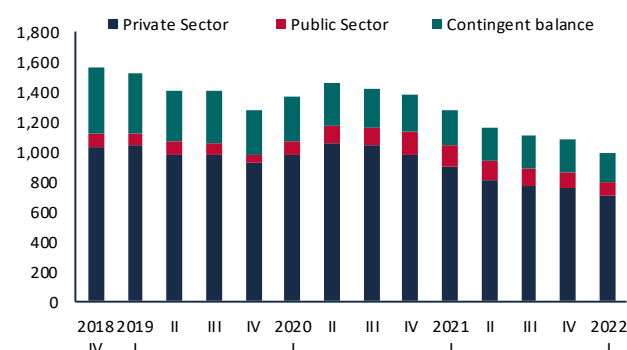
Data as of March 2022

Source: Banco de México, and CNBV

The concentration of the credit portfolios of development banks and other development financial institutions is low (HHI<100); however, due to their mandate, some institutions reflect concentrations in specific sectors. Additionally, although a migration

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tier credit, "direct credit" and the provision of guarantees, "induced credit", which refers to the amount of final credit that has a percentage

of guarantee hedging, b) the operation of special development programs, c) technical assistance and d) transactions performed as financial agents.

towards higher risk ratings has been observed in the corporate portfolio, approximately 75% remain concentrated in the highest regulatory credit ratings (A1/A2 / *CNBV* Scale).

In March 2022, the past-due portfolio amounted to 41.357 billion pesos. In the last quarter of 2021 the delinquency increased 49%, as a result of a company financed by several development banks entering into the past-due portfolio. The latter transaction is currently in a restructuring process; therefore, once this process is concluded, including the terms provided by the regulations for reclassification of this portfolio, the default level may return to previous default levels. Moreover, during the first quarter of 2022, the past-due portfolio decreased by 9% mainly as a result of the application of the IFRS9 accounting standards.[51] From this period, the Federal Mortgage Society's (*SHF*, its acronym in Spanish) participation in the amount of past-due portfolio ceased to be the highest among the financial development institutions.

The development banking system recorded a delinquency rate of 3.36%, greater by 100 basis points than in March 2021. As a reference, the delinquency rate of the commercial bank's portfolio reached 2.12%.[52] The increase in the rate can be explained by two effects: the increase in the past-due portfolio and the decrease in the credit balance. The *FND* and *SHF* reflected the highest default levels, with 16.9% and 9.13%, respectively.

Graph 99
Evolution of past-due portfolio of the development banks and development institutions
Left axis: Billions of pesos
Right axis: per cent

Data as of March 2022
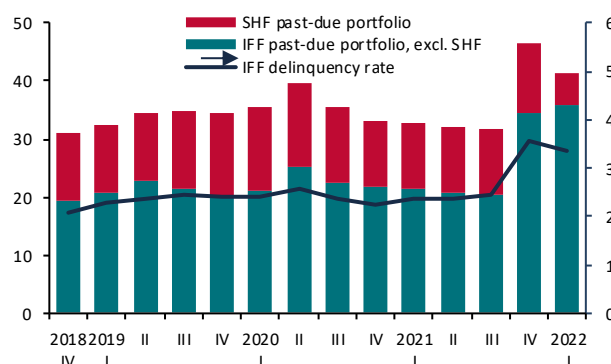Source: Banco de México, and CNBV

Credit induced by guarantees represents 2.7 times the contingent balance, i.e., hedging is on average 37%. The induced credit persists on a downward trend and recorded a real decrease of 3.7% in the last year. Among the outstanding factors associated with this result is the lower risk appetite of private financial brokers and lower demand for secured products, particularly from the *Nafin*.

The main funding sources of the sector are the promissory notes with interest payable on maturity (*PRLV*, its acronym in Spanish) and instruments issued, which in March 2022, have a participation of 66% and 25%, respectively. In March 2020, the development banks' cost of funding was below the 28-day *TIIE*; however, from that date on the cost increased to above the *TIIE* (Graph 100) as a result of the difficulties caused by the pandemic in placing instruments in the medium- and long-term. This cost has stabilized from 2021 and surcharges lower than in the previous year have been achieved in the new issuances made by some development banks. Thus, in the first quarter of 2022, the funding costs returned to levels below the 28-day *TIIE*.

Regarding market risk, three institutions maintain significant securities holdings, which are those reported

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[51] With the application of IFRS9 in 2022, the portfolio must now be classified through business models, which depend on the cash flows they generate for the institutions on performing their activities (Collecting Principal and Interest or Fair Value). The foregoing had an impact on the SHF's portfolio received in payment as a result of the 2009 crisis as it was reclassified to "fair value"; therefore, it is not part of the portfolio recorded in phases 1, 2 or 3.

[52] The commercial bank's figure also includes the balance of multi-purpose financial companies (SOFOMES, its acronym in Spanish) for having an equity linked with a bank, whether subsidiaries of the latter or not.

mainly with institutional clients. These institutions maintain adequate risk management and prudent investment structures, which are in line with their liability characteristics.

Graph 100
Evolution of development banks funding
Left axis: Billions of pesos
Right axis: Multiples
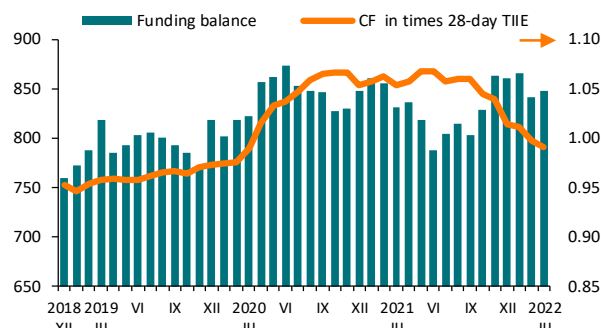
Data in current prices
Source: Banco de México

CF: Cost of funding in 28-day multiples TIIE (weighted average)

The liquidity risk indicators of some institutions recorded a certain degree of deterioration during 2020. Nevertheless, the liquidity conditions in development banks and other development financial institutions improved in 2021. This trend has been maintained through March 2022.

In March 2022, the development institutions reported a net income of 6,521 million pesos, a 28% improvement on the same period last year. This is due to, on the one hand, a decrease in the loan loss reserve that was recorded during 2022, and on the other hand, to greater benefits achieved in deferred taxes. The annualized ROE indicator is 0.71% (Graph 101).

Graph 101
Net income and ROE (12M) of the development banks and development institutions
Left axis: Billions of pesos
Right axis: Percent
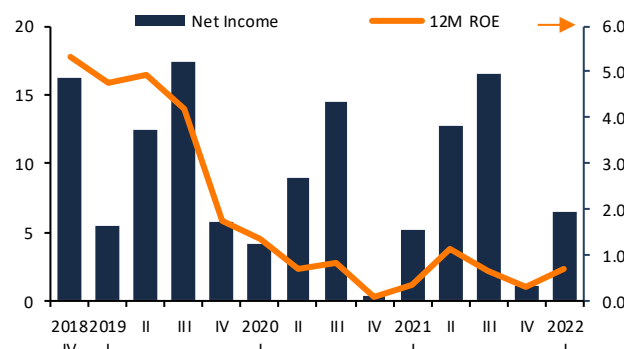
Data as of March 2022
Source: Banco de México, and CNBV

The financial margin in March 2022 was greater than in the previous year by 14%, which can be explained mainly by the increase in reference rates. Interest income increased by 36% and interest expense by 48%; however, the hike in the former was sufficient to offset the latter expense. The financial margin covered management and promotion expenses and the preventive credit risk estimates. Moreover, in the first quarter of 2022, the development banking system constituted preventive reserves 18% below the amount of the same period of 2021 (Graph 102).

Graph 102
Results indicators (regarding net productive assets)
Percent
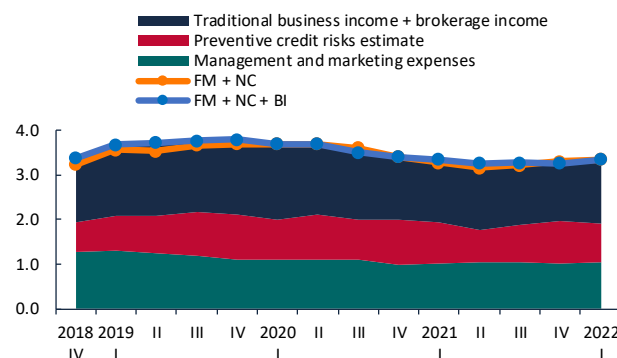
Data as of March 2022
Source: CNBV and Banco de México
Cumulative figures of the last 12 months
FM + NC + BI refer to the sum of the Financial Margin, Net Commissions and Brokerage Income

Figure 2

Credit and credit induced by guarantees granted by development banks and development institutions
Millions of pesos
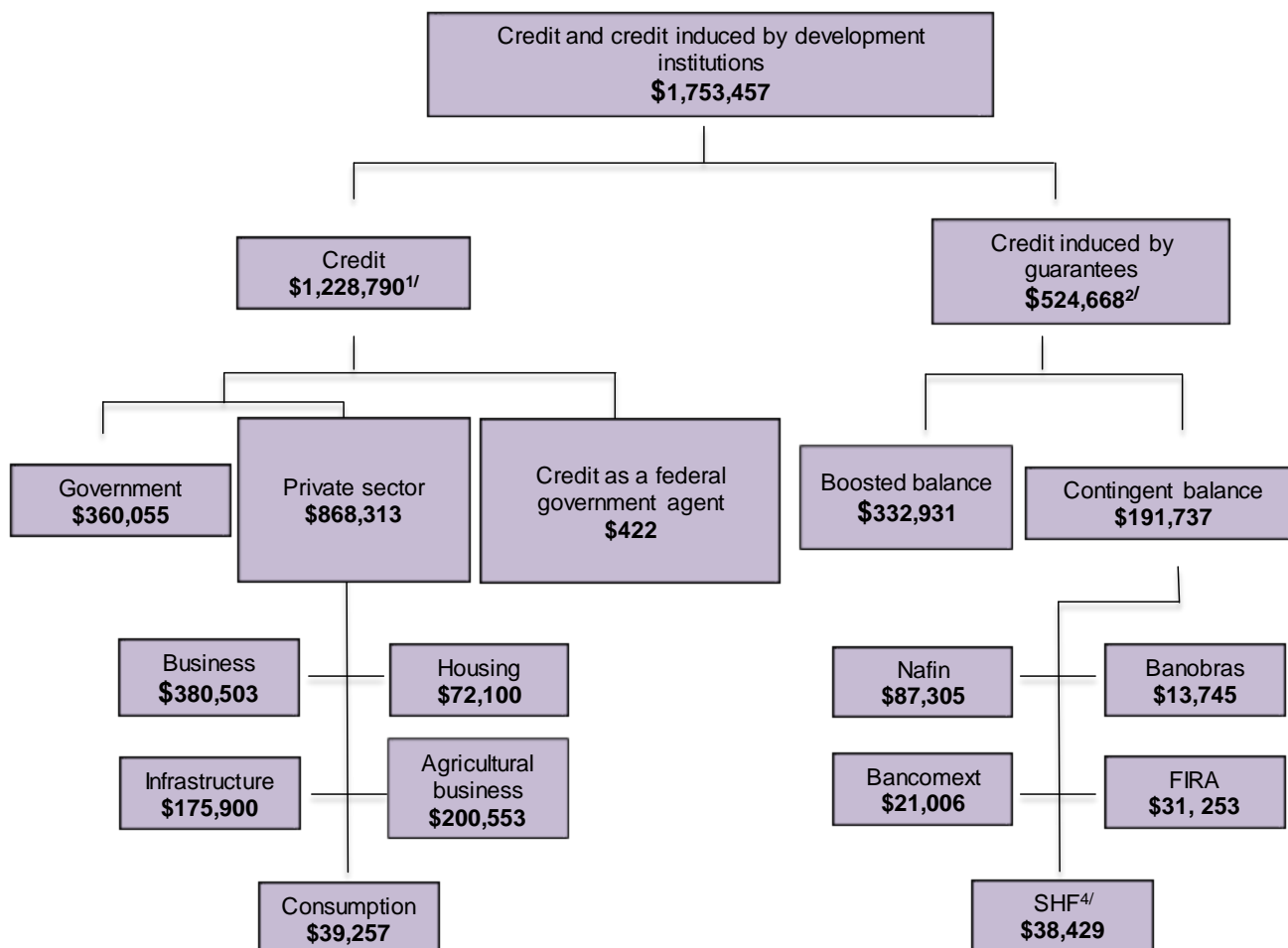
Data as of March 2022

Source: Banco de México

1/ Amount of credit from development financial institutions' balances

2/ Net indiced credit refers to the total credit and balance granted by different private financial brokers, which is partially guaranteed by the development bank, FIRA, and the FND. This is not funded directly by the development institutions.

3/ Consumer credit consists of credit granted to the armed forces served by Banjercito, payroll loans granted by Banco del Bienestar, and loans granted to employees of development institutions associated with their employment benefits.

4/ Includes guarantees granted by the SHF's mortgage credit insurance entity (*SCV*, its acronym in Spanish).

V.3.2.1. Federal housing fund (*Infonavit*) and *Fovissste*

Federal Housing Fund (*Infonavit*)

The *Infonavit* is the main grantor of housing financing in the country. As most of its borrowers are in the lower income brackets, they are particularly vulnerable to employment shocks. They are also prone to reductions in their disposable income in real terms. At the end of February 2022 (bimonthly data), the *Infonavit* had 20.8 million active claimants, with an annual growth of 6%. The number of employment relationships that received contributions registered an annual growth of 7.2% to reach 22.2 million. Almost 73% of the employment relationships that received contributions at that date was to claimants with income reported as being less than or equal to six Measurement and Update Units (*UMA*, its acronym in Spanish).

Following the increase in non-performing loans ratio in the Institute's mortgage portfolio, it reached its maximum level in February 2022 to then decrease by 0.3 percentage points in March (Graph 103). This decrease is explained by the annual growth of the past-due portfolio balance that continues to be registered month on month from August 2020, although at an ever-slowing rate, whereas the balance of the current portfolio recorded a contraction throughout the same period.

Graph 103

Infonavit's non-performing loan ratio (mortgage portfolio)[1/]

Percent
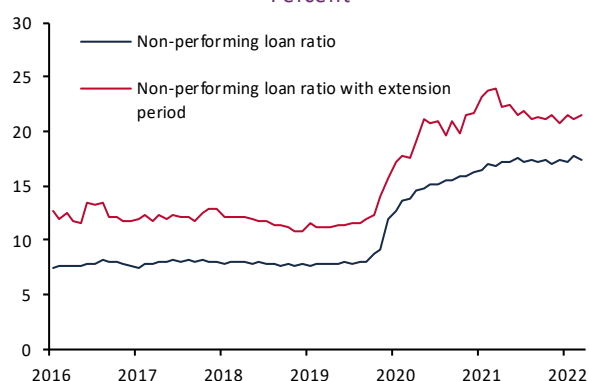
Data as of March 2022

Source: Banco de México (SIE)

1/ The non-performing loan ratio is defined as the ratio of non-performing loans divided by the total portfolio. The non-performing loan ratio with extension period is defined as the ratio between the sum of the non-performing loans plus the portfolio in a situation of payment extension (up to 6 months), divided by the total portfolio.

The past-due mortgage portfolio balance increased by 2.9% annually in real terms at the end of the first quarter of 2022. The growth of this portfolio can be partly explained by the maturity of extensions and the consequent transfer of current portfolio to past-due portfolio. The foregoing is due to the borrowers' employment situations not changing, when their loan payment suspensions mature, and them not being able to repay their loans. The increase can also be explained by the effect of greater indexing rates for loans denominated in minimum wage multiples.

Nevertheless, the credit balance of claimants in active formal employment and who repay loans through employment withholdings has continued to show real growth of 2.4% at an average annual rate from June 2021. On the contrary, the loan portfolios of claimants not in formal employment and who depend on the voluntary payment of borrowers to keep up to date has been contracting on average 2.7% in real terms since August 2021. This suggests an increase in the credit quality of the *Infonavit*'s portfolio.

Origination of the *Infonavit*'s mortgage loans continues to slow down. More than 235.6 thousand new loans were originated between October 2021 and March 2022, which represents 10.2% less than those placed in the same period of the previous year. The decrease is only 0.1% in terms of the nominal amount placed. As a result, at the end of March the current mortgage loan portfolio decreased by 1.9% annually in real terms (Graph 104). However, it increased 2.1% annually in real terms if loan repayment suspensions (accounted for as current) are excluded.

Graph 104

Infonavit and Fovissste: Current mortgage loan portfolio growth

Real annual percentage change
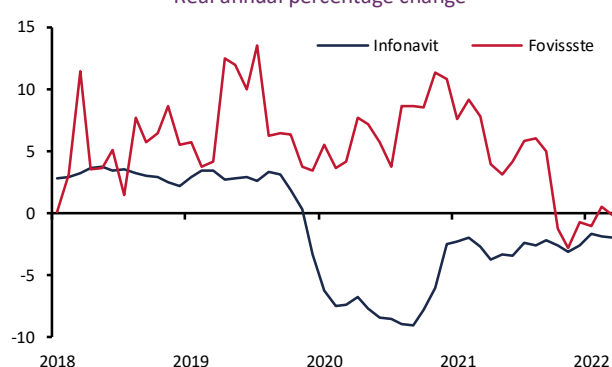
Data as of March 2022

Source: Banco de México

Faced with the foregoing situation, the *Infonavit* has modified its policies in order to support borrowers, as well as to stimulate the origination of credit. In particular, *Infonavit* implemented a program in May 2022 in order to encourage borrowers whose loans are indexed in minimum wage multiples (*VSM*, its acronym

in Spanish) to restructure their loans in Mexican Pesos at fixed rates, thereby avoiding increases of outstanding balances when the minimum wage is raised.[53] The *Infonavit* estimates that approximately 2.6 million loans will be converted.[54]

The greatest risk for the *Infonavit* is that its borrowers become unemployed and therefore interrupt their repayments of their loans to the Institute. Also, there is a risk that borrowers join the informal employment sector and do not voluntarily keep up with their repayments on not having payroll discounts. Another risk that the *Infonavit* must manage is the extension risk, which arises from the fact that contractually, the loan is canceled once 360 mortgage payments have been made but there is still an outstanding balance to be paid, and for which the Institute estimates and constitutes credit reserves. In this vein, the reserves coverage index calculated as a result of the credit reserves (Credit Risk + Extension Risk) divided by the total of the asset balance on the balance sheet, is currently at levels similar to those prior to the pandemic. The loan loss reserves have also reduced by 3.8% of the annual in real terms since May 2021. The coverage of credit reserves of past-due portfolio has remained stable since the last *Report*, although it continues below 100% (Graph 105).

Graph 105
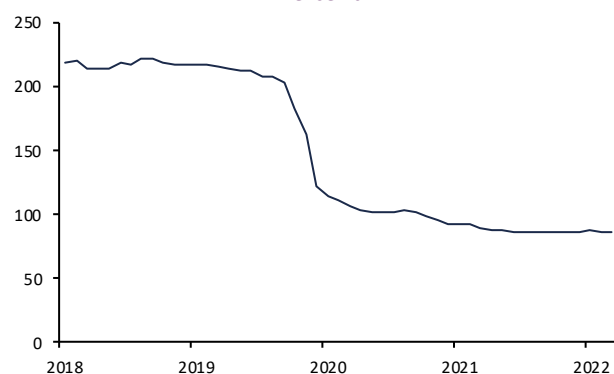**Infonavit's Loan Coverage Ratio** [1]
Percent

Data as of March 2022
Source: Banco de México (SIE)
1/ Calculated as the ratio between the credit reserves and past-due loan portfolio.

Finally, the *Infonavit* is working on the analysis and implementation of the IFRS9 accounting standards, which will allow it to improve the classification and the preventive reserves of the loan portfolio in relation to

the level of credit risk. The standard is expected to take effect in 2023.

Fovissste

Fovissste is the second largest participant in the housing mortgage market in the country and a stable performance of its mortgage loan portfolio is expected. At the end of March 2022, the non-performing loan ratio of the *Fovissste's* mortgage portfolio is 7.6%, which is 0.6 percentage points greater than the level observed in the last *Report* (data as of the end of September 2021) and after having reached the maximum level from the beginning of the pandemic of 7.9% in January 2022 (Graph 106).

Graph 106
Fovissste's non-performing loan ratio [1]
Percent
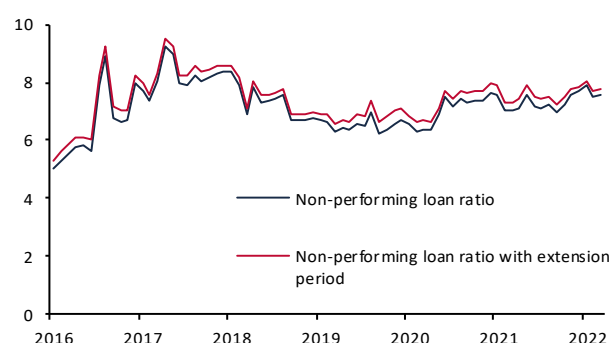
Data as of March 2022
Source: Banco de México (SIE).
1/ The non-performing loan ratio is defined as the raio of non-permorming loans divided by the total portfolio. The non-performing loan ratio with extension period is defined as the ratio between the sum of the non-performing loans plus the portfolio in a situation of payment extension (up to 6 months), divided by the total portfolio.

In the last six months, the current credit portfolio recorded an annual contraction that contrasts with the sustained growth that had been observed through the third quarter of 2021 (Graph 106). For its part, the credit portfolio under repayment suspension, --which is part of the current portfolio-- reflected a sustained contraction from September 2021, although from a small base. A contraction in the past-due portfolio was registered during the fourth quarter of 2021; however, it must be noted that an annual sustained increase in real terms has been observed from November 2021 onwards. At the end of March, this portfolio recorded an annual increase of 8.8% in real terms.

Contrary to what happened in the case of the *Infonavit*, for the *Fovissste*, the balance of the portfolio in the

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ordinary repayment scheme decreased in real terms from September, whereas the portfolio in the special repayment scheme has been growing at higher rates since December 2021. It must be borne in mind that the latter scheme accounts for the portfolio of borrowers who lost their jobs, in this case Government or Public sector employees and that therefore, their loans cannot be paid via direct payroll withholdings. Nevertheless, the portfolio in the special repayment scheme only represents 11.9% of the total mortgage portfolio.

Employment stability of *Fovissste* claimants is an element of strength for its financial situation that can be observed in the small fraction of its loan repayment suspended portfolio in terms of the total portfolio. In addition, the contributions of employees entitled to the *Fovissste* showed a recovery in the first quarter of this year on growing at an average annual rate close to the long-term average. In May of this year, the *Fovisste* launched a program to stimulate the early liquidation of mortgage loans for eligible borrowers.[55]

The *Fovissste* has moved forward with its program to restructure credits indexed in Measurement and Update Units (*UMA*, its acronym in Spanish) to Mexican pesos, although at the end of December 2021, most of the credits are still in minimum wage multiples (*VSM*, its acronym in Spanish) or *UMA*s; therefore, there is an impact on outstanding credit balances as a result of the increase in the indexing rate. Nonetheless, the past-due portfolio coverage index is at adequate levels and is sufficiently covering the past-due balance.

In addition to the contributions and repayment of loans collected by the *Fovissste*, it also has alternative liquidity to continue granting mortgage loans through portfolio securitizations (with property transfers) by issuing trust certificates to the investor community.[56]

V.3.3.   *Siefores* and investment funds

V.3.3.1. *Siefores*

Although in March 2022 siefores registered an increase in their managed funds compared to September 2021, which continue to make them the main institutional investors in the country, there is the risk that the volatility of the international markets will affect the capital gains of these funds.

Indeed, during the first months of 2022, siefores presented the capital losses in their investments, which led to a decrease in cumulative capital gains, mainly as

a reflection of the volatile conditions of the international financial markets that affected siefores' investments in foreign securities (Graph 107).

Graph 107
Cumulative capital gains of *Siefores*
Billions of pesos
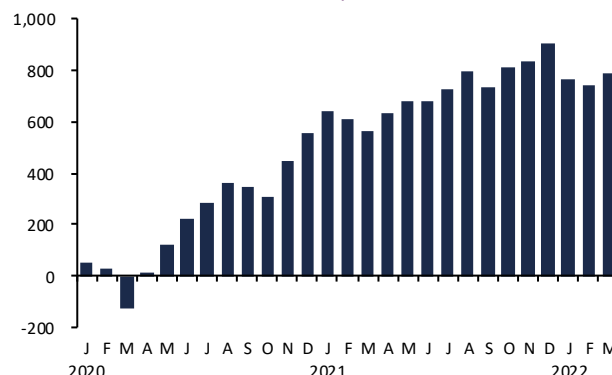
Data as of March 2022

Source: CONSAR

Thus, although in general between September 2021 and March 2022, *siefores* have remained relatively stable in terms of their risk-return ratios, some of them have recorded increases in their risk indicators (tracking error), which at the same time have improved their profitability. This shows that siefores have a suitable risk management (Graph 108).

Graph 108
Tracking error and total net yield
Percent
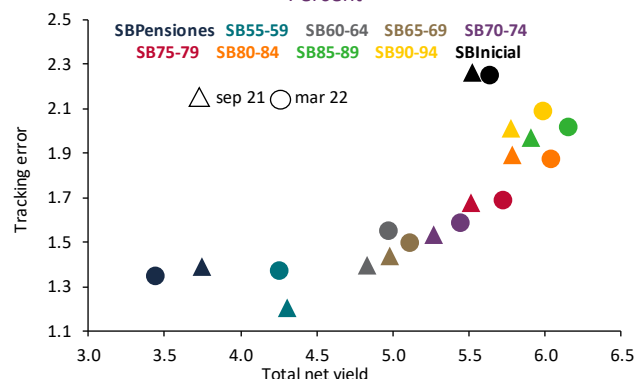
Data as of March 2022

Source: Banco de México, and Consar

In terms of portfolio composition, the share of investments in government securities decreased compared to the levels recorded in September 2021, whereas increases in investments in structured instruments, domestic-equity, and to a lesser extent,

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[55] Please refer to the *Fovissste* Press Release of May 8, 2022.

[56] Securitized assets are credits denominated in VSM that originated at fixed rates and with high ratings.

foreign securities were observed in the same period (Graph 109).

Graph 109
Composition of *Siefores*' portfolio
Right axis: Trillions of pesos
Left axis: Percent
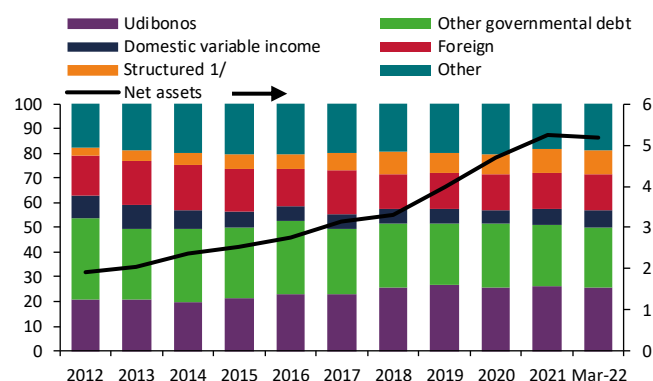
Data as of March 2022

Source: CONSAR

1/ Includes CKDs, CERPIS and FIBRAS

In March 2022, withdrawals due to unemployment remained at high levels, although they only represented approximately 4% of the contributions received by pension funds manager for the first two months of 2022; therefore, the risks arising from these outflows remain limited.

In order to incentivize improvements in Pension Funds' risk management practices, in December 2021, the rules on the composition of the special reserve to be maintained by these managers in their basic *siefores* [57] were modified to protect their funds against possible capital losses arising from the non-compliance of the investment system for reasons other than valuation, with which the net assets of this reserve decreased from 0.71% to 0.55%. Additionally, and in compliance with certain conditions, these reserves could be reduced gradually until they reach 0.11% of the net assets managed by *siefores*.[58] These amounts, according to the National Commission for the Pension System (*Consar*, its acronym in Spanish), are congruent and sufficient to cover the potential capital losses that may result from the non-compliance with the investment system; therefore, the reduced amount of reserve would not

have any consequences that affect the interests of the working population.

Moreover, and as mentioned in the previous *Report*, the adjustment to the maximum commissions that pension fund managers may charge came into force on January 2022. This adjustment is based on the provisions of the Pensions System Reform, which took effect on January 1, 2021. The Reform limits the commissions charged by pension fund managers to a maximum, which will result from the arithmetical average in terms of commissions in the contributions systems defined in the United States of America, Colombia, and Chile. The resulting average is 0.566% as an annual commission (considering basic *siefores*) on the balances managed.

V.3.3.2. Investment funds

From the end of 2021 and until May 2022, the behavior of the investment funds sector has been mixed. On the one hand, fixed income funds resumed growth following several months of decline or stagnation. On the other hand, following several months of growth, equity funds decreased their assets under management (AUM), as a consequence of outflows and valuation losses.

As of May 31, 2022, the investment funds sector consisted of 246 fixed income funds, which manage 1,946 billion Mexican pesos of total net assets and 370 equity funds, which manage assets in the amount of 871 billion of pesos.

Whereas, in nominal terms, AUM by fixed income funds have increased by 6.03% compared to year-end 2021, whereas equity funds have reduced their AUM by 9.03%, thus reducing their participation in the sector's total assets by 2%, in contrast to the growth observed from mid-2020 (Graph 110).

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[57] Modifications to the General Provisions that establish the Employer Scheme to which Retirement Fund Managers are to be Subject, the PENSIONISSSTE, and the Specialized Retirement Funds and Special Reserve Management Companies, published by the CONSAR in the Federal Official Gazette on December 31, 2021.

[58] This reduction may be equivalent to 0.05% on a single occasion provided that the prudent capitalization guidelines are met. The remaining 0.06% may be reduced gradually through an annual reduction of 0.02% subject to the confirmation of certain asset selection and evaluation requirements, as well as operating requirements under the best risk and information practices.

Graph 110
Investment funds' net assets
Billions of pesos
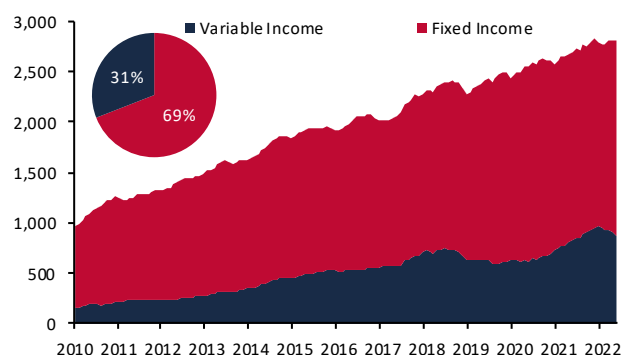
Data as of May 2022

Source: Banco de México using CNBV data

The increase in AUM by fixed-income funds is associated with a recovery, both of yields (Graph 111) as well as flows, compared to the year-end 2021. So far in 2022, these funds reflect a cumulative flow of 67.77 billion pesos, which represents 3.69% of AUM in December 2021 (Graph 112).

Graph 111
Monthly yields from fixed income funds[1, 2]
Percent
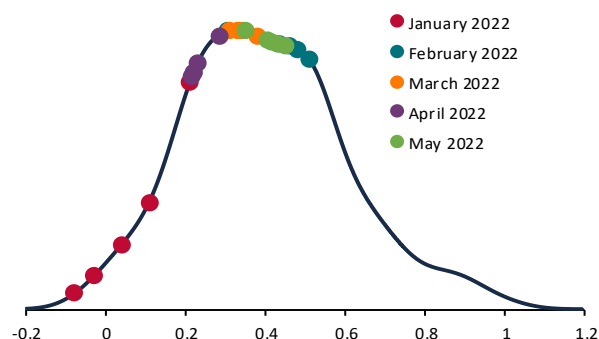
Data as of May 2022

Source: Banco de México using CNBV data and Morningstar Direct.
1/ Each point relates to the average of the daily observations of monthly yields of one week of the month.
2/ The distribution refers to the weekly average of monthly yields from January 2016

Graph 112
Cumulative flows of investment funds [1]
Billions of pesos
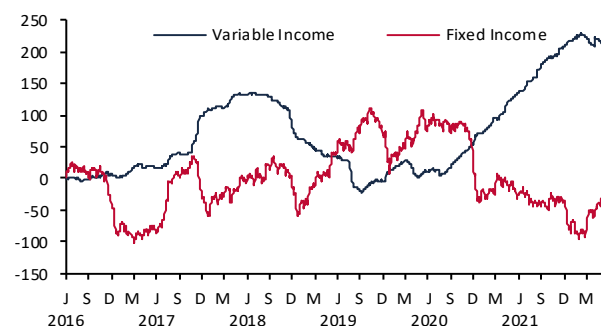
Data as of May 2022

Source: Banco de México using CNBV data

1/ Flows accumulate from June 2016

At the beginning of 2022, equity investment funds continued with the upward trend in their AUM, as observed since the second half of 2020. However, this trend came to a halt in mid-February that resulted in a negative cumulative flow of -18.84 billion pesos up to May 31, 2022 (Graph 112). In general terms, monthly returns have been negative and below the average distribution of the last five years (Graph 113).

Graph 113
Monthly yields from variable income funds[1, 2]
Percent
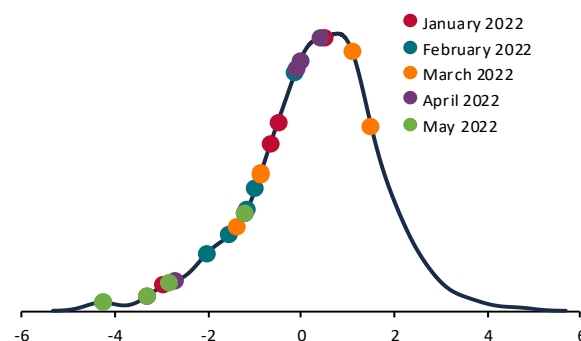
Data as of May 2022

Source: Banco de México using CNBV data and Morningstar Direct.
1/ Each point relates to the average of the daily observations of monthly yields of one week of the month.
2/ The distribution refers to the weekly average of monthly yields from January 2016

The types of assets that have suffered the greatest decreases within the equity funds portfolios are: shares from commercial and services industries, stock-referenced certificates, (*TRACS*, its acronym in Spanish) and stock quoted in the International Listing System (*SIC*, its acronym in Spanish). These assets have a significant

proportion within the composition of their portfolios, as of May 31, 2022, they represented 16%, 43% and 15%, respectively (Graph 114). Within the shares from commercial and services industries, the sectors that have incurred the greatest losses for valuation are: construction materials, industrial and telecommunications, which, as a whole, represent 53% of the total of shares in the equity investment funds system (Graph 115).

Graph 114

Composition of variable income investment funds portfolio

Percentage
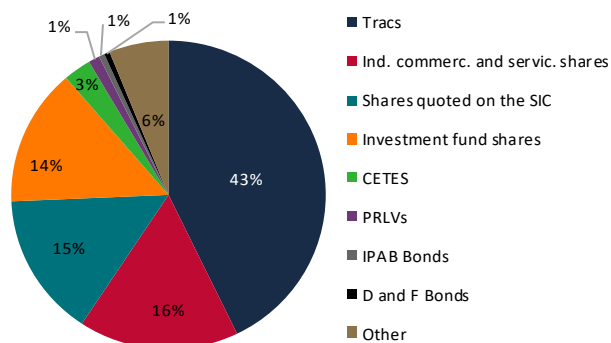
Data as of May 2022

Source: Banco de México using CNBV data

Graph 115

Change in the amount of shares in variable income funds portfolios at end of December 2021

Billions of pesos
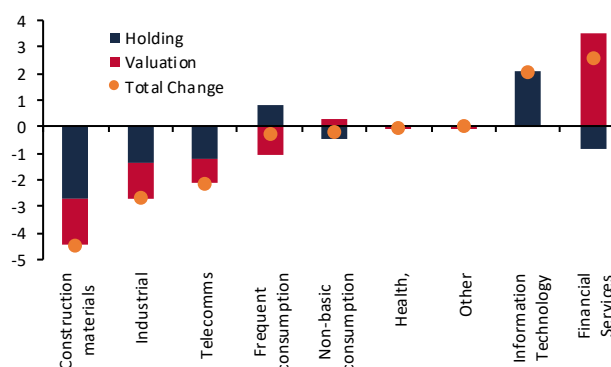
Data as of May 2022

Source: Banco de México using CNBV data

V.3.4. Broker-dealers

Since the last *Report*, broker-dealers continued to increase their investments in securities, although at a lower rate up to January 2022, to then contract in real annual terms for the rest of the first quarter of the year. This dynamic can be explained particularly by the fall in

investments in government securities. In the case of banking instruments, the contraction rate that began at the end of 2020 continued throughout the period, whereas investments in shares registered a contraction from January of this year in a context of financial market volatility associated with the global uncertainty.

Although the sector's leverage had been increasing during 2021, it reduced slightly from the fourth quarter of 2021 and remained stable throughout the first quarter of the year, while at the same time its liquidity situation remains stable. Also, broker-dealers' profitability, measured as the ratio of net income to stockholders' equity using a 12-month window, shows a slight increase from the last *Report* (Graph 116).

Graph 116

Leverage, liquidity, and ROE

Left axis: Percent

Right axis: Multiples
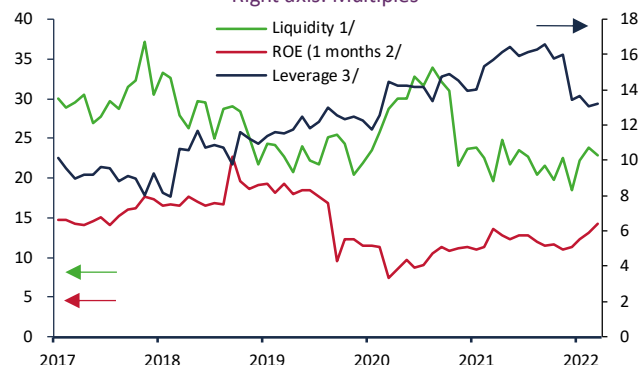
Preliminary data as of March 2022.

Source: Banco de México and CNBV.

1/ Liquidity = Current asset balance at month end / Current liability asset balance at month-end *100. Where:
Current Assets = Cash and Cash Equivalents (Cash + Banks + Other cash and cash equivalents + Currencies receivable) + Unrestricted Negotiable Instruments + Unrestricted Readily Marketable Instruments + Repurchase Debtors + Accounts Receivable.
Current Liabilities = Short-term bank loans and from other bodies + Repurchase Creditors + Other Accounts Payable

2/ ROE = 12-month return on net flows / 12-month average Stockholders' Equity.

3/ Leverage= (Current liability balance at month end - Creditors on transactions settlements at month end) / Stockholders' equity balances at month-end.

The market risk to which broker-dealers are exposed, measured using the CVaR as a percentage of net capital, recorded a decrease from 17.43% to 12.66% in April compared to the same month of the previous year (Graph 117). So far this year, although the general trend seems to be downwards, there was a slight peak in March and April. This decrease is the result of the rebalancing of short- and long-term positions. These adjustments consisted of a reduction of the direct

position in fixed rates and long-term debt instruments, thereby reducing the sensitivity of portfolios to interest rate movements.

Graph 117

99.9% Conditional Value at Risk (*CVaR*) for broker-dealers' market risk
Percent of net capital

Data as of April 2022

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

The duration of the debt instruments portfolio calculated based on market information, which measures the sensitivity of broker-dealers' portfolios to changes in interest rates continued to reflect a downward trend over recent months and compared with the prior year, it decreased from 0.805 years in April 2020 to 0.704 years in April 2022. This decrease is due mainly to the reduction in the positions of the private issues and long-term debt instruments.

V.3.5. Insurance companies and bonding Institutions

The recovery of the insurance and bonding sector continued with an increase in written premiums in the first quarter of 2022. Moreover, the cost of claims began to decrease in 2022 after showing historically high levels in the second half of 2020 and during 2021. As a consequence, earnings registered an increase, although they remained at levels below those observed before the pandemic. Overall, the sector continued to show adequate solvency indexes.

At the first quarter of 2022, the insurance and bonding sector consisted of 113 institutions in total, with 103 insurance companies and 10 bonding institutions. The sector's assets amounted to 2.06 trillion pesos, reflecting an annual growth of 1.1% in real terms. The

sector's assets represent 7.8% of the total assets of the financial system.

At the first quarter of 2022, the sector recorded a growth rate of direct premiums of 2.4%[59] (Graph 118), below the average real growth rate between 2007 and 2021, which was approximately 5.7%. The recovery of written premiums has been irregular among sectors. Accident and Health insurance continued to grow driven by the three segments it covers, with Medical Expenses, Personal Accident and Health insurance increasing by 8.8%, 14.9% and 53%, respectively. Also, the Casualty segment recorded growth. However, the Auto segment, which is the most important component, continues to decrease due to lower production, and sales of new cars. For its part, the Pensions insurance showed almost zero growth due to an elevated base for comparison, as the number of resolutions in the previous year that enabled beneficiaries to receive their Social Security pensions was higher. Moreover, life insurance decreased in annual terms due to the reduction of insurance policies with savings components (Table 5).

Graph 118
Real annual growth of the written premium of the insurance and bonding sector [1/]
Percent
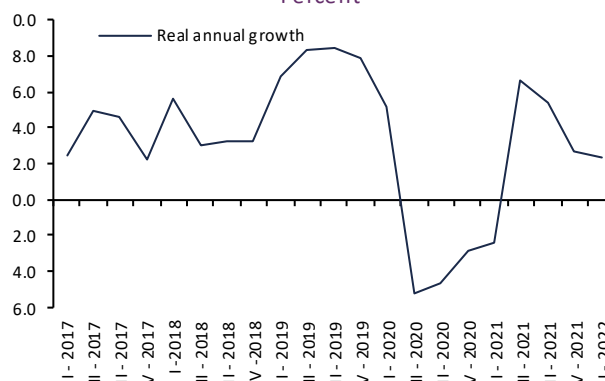
Data as of March 2022

Source: CNSF

1/ Cumulative growth compared to the same quarter last year

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

Table 5
Market share and real growth per segment
Percent

Transaction	Participation of Portfolio (%)	Annual real growth (%)
Life	40.0	-3.9
Pensions	5.6	0.4
Accidents and Sickness	19.0	10.1
General Insurance excl. Auto	18.4	14.8
Auto	15.4	-1.0
Bonds	1.7	3.2
Insurance and Bonding Market	100	2.4

Data as of March 2022
Source: CNSF

With regard to the contribution to real annual growth of premiums, Accident and Health, and Casualty insurance segments, excluding, auto, were the branches that contributed the most (Graph 119). In 2022, the increase in the issuance of premiums will be subject to the risks associated with the performance of the Mexican economy.

Claims have remained at high levels since the second half of 2020 but reduced by 4.9% in the first quarter of 2022 compared to the same quarter of 2021. In particular, Life insurance recorded a significant annual decrease due to the lower number of claims due to the pandemic. Accidents and Health also recorded a recent decrease due to lower claims in the Medical Expenses segment, after having maintained a positive trend in the second half of 2020 and during 2021.

Graph 119
Contribution to the real annual growth of the written premiums of the insurance and bonding sector
Percent
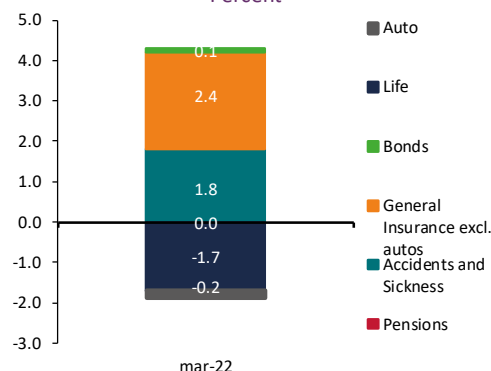
Data as of March 2022
Source: CNSF

The sector's investments are concentrated mainly in government securities, followed by investments in variable-income securities and private debt instruments, and to a lesser extent, in foreign securities, as well as in derivative products transactions. It must be emphasized that in the last year, the investment portfolio underwent a rebalancing from private debt to variable-income instruments.

In 2020 and 2021, the sector achieved positive earnings, although they were considerably lower than those observed before the pandemic. In the first quarter of 2022, the sector as a whole recorded a 26.9% increase in earnings compared to the first quarter of 2021 due to lower required reserves and to a reduction in the cost of claims. The sector's profitability risks are associated with the increase in the issuance of premiums and occurrence of claims.

The sector continues to show highly solvency indexes. The Technical Reserves Coverage Index[60] (*ICRT,* its acronym in Spanish) and the Capital Solvency Requirement Coverage Index [61] (*ICRCS*, its acronym in Spanish) were at levels of 1.06 and 2.7, respectively, which indicates that investments are sufficient to meet the obligations contracted with policyholders (Graph 120).[62] There is also a reserve for catastrophic risks given the country's exposure to natural disasters such as earthquakes or hurricanes that may be exacerbated by climate change (hydro-meteorological risks), which at the first quarter of 2022, represented 3.1% of the

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[60] The technical reserves coverage index is calculated by dividing the investments that support the technical reserves by the total reserves. When this index is greater than or equal to one, it means that the institution has sufficient resources to meet its obligations.

[61] The Capital Solvency Requirement Coverage Index (*ICRCS*, its acronym in Spanish) is calculated by dividing the sum of own admissible funds

that support the Capital Solvency Requirement (*RCS*, its acronym in Spanish) by the amount of the capital solvency requirement. When this index is greater than one, it means that the institution has sufficient resources to cover unexpected losses.

[62] In March 2022, two institutions, which together represent 0.10% of the sector's assets, recorded a shortfall in their *ICRCS*.

total technical reserves. Therefore, the Mexican insurance sector has sufficient liquid reserves to cope with risks without putting the stability and solvency of the sector at risk.

Graph 120
Coverage indexes for the insurance sector
Percent
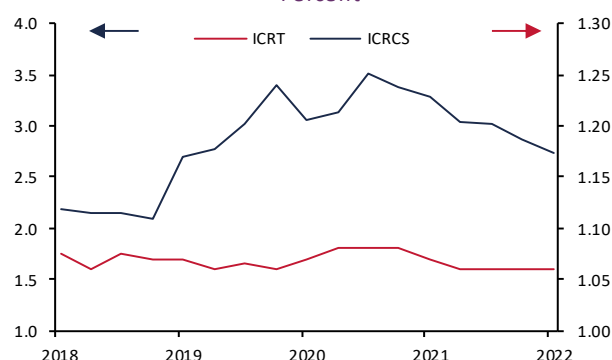
Data as of March 2022
Source: CNSF

V.3.6. Other Non-Bank Financial Intermediaries

Regulated and non-regulated financial entities that are part of the financial system, including other companies that, among other activities, are engaged in credit intermediation activities regularly and professionally in the country (referred to jointly as Other Non-bank Financial Intermediaries -*OIFNB,* its acronym in Spanish) complement the country's banking activity by providing financing to various sectors. Due to their small size and limited interconnection with the banking and financial system in general, they are not of systemic importance; however, it is relevant to mention that they continue to face challenges (Table 6).[63]

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[63] This section evaluates the situation of non-banking financial intermediaries that grant credit. However, other non-bank intermediaries are discussed in other sections of this Report that provide resources to the financial and non-financial sectors (public and private) through the purchase and holding of debt securities issued by the different sectors. This market financing is relevant for the economy, as can be seen in Table 3, Institutions of the Financial System. The non-bank financial intermediaries that grant this type of financing include broker-dealers, investment funds, pension funds, and the insurance sector.

Table 6

Other non-banking financial brokers and activities not subject to banking regulation [1]

Entity / Instruments / Activity		Risk of:			Those that participate in credit brokering other than banking	Total assets			Regulation by:			Supervisor / Regulator
		Maturity transforma-tion	Leverage	Funding problems		Billions of pesos	% of GDP	Real annual growth in percent	Capitaliz-ation	Liquidity	Leverage	
Socaps (levels 1 to 4)		✓	✓		✓	215	0.8	2.2	✓	✓		CNBV
Sofipos (levels 1 to 4)		✓	✓	✓	✓	36	0.1	0.6	✓	✓		CNBV
Credit unions (levels 1 to 3)		✓	✓		✓	61	0.2	-5.0	✓	✓		CNBV
Regulated Sofomes	With links with a bank and consolidated with that bank	✓	✓			337	1.2	3.5	✓	✓		CNBV
	With links with a bank but not consolidated	✓	✓			63	0.2	-6.3	✓	✓		CNBV
	No links with a bank and issues debt 2/	✓	✓	✓	✓	189	0.7	-9.5				CNBV
Non-regulated Sofomes 3/		✓	✓		✓	516	1.9	-14.2				
Specialized financial credit, lease or factoring companies 4/		✓	✓		✓	338	1.2	-17.6				
Consumer credit companies 5/		✓	✓		✓	63	0.2	-1.3				
Securitizations of financial entities 6/ 7/		✓	✓		✓	481	1.7	-5.1				CNBV
Securitizations of non-financial entities 6/ 8/		✓	✓			280	1.0	-23.4				CNBV
Total non-banking financial brokers and activities						**2,241**	**8.1**	**-11.5**				
Real Estate and Infrastructure Trusts (REITs) 6/			✓			449	1.6	13.3			✓	CNBV
Mortgage trusts (excluding REITs) 6/		✓	✓		✓	8	0.03	-13.2			✓	CNBV
Development Capital Certificates (DCC) 6/			✓			395	1.4	23.5			✓	CNBV
Energy and infrastructure trusts (*FIBRA E, its* acronym in Spanish) 6/			✓			125.8	0.5	13.3			✓	CNBV
Investment projects senior trusts bonds (*CERPIS, its* acronym in Spanish) 6/			✓			61.8	0.2	64.5			✓	CNBV
Total infrastructure financing vehicles						**1,039**	**3.8**	**19.0**				
Total of financial brokers, infrastructure financing vehicles and activities						**3,280**	**11.9**	**-3.7**				
Other credit brokers or activities 9/					✓	3,904	14.1	-3.3				CNBV/CNSF
Capital investment funds 10/						0	0.0	n/a				
Pensions funds 11/						5,750	20.8	-1.6				CONSAR
Commercial bank		✓	✓	✓		11,864	42.9	0.8	✓	✓	✓	CNBV/Banxico

Preliminary data as of March 2022

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

1/ The red marks indicate cases in which the risk described may materialize or does materialize currently in some of the entities within the specific sector in Mexico. The risks in the columns are defined as: (i) term transformation risk: the risk that gestates from obtaining short-term funding to invest in long-term assets (maturity mismatch); and (ii) the leverage risk: the risk that gestates when using techniques or strategies that require funds to be lent to then acquire assets in order to increase potential investment profits (losses).

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

3/ The figures referring to the number of non-regulated sofomes is taken from the Commission's Registry - RECO (Condusef). The data on assets is not available; therefore, an approximation is made with the size of the total credit portfolio granted by the entities and reported to the Condusef. The credit portfolios of non-regulated Sofomes that only grant credit to related or affiliated entities are not considered on their not being credit brokers in the strictest sense. The figures of non-regulated Sofomes collected by the Condusef are subject to changes as the authority follows validation processes.

4/ These are companies that take on indebtedness but are no financial entities under Mexican law. For example, the financial arms of auto manufacturers and commercial credit or leasing companies. The figures shown here only include those that issue debt in the financial markets. It must be mentioned that two entities changed their purpose by changing from regulated and non-regulated Sofom, respectively, for both to assume the purpose of financial company; therefore, the growth of this caption is affected by reclassification.

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

6/ Relates to the outstanding value a market prices.

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

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

9/ Includes fixed income investments funds, locally traded debt funds (ETFs) depositaries, stockbrokers and credit insurers.

10/ Includes investment funds in capital instruments and locally traded debt funds that follow stock market indexes.

11/ Includes Siefores.

Table 7
Assets and Liabilities of Other Non-Bank Financial Intermediaries (OIFNB)

	Savings and Loan Cooperatives (socaps)	Popular Finance Corporations (sofipos)	Credit Unions	Regulated Sofomes for issuing debt, with no links to banks	Listed non-regulated Sofomes 1/	Unlisted non-regulated Sofomes 2/	Debt-issuing financial corporations	Credit cards granted by listed Department Stores
Total assets	**225.2**	**38.5**	**61.9**	**213.6**	**84.5**	**n/a.**	**337.8**	**304.6**
Credit Portfolio	120.38	24.6	46.8	163.7	58.9	457.6	290.8	n/a.
Other assets	104.9	13.9	15.0	49.9	25.6	n/a.	46.9	n/a.
Liabilities	**189.16**	**31.6**	**49.6**	**169.1**	**63.6**	**n/a.**	**250.5**	**127.1**
Fund deposits	176.3	24.7	n/a	n/a	n/a	n/a	n/a	n/a
On-demand	101.7	4.3	n/a	n/a	n/a	n/a	n/a	n/a
Term Deposits	74.6	20.4	n/a	n/a	n/a	n/a	n/a	n/a
Banking funding	0.1	2.1	10.6	80.4	17.5	72.1	133.0	0.0
Short term	0.0	1.9	6.5	48.0	10.7	33.5	72.7	0.0
Long term	0.0	0.1	4.1	32.5	6.8	38.6	60.3	0.0
Market funding	0.0	0.1	0.0	42.7	41.4	n/a.	54.1	38.4
Short term	0.0	0.1	0.0	42.7	41.4	n/a.	30.6	1.5
Long term	0.0	0.0	0.0	0.0	0.0	n/a.	23.4	36.9
Other liabilities 3/	12.8	4.8	39.0	46.1	4.7	n/a.	63.4	39.0
Equity	**36.1**	**6.9**	**12.2**	**44.5**	**20.9**	**n/a.**	**87.3**	**177.5**
MEMO: Main Indicators								
NPL ratio 4/	4.6	9.0	5.1	2.4	3.8	6.8	2.5	2.9
Coverage ratio 5/	127.6	104.7	59.0	132.6	n/a.	n/a.	n/a.	n/a.
Liquidity 6/	19.7	13.5	20.8	15.0	n/a.	n/a.	n/a.	n/a.
Leverage 7/	6.2	5.6	5.2	5.0	4.1	n/a.	3.9	1.7
Profitability 8/	6.0	-0.5	2.7	2.3	1.9	n/a.	3.1	3.7

Preliminary data as of March 2022 | Note: n/a. = not available and n/a. = not applicable

Source: Banco de México, BMV, CNBV and Condusef

1/ By being non-regulated intermediaries, market funding refers to issuances on international markets.

2/ By being non-regulated intermediaries, only information on the total credit portfolio and banking funding is available.

3/ Other liabilities includes (figures in millions of Mexican pesos):

 - Socaps: loan provisions (7.1), other accounts payable and deferred liabilities (5.4), loans from other financial entities (0.3).

 - Sofipos: loan provisions (2.7), loans from financial entities (1.1) and other accounts payable and deferred liabilities (1).

 - Credit unions: loans from partners (33), loans from other financial entities (2.9), loan provisions (1.5) and other accounts payable and deferred liabilities (1.6).

- Sofomes regulated for issuing debt: loans from other financial entities (27), other accounts payable and deferred liabilities (5.8), various creditors (7.8) and loan provisions (5.5).

- Listed non-regulated Sofomes: other liabilities (3.1), other accounts payable (1.6).

- Specialized credit companies : other liabilities (44.9), suppliers and other accounts payable (11.8) and leasing liabilities (6.7).

- Consumer credit companies: other deferred liabilities (8), suppliers and other accounts payable (31).

4/ Non-performing loans to total portfolio, in percent.

5/ Loan provisions to non-performing loans, in percent.

6/ Liquid assets on short-term liabilities, in percent. Liquid assets include: cash and cash equivalents, investments in government and banking securities and repo debtors. Short-term liabilities include: traditional deposits (when applicable) and short-term loans.

7/ Total assets to Total equity, in times.

8/ Operating result over total assets, in percent

The financing granted by the *OIFNB* as a whole continues to contract in real terms at the end of March 2022 (Graph 121). Nevertheless, a slight decrease or stability in non-performing loan ratios has been observed since the last *Report* based on the type of entity, whereas profitability levels of most of the entities have reflected marginal increases (Graph 122 and Graph 123).[64]

Graph 121

a) Portfolio Growth of Regulated Non-Banking Financial Entities

Real annual change in percent
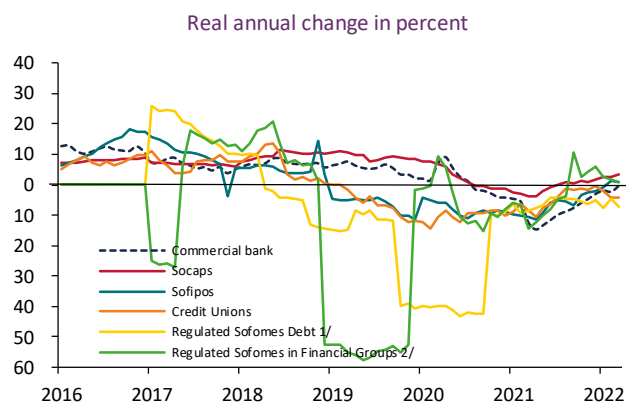
b) Portfolio Growth of Non-Regulated Non-Banking Financial Entities

Real annual change in percent
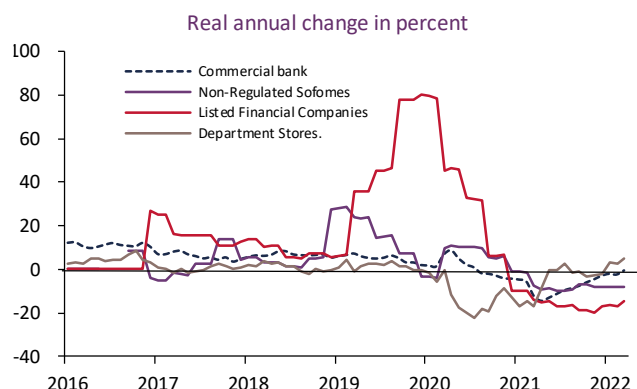
Preliminary data as of March 2022.

Source: CNBV, BMV, Condusef and Credit Bureau.

1/ The rise in financial companies' portfolios and the respective fall in regulated debt sofomes' portfolios is because NR finance changed from being a regulated debt sofom to financial company in September 2019. Additionally, Unifin changed from a Sofom ENR to a financial company in December 2018.

2/ The decrease in the portfolios of regulated sofomes in financial groups is because SabCapital began to consolidate its financial statements with the commercial bank in December 2018.

Graph 122

Non-performing loan ratio - Non-financial corporations

Percent
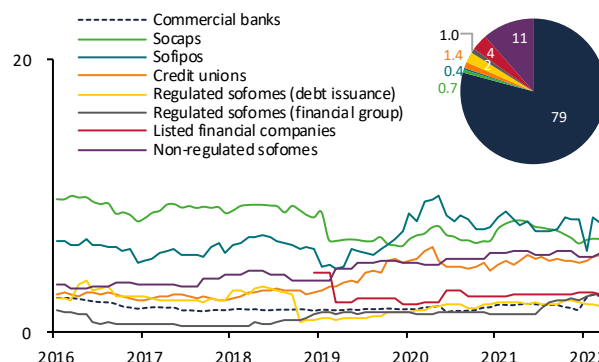
Data as of March 2022

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

Graph 123

Profitability of other non-banking financial intermediaries[1/]

Percent
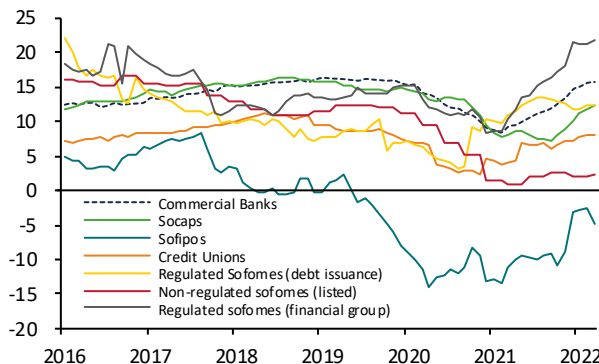
Data as of March 2022

Source: Banco de México, CNBV, and BMV

1/ It is calculated as the ratio between Net Income (12 months cumulative flow) and the average of shaholder's total equity in the last 12 months.

Moreover, the financing granted by the commercial banks to other *OIFNB*, after having reflected an accelerated contraction from the beginning of the pandemic in 2020, continues to decrease although at a slower contraction rate (Graph 124). In particular, commercial banks have reduced their exposure to the non-regulated sector (Graph 125).

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[64] For some institutions, in particular non-regulated, non-performing loan ratio levels are high in historical terms. Non-performing loans ratio levels of multi-purpose financial companies (*Sofomes*) have remained stable since the last *Report*. Non-performing loans ratios of the portfolios of non-regulated multi-purpose financial companies

(*Sofomes*) showed a slight decrease in December 2021. Non-performing loans ratio of the consumer credit portfolio is at low levels within the sector of listed financial companies that grant financing, whereas the corporate credit portfolio reflected a slight increase from small bases.

Graph 124
Financing received by OIFNBs from Commercial Banks and other sources
Real annual change in percent
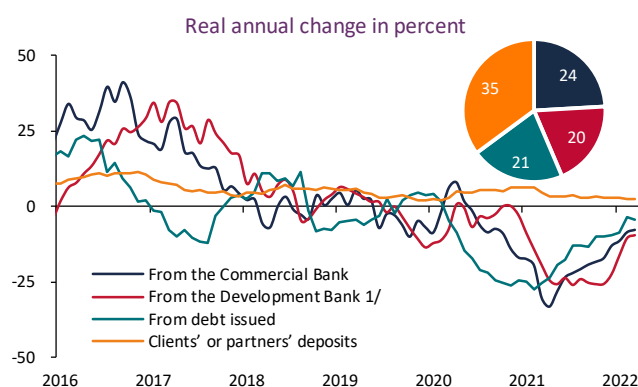
Preliminary data as of March 2022
Source: Banco de México and CNBV
1/ Development Banks' data as of December 2021.

Graph 125
Commercial banks' financing to financial entities by type
Percent of regulatory capital
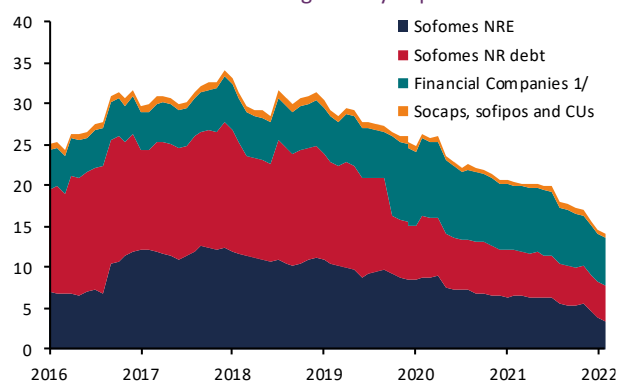
Preliminary data as of March 2022
Source: Banco de México and CNBV

1/ The increase in financial companies' portfolios and the respective decrease in regulated debt sofomes' portfolios is because NR finance changed from being a regulated debt sofom to financial company in September 2019.

Some types of entities depend on both long- and short-term market-based financing in order to fund their credit activities (Graph 126). Although some companies also placed debt in international markets during the period prior to the pandemic, they have faced tighter financing abroad in recent months. Some of them have turned to the local markets to place greater amounts. It is noteworthy that the placement cost in the local market for auto financial companies has recorded an increase since the last Report (Graph 127) and that the outstanding balance

of short-term debt for these companies, which recorded a slight growth in April 2022, is still 17% below the level observed before the pandemic.

Graph 126
Yield spread of short-term local debt issued by OIFNB
Basis points
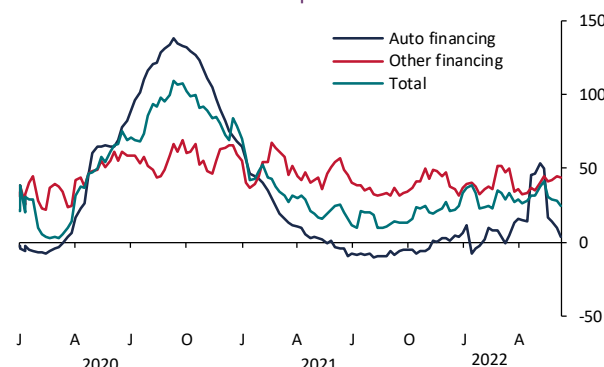
Data as of June 9, 2022
Source: BMV

Moreover, companies in the traditional Savings and Loan sector depend to a great extent on traditional deposits to fund their credit activities and have not reactivated their loan placement despite the increase in their deposit levels. In particular, the Popular Finance Corporations (*sofipos,* its acronym in Spanish) continue to register high non-performing loan ratio levels and low liquidity levels, and both their credit portfolios and traditional deposits reflect high concentrations. The largest company in the sector has recently recorded increases in its capitalization level to take it above the minimum; however, its profitability remains low. Although some of the largest *sofipos* are comparable to some medium-sized banks in total assets terms, they are subject to a different regulation although, in essence, it can perform activities similar to those of the banks.

The Savings and Loan Cooperatives (*socaps,* its acronym in Spanish)[65] have maintained non-performing loan ratio levels in its portfolio relatively stable and reflect adequate levels of capitalization and liquidity, whereas its profitability remains low with regard to the historical average (Graph 123 and Graph 128). This sector's portfolio has also shown real positive growth rates, although they have been low in recent months.

Due to their union nature, credit unions are specialized in certain sectors or economic activities, making it difficult to diversify their income sources, leading to a continuing contraction in their credit portfolio, although

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[65] *Socaps* are cooperatives in which a group of individuals make the company to gather the resources to then lend among themselves, thus

generating earnings on savings. They are also known as savings banks and are non-profit companies.

at lower rates. Credit unions receive financing through bank loans, from other parties and from their own partners to finance their credit activity. However, they are exposed to liquidity risk as most of their funding is short-term, although the financing from their partners has certain restrictions for withdrawals (Graph 127). The non-performing loan ratio levels of their portfolios remain high in historical terms, although their profitability levels have returned to their pre-pandemic levels (Graph 122 and Graph 123).

Graph 127
Liquidity indicator of non-banking financial intermediaries [1/]
Percent
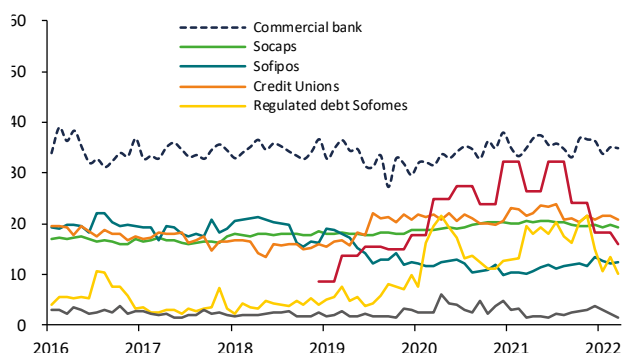
Preliminary data as of March 2022
Source: Banco de México (SIE), CNBV and BMV

1/ The Liquidity Indicator is defined as liquid assets on short-term liabilities. Liquid assets include: cash and cash equivalents, investments in government and banking securities and repurchase debtors. Short-term liabilities include: traditional deposits (when applicable) and short-term loans.

Graph 128
Capitalization level of regulated OIFNBs [1/, 2/]
Percent
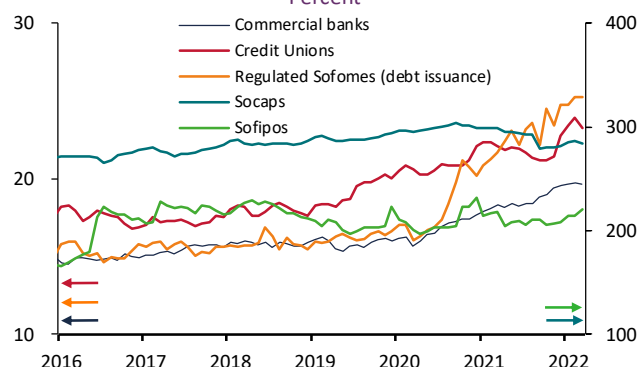
Preliminary data as of March 2022
Source: CNBV

1/ Right axis: Capitalization Level = Net capital / Total capital requirement for risks. Socaps and Sofipos must maintain a net capital equal to or greater than the total capital requirement for risks; i.e., equal to or greater than 100%.
2/ Left axis: Capitalization Index = Net capital / Risk-weighted assets. Commercial Banks, regulated Sofomes equity-linked to Commercial banking institutions or financial groups and and Credit Unions must maintain a minimum CAR of above 8%.

It is noteworthy that the companies analyzed in this section do not represent any risk to financial stability on being small or having limited interconnections with country's banking system (Table 8) or with the rest of the financial system. However, it must be pointed out that some types of entities that receive funds from their customers and partners (*sofipos* and *socaps*) may have a large number of customers, although many of their institutions are covered by a deposit insurance. [66] Nevertheless, there are new participants in the credit market that still do not carry out credit intermediation to date, as they do not take on liabilities to do so (they receive funds from the capital market through private investors or seed capital funds). For the time being, there is no financial information available to evaluate their situation as they have not yet obtained financing from the country's banking sector or have accessed the capital market to obtain funding from investors.

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[66] To guarantee that deposits, a SOFIPO must be associated with the Protection Fund, which is a trust constituted by the Federal Government with the development bank acting as a fiduciary institution, without this trust having the character of a Federal public management body or a public trust (Articles 98 and 99 of the Popular Savings and Credit Law *(LACP*, its acronym in Spanish). The deposit insurance is managed by the SOFIPO Protection Fund (PROSOFIPO) through the trust. Therefore, the savings of *Sofipos*' depositors are protected up to the amount of 25,000 investment units (UDIS) in the

event that a SOFIPO is liquidated or dissolved (Article 105 of the LACP). The Protection Fund' equity will consist of the following resources: contributions made by the Federal Government, ordinary monthly quotas to be paid by the *Sofipos*, extraordinary quotas payable by the *Sofipos* and other assets, rights and obligations that the Fund acquires (Article 101 of the LACP). As with the *Sofipos*, the Socaps have a Savings Protection Fund to cover up to 25,000 investment units (*UDIs*) per saver managed by the Cooperative Protection Trust Fund (*FOCOOP,* its acronym in Spanish).

Table 8

Exposures (assets minus liabilities) of banks with OIFNBs

| Entity	Commercial Bank's assets with OIFNBs	Commercial Bank's liabilities with OIFNBs	Assets - Liabilities	
	Millions of Pesos	Millions of Pesos	Millions of Pesos	% of bank capital
Socaps	51	55,422	-55,371	-4.2
Sofipos	670	2,395	-1,725	-0.1
Credit Unions	5,125	5,741	-616	-0.05
Regulated Sofomes	60,286	8,320	51,966	4.0
Non-regulated Sofomes	43,875	n/a.	43,875	3.3
Financial Companies	35,008	n/a.	35,008	2.7

Preliminary data as of March 2022.

Source: Banco de México and Indeval

1/ The bank's assets with OIFNBs include credits and investments in securities, whereas it liabilities with OIFNBs include deposits in banks, investments in banking securities and bank liability positions in repurchase transactions with the OIFNBs.

Other financing vehicles

During the first quarter of 2022, the operating flow of the Infrastructure and Real Estate Trusts (*FIBRA,* its acronym in Spanish) have shown a recovery, although in terms of assets, the operating flow is slightly below the level observed before the pandemic. This recovery has favored their indebtedness indicators and debt service capacity. Moreover, the outstanding balance of issues of Certificates of Capital Development (*CCDs,* its acronym in Spanish) and Senior Trust Bonds for Investment Projects (*Cerpis,* its acronym in Spanish) increased at constant prices since the last Report, although at a slower rate, whereas the Energy and Infrastructure Investment Trusts (*Fibras E,* its acronym in Spanish) balance decelerated at the end of 2021. A slight increase in the outstanding balance of debt securitizations was observed towards the end of the year, although it remains below the levels reached in 2018 due to less placement activity by *Infonavit* and *Fovissste,* which are the main participants in this market. Additionally, the profitability of the types of investment instruments mentioned shows a recovery compared to the levels observed from the beginning of the pandemic (Graph 129). The leverage risk and the risk of liquidity mismatch of these securities is also low.

Graph 129

Profitability of other financing vehicles

Percent
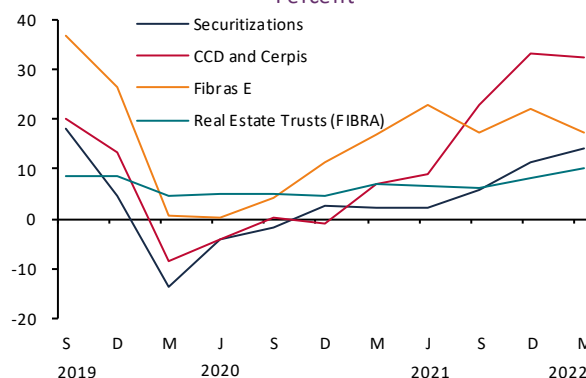
Data as of March 2022

Source: Banco de México and BMV

Institutions that make use of financial technology

The Financial Technology Institutions (FTI) sector continues to grow, although it remains at relatively small levels when compared to the banking system.

This sector consists of crowdfunding Institutions (*IFC,* its acronym in Spanish) and online payments Institutions (*IFPE,* its acronym in Spanish). Pursuant to Article 15 of the Law to Regulate Financial Technology Institutions (*LRITF,* its acronym in Spanish), crowdfunding institutions' activities are intended to establish contact with the general public for them to grant collective financing through digital applications, interfaces, web pages or other electronic or digital communication media. Moreover, under the Article 22 of the *LRITF,* the *IFPES* perform services to the general public on a regular and professional basis, consisting of the issuance, administration, redemption, and transmission of electronic payment funds through digital applications, interfaces, web pages, or any other electronic or digital communication media.

*IFC*s may be classified according to their specialization in the equity, royalties, co-ownership, and debt business models. In the case of equity, investors purchase or acquire securities representing the share capital of legal entities that act as applicants. In terms of the royalties and co-ownership business models, investors and applicants sign joint venture or any other type of agreement in which investors acquire and aliquot share of participation in a present or future asset or in the income, earnings, royalties or losses obtained or incurred from the performance of one or more of an applicant's activities or projects. In the case of the debt business model, investors grant loans, credits, mutuum loans or any other type of financing that gives rise to a direct liability or contingency for the applicants.

Moreover, the *IFPES* may issue, trade or manage instruments for the draw-down of online funds, render money transmission services, draw-down network services, process the information related to the means corresponding to online payment funds or any other means of payment, and perform transactions with virtual assets, subject to the provisions established in the *LRITF*.

FTIs continue their process of formal integration into the Financial System. As of May 2022, 33 licenses to operate as Fintechs, subject to the provisions of the LRITF, have been granted and published in the Federal Official Gazette (*DOF,* its acronym in Spanish). Of these, 14 are crowdfunding Institutions (*IFC*) and 19 are online payments Institutions (*IFPE*). The IFCs authorized in 2022 are: *Ángeles en Ark*, Top Kapital, *Red Girasol* and *Yo te Presto*. Moreover, the *IFPES* authorized in the same period are: Todito Pagos, Mercado Pago Wallet, Medá, Liftoff and Albo. Some of them, such as Mercado Pago Wallet, *Todito Pagos*, *Ángeles en Ark, Red Girasol* and *Yo te Presto* were already operating while in the license authorization and granting process.

The FTI sector continues to be small when compared to the Commercial Banking sector. Taking the entire capital contributed of the Fintechs as base (initial capital plus capital obtained in investment rounds), it only represents 0.88% of the capital stock of the commercial banks (Graph 130). Notwithstanding this, compared to the other financial intermediaries, such as the *Socaps* or *Sofipos*, the size of the FTI´s capital represents a greater proportion (25.9% and 29.2%).

Graph 130
Relative size of financial intermediaries compared to commercial banks [1/]
Percentage in terms of capital stock
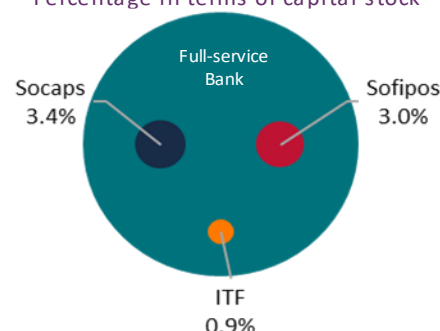
Data as of May 2022
Source: CNBV, Federal Official Gazette, Crunchbase and entities' websites.
1/ For the case of Financial Brokers (ITF), this refers to the capital contributed, which results from the sum of the initial capital stock plus the financing obtained through several investment rounds. The figures relating to capital stock of the Commercial Banks are to April 2022, and the Socaps' and Sofipos' figures are to January 2022.

The FTI's contribution to the financial system may be valuable because they will enable access to a larger number of clients through transactions different from those offered by traditional banking, contributing to the increase in financial inclusion. The foregoing is also driven by the FTI's different business approaches. In particular, the financing placed by the main *IFCs* in the debt sector continued its upward trend during the first quarter of 2022, due mainly to one of the largest crowdfunding companies recording an increase of almost 40% in its quarterly credit placement (Graph 131).

Graph 131
Quarterly credit placement by institution [1/]
Millions of pesos
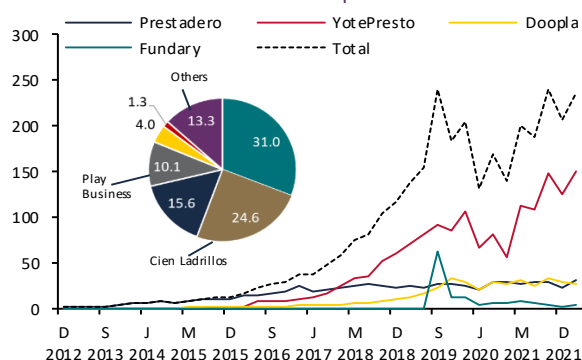
Data as of March 2022
Source: Institutions' Websites
1/ The pie chart denotes the proportion of capital contributed by the IFC compared to the total. The placement series omit certain institutions due to the low frequency of their data.

Box 8: Ecosystem of institutions offering technology-based financial services
(Fintech in the broad sense)

I. Introduction

This Box describes recent developments in institutions providing technology-based financial services. It is important to monitor the growth of this sector to ensure its healthy development because although it is currently small, its accelerated growth and interaction with the financial system could at some point have implications for financial stability that must be detected promptly.

There are certain entities that provide financial services based on technology, but that did not request authorization to operate as Financial Technology Institutions (ITFs) and so operate under the figure of Variable Capital Corporations or other legal figures within the financial system (e.g., Sofom ENR). These companies, both financial and non-financial, use technology to innovate in business models related to financial services (for example, online securities trading platforms, automated financial advisors, and cloud technologies), but do not carry out an activity reserved by the Law to Regulate ITFs (LRITF).

These companies, called Fintech (in the broad sense), have had an accelerated development in Mexico and can contribute to improving certain services, providing other complementary services to the financial system, and contributing to financial inclusion. However, it is important to monitor Fintechs and the services they provide, both to avoid regulatory arbitrage and to detect promptly any risk arising from their operation. Likewise, its monitoring is important since the use of new technologies can open risks to the financial system in areas where new participants do not have the experience that traditional financial institutions have been developing over the years.

II. Regulatory Framework and Segments Identified

The LRITF is not intended to regulate all activities related to the provision of financial services from innovative technologies, but only collective financing and electronic payment funds.

However, Fintechs that are not regulated by the LRITF are subject to regulations and applicable Federal Laws in the area that corresponds to them, so users have legal certainty that they are companies duly incorporated under the Mexican regulatory framework. In particular, some of the identified sectors are presented in the following Table

Table 1
Fintech companies, and segments

Fintech segment	Description
Loans	Using technology to grant loans through data analysis. Loans could be wholesale, retail, and peer to peer.
Payments and remittances	Using technology to make crossboder payments and transfer remittances
Technology companies for financial institutions	Providing IT solutions for financial institutions (security, contracts, chatbots, risk management, fraud prevention, etc.)
Business finance management	Providing IT solutions for electronic invoicing, digital accounting, financial management, business intelligence, and collections.
Financial wellness	Debt comparison and management platforms, financial education and savings and investment recommendations based on personal data.
Insurance	Platforms for comparing insurance providers, digital insurance, and IT solutions for insurance companies.
Digital banking	Business banking and consumer banking APIs.
Real state services	Buying or renting real estate, crowdfunding for real estate, and IT solutions for real estate companies.
Open finance	Providing open data services fo connect to the financial system
Asset management	Platforms for digital wealth management, robo-investors, and solutions for stock markets and virtual asset exchanges.
Crowdfunding	Funding projects through a crowdfunding platform.

Source: Own elaboration with data from Finnovista.

II. Recent evolution

According to a biennial Fintech sector survey carried out in Chile, Colombia, Mexico, and Peru by Finnovista and the Inter-American Development Bank (IDB) (Finnovista et al. 2021), significant growth is reported in recent years related to the global trend of intensification of efforts by Fintech companies to meet all user needs in a completely virtual way.

In 2021, Mexico had approximately 512 companies, an increase of 16% compared to the existing companies in 2020. The most important sectors are lending, payments and remittances, technology companies for financial institutions, and corporate finance management. It is worth mentioning that the sectors that grew the most were digital banking and loans (Graph 1).

Graph 1

Fintech startups

Number. 2016-2021 [1/]

- ■ Payments and remittances
- ■ Loans
- ■ Business finance management
- ■ Crowdfunding
- ■ Wealth management
- ■ Tech providers for Financial Entities
- ■ Others
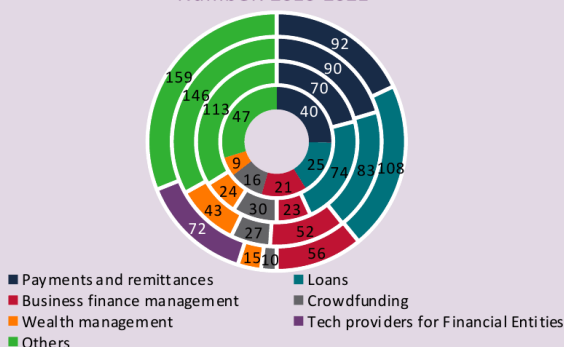
Data as of December 2021.

Radar Fintech and Incumbents". Finnovista, Pacific Alliance and IDB. 2021 and "Radar Mexico 2020", Finnovista. 2020.

1/ The rings correspond to the years 2016, 2018, 2020, and 2021, seen from the center of the graph outwards, respectively.

*Before 2021, the segment of Technology Companies for Financial Institutions was included in the "other" category.

For 61% of Fintech companies that received investments, these were less than 500 thousand dollars, while 25% of them received between 500 thousand and 5 million dollars. (Graph2) Most of the funding came from investors or entrepreneurs who provide seed capital to startups *in* exchange for an equity stake, followed by resources from friends and family and, finally, venture capital funds.

Graph 2

Investment range received by Mexican Fintech startups

Percent

- ■ 0-500,000 USD
- ■ 500,000 - 5 millions USD
- ■ 5-15 millions USD
- ■ 15-50 millions USD
- ■ Over 50 millions USD
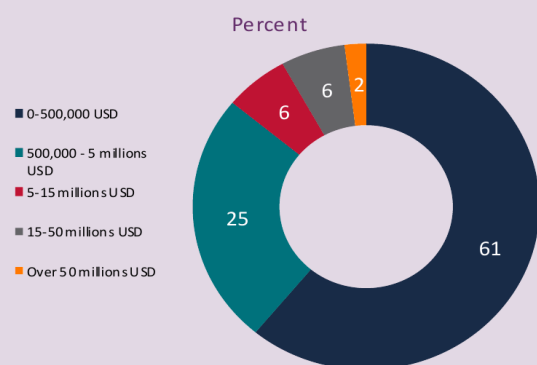
Data as of December 2021.

Fuente: *"Radar Fintech e Incumbentes* ", Finnovista, *Alianza del Pacífico* , and IDB, 2021y *"Radar México 2020"* , Finnovista, 2020.

Likewise, the total value of transactions made through Fintech platforms increased considerably. Despite the impact of the pandemic, the sector performed positively. The 59% of the companies surveyed reported an increase in users and the company revenues, while 27% recorded a neutral impact and only 14% recorded a negative impact.

Some of these Fintech companies have started merging and acquiring some financial system entities. Likewise, some financial institutions are also approaching Fintech to modernize their platforms and applications and not lose market share. Innovation and increased competition are healthy, but the implementation of new technologies, as well as interactions between sectors, need to be closely monitored by the authorities.

As with other financial intermediaries, the current economic situation and tight financial conditions can put pressure on some Fintech companies, testing their business models. Potential difficulties include reduced availability of resources to raise finance or capital; increased risk aversion by users; possible increase in delinquency, etc.

II. Final considerations

The Fintech sector is in a dynamic stage, with a growth in the number of companies (startups) and investment, in the middle of a process of consolidation of the industry. Their participation is positive in improving financial services and promoting greater financial inclusion as well as innovation. The current situation represents risks and opportunities for this rapidly adapting sector. However, it is important that, within the scope of their competence, the authorities carry out adequate supervision, considering consumer protection.

References

"Fintech Radar and Incumbents", Finnovista, Pacific Alliance and IDB, 2021.

"Radar Mexico 2020", Finnovista, 2020.

V.4. Financial markets infrastructures

Central securities depository and securities settlement systems

The Securities Deposit, Administration and Settlement System (*DALI*, its acronym in Spanish) is the unique central securities depository and securities settlement system in Mexico and it is owned and operated by Indeval. *DALI* provides clearing and settlement services by immobilizing securities and making "book-entry" changes to ownership of both debt and securities transactions. For instance, repurchase agreements transactions, buy/sell-back transactions and securities lending. This market infrastructure uses a dedicated communication protocols based on standard called "Indeval Financial Protocol". In addition, Indeval uses other relevant internationally accepted communication procedures and standards in order to facilitate efficient payment, clearing, settlement, and recording.

At the end of April 2022, the aggregated level of availability of the *DALI* clearing and settlement services was 99.90%. Moreover, the availability of the other activities in that same period was 100%. These services include:

- Collateral management for repurchase agreement transactions, with a tenor greater than three days. (*SAVAR*, its acronym in Spanish).

- Securities lending facility for federal government bonds related to the Ministry of Finance and Public Credit's (*SHCP*) market makers program (Valpre E), and

- Securities lending facility for *DALI* participants (Valpre FV).

The value of assets held in custody increased by 9.4% in comparison with the same period of 2021. Particularly, debt instruments grew by 3.4%, but in contrast, banking sector securities fell by 3.1%. Also, the average daily settlement amount in the *DALI was* 3.83 trillion pesos. For the most part, settlements consist of federal government bonds, which represent 85.5% of the average amount settled, followed by banking sector securities with 11.5%, corporate sector securities with 2.2% and capital market instruments with 0.9%. Average daily settlements grew by 0.2%, of which

capital markets transactions represent the greater part, with a 17.0% growth. Moreover, securities transactions in the international market (SIC, its acronym in Spanish) increased by 13.5% in comparison with the same period of 2021.[67]

In the first quarter of 2022, Indeval fully implemented an electronic mechanism for the issuance of securities, according. This project is based on the rules established by Banco de México through the *Circular 36/2020* in September 2020. Pursuant to the aforementioned Circular, the first electronic issuance of securities was on February 28, 2022. The implementation of electronic issuance will contribute to the sound development of the financial system, mainly through the generation of efficiencies in the issuance of securities. These efficiencies result from the automation and standardization of processes, and from the strengthening of security and operating continuity policy and procedures established by Banco de México in these rules, as well as promoting innovation in the securities market.

Central Counterparties

A central counterparty is a financial market infrastructure that interposes itself between the parties that perform financial transactions, becoming the buyer for each seller and the seller for each buyer.

Contraparte Central de Valores, S.A. de C.V. (*CCV*, its acronym in Spanish) and the trust *Asigna Compensación y Liquidación* (Asigna) are the central counterparties established in Mexico for the clearing and settlement of securities transactions and derivatives contracts, respectively. Asigna and *CCV* have procedures and methodologies to require financial resources to cover the exposures to credit and liquidity risks that these infrastructures assume through their reciprocal debtor and creditor function of the financial transactions that they clear and settle. These resources are composed mainly of the Contributions Fund and the Default Fund. The Contributions Fund consists of collateral provided by the central counterparty's participants, also known as Clearing Members, and the clients of these Clearing Members to cover the market and liquidity risk exposures in the event that the credit risk of a Clearing Member materializes. In turn, the Default Fund consists of the Clearing Members' collateral prone to being

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[67]Source: Indeval, data as of the end of March 2022.

mutualized to face a default, particularly in conditions of market stress. In March 2022, *CCV* and Asigna's systems have attained accumulated availability levels of 99.92% and 99.93%, respectively. Asigna and *CCV* are currently implementing adaptations into their risk models in order to strengthen their resilience and management during events of insolvency and illiquidity of their Clearing Members.

During the first half of 2022, Asigna and *CCV*'s resilience to market risk exposure in this period has been consistent with the resources they required as collateral for their Contributions Funds and Default Funds. Asigna's default waterfall[68] amounts to 31,467 million Mexican pesos. It is composed mainly of the Contributions Fund in the amount of 27,310 million Mexican pesos, with cash resources of 49%, and the Default Fund in the amount of 3,355 million Mexican pesos, which is composed of resources entirely in cash.[69]

CCV's default waterfall amounts to 4,687 million Mexican pesos. It is composed mainly of the Contributions Fund in the amount of 3,919 million Mexican pesos, with cash resources of 94%, and the Default Fund in the amount of 227 million Mexican pesos, which is composed of resources entirely in cash.[70]

V.5. Other risks for the financial system

V.5.1. Operating continuity risks

Due to their systemic importance for the economy and financial system, the financial markets infrastructures and the payment systems must render their services and operate in all conditions, at any time and from anywhere. In this vein, Banco de México must maintain a high level of availability of the systems it manages and operates. At the end of the first quarter of 2022, the Interbank Electronica Payment System (*SPEI,* its acronym in Spanish) availability index was 99.996%, due to the time required to provide maintenance to the system operation infrastructure.

In order to ensure operating continuity and to maintain the standards of service and operation of the *SPEI* faced with the sustained growth in the number of transfers processed, a new instance for the processing of

transfers was implemented, which commenced operations in May 2022.

It must be mentioned that during this period, Banco de México has not had any incidents in the technological infrastructure it uses to operates payment systems, or in its operating processes. In this vein, there have been no interruptions in the payment system's services as a result of any incident.

V.5.2. Cybersecurity risks

Since December 2021, no cybernetic incidents in the banks within the Mexican financial sector have been registered. During this period, through their Information Security Sensitive Incidents Response Group (*GRI*), the financial authorities issued 13 technical information bulletins of incidents that occurred in the Mexican and international financial sectors, thereby enabling institutions to apply incident prevention measures.

Notwithstanding this, cybernetic risks continue to increase at the global level and have recently been exacerbated as a result of military conflict. The financial institutions and authorities adopted several measures to face these risks, the most notable being greater monitoring of their operations and infrastructures. However, as a result of the military conflict between Russia and Ukraine, the risk of cyber-attacks by players sympathetic to either party may increase significantly. On March 12, several Russian financial institutions were disconnected from SWIFT as part of the sanctions imposed on Russia by the European Union in consultation with Canada and the United Kingdom. Different international bodies and governments recommended strengthening their monitoring actions of the system's operation in order to foresee hostile reactions of groups of attackers by players sympathetic to either of the parties. Thus, the financial authorities and the *CESF* requested the institutions in the Mexican financial system to raise their cybersecurity alert level by increasing their cybernetic detection and defense measures to be better prepared to deal with possible incidents.

Moreover, ransomware attacks, initiated through phishing campaigns, continue to be one of the most worrying cybernetic risks for financial stability both in Mexico and the world because their impact may

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[68] The default waterfall is a set of financial resources that central counterparties establish, mainly from the financial requirements they make to their participants to cover credit and liquidity risk exposures.

[69] Data provided by Asigna as of April 29, 2022.

[70] Data provided by CCV as of April 29, 2022.

interrupt organizations' operations for days, as has been observed in other sectors.

One of the risks to which Banco de México pays special attention is associated with the growing threat to third-party products in the financial institutions' supply chains. Cyber attackers have discovered that one way to undermine institutions is through the technological tools that they acquire and install into their infrastructures. Compromising these products allows them to penetrate multiple organizations that acquire them. Banco de México encourages actions in the sector to deal with this risk, as well as validates the institution's compliance with the basic cybersecurity measures by conducting inspection visits to ensure that the protection mechanisms are implemented around third-party products.

In order to continue developing the institutions' capacities to cope with potential cybernetic incidents, Banco de México coordinated cyber-resilience drills, which simulated cybernetic attack scenarios against the Central Bank's critical processes. Five institutions of systemic importance took part in the drills. The results obtained allowed areas of opportunity to be identified, which have already been implemented to continue improving in this matter. The participating institutions demonstrated that they have well-defined and suitable response, continuity, and communication processes to cope with cyber-attacks. Banco de México will continue driving actions to enable institutions to reinforce their response and reaction capacities to cyber-attacks.

Banco de México is also promoting, with the assistance of the Mexican Banks' Association (ABM), the application of best practices to hold information that may be relevant in the reporting and prosecuting of cybernetic crimes in order to improve the institutions' response capacities to cyber-attacks. In particular, Banco de México provided Forensic Evidence Preparation Guidelines to provide institutions with a guide to collect, file and share evidence in the event that they suffer a cyber-attack. These guidelines will help institutions to file reports with clear and solid evidence that would be inserted into the investigation files that the judicial authorities may use to seek and detain cyber attackers.[71]

In order to ensure constant monitoring of the cybersecurity status in the Mexican financial sector, Banco de México has been following up on several indexes, which evaluate the cybersecurity status from different angles; in particular, the tools available in Mexico, the level of threats that arise in each country and the threats that were relevant and had an impact on the financial sector. The guidelines emphasize the International Telecommunications Union's (ITU) Global Cybersecurity Index (GCI) and the Financial Cyber Risk Index, the latter being estimated based on a methodology developed by the IMF.[72]

The GCI is determined biennially based on the countries' responses to a questionnaire that serves to evaluate and monitor the cybersecurity commitment in the five pillars of the Global Cybersecurity Agenda: i) Legal Measures, ii) Technical Measures, iii) Organizational Measures, iv) Capacity Development, and v) Cooperation. A score of 0 to 20 is assigned to each country and each pillar, giving a total of 100, in such a manner that a high index means that the country is better prepared to face cybersecurity challenges. Mexico has a score of 81.68,[73] which is above the average (51.7) and the score places it in the 61st place of the 194 countries.[74] According to the ITU indicator, Mexico is strong in cooperation and technical measures, whereas the organizational measures are an area of improvement. Compared to 2018, Mexico showed an increase of 29.8%, in contrast to the average increase in the GCI score of 9.5%.

The Financial Cyber Risk Index measures the cybersecurity risk in the financial sector for different countries based on international news media coverage. The index per country is calculated as the ratio between the number of news items that refer to cybernetic risks and the number of news items that mention the risk in the financial sector;[75] therefore, the higher its value, the higher the number of news items on the cyber-attacks for the country evaluated. On applying the IMF methodology to news items from January 2017 to March 2022, Banco de México found that Mexico is in 39th place of 105 countries with a score of 3.68%. The average score of all the countries is 6.88% and the median is 4.73%.

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[71] Please enter this link to view the guidelines.

[72] Bouveret, A (2018): "Cyber Risk for the Financial Sector: A Framework for Quantitative Assessment", WP/18/143, June 2018.

[73] Legal Measures = 15.61, Technical Measures = 17.90, Organizational Measures = 14.70, Development of Capacities = 16.13, Corporation Measures = 17.34.

[74] There are 60 countries with higher scores than Mexico. The index places Mexico in the 52nd position of 194 countries including tied countries.

[75] The numerator contains the number of these items that contain in words cyber, bank, risk, plus the name of the country. The denominator contains the number of news items that contain the words bank, risk, plus the name of the country.

Banco de México will continue monitoring these indexes and will also develop others based on its experience, and the information on the cybersecurity plans, strategies, incidents and measurements that it collects directly from the financial institutions.

V.5.3. Environmental risks and sustainability of investments

Banco de Mexico will continue working actively to improve the financial sector's resilience to climate-related risks. Against this backdrop, it continues to broaden its analysis of the environmental and sustainability risks to financial stability.

Indexes of Public Interest in Matters Related to Environmental Risks and Natural Disasters

In recent decades, the financial authorities and several international bodies have dedicated a significant part of their agendas to analyzing physical and transition risks. In parallel, public interest in climate issues also seems to have increased. In this context, two indexes are being constructed to capture the interest of Mexican society in issues related to (i) extreme hydrometeorological events and natural disasters and (ii) transition risks.

For the construction of these indexes, the number of monthly online searches made in Mexico (via "Google Trends") on a series of terms related to extreme climatic events, natural disasters, and the risks of moving towards a cleaner economy was recorded.[76] It is important to point out that, although on occasions an increase in the indexes may reflect the occurrence of events that denote a greater environmental risk or a lower transition cost for companies, this is not always the case; therefore, the indexes must not be interpreted mechanically. In other words, a greater value of the indexes always reflects a greater public interest, despite that this greater interest may be derived from events that are positive, negative or even neutral for the environment. Also, the seasonal element of the searches is also eliminated; therefore, a greater index value may be interpreted as a greater public interest above those that relate to seasonal factors.

The index of searches related to extreme hydrometeorological events and natural disasters has shown an upward trend since 2016, reflecting any greater public interest in these issues (Graph 132). In general, the highest values coincide with natural disasters and extreme climatic events. The two

moments with the highest values are September 2017, when there were earthquakes of significant magnitude in the state of Oaxaca and Mexico City, and June 2021, where there were droughts that affected a major part of the Republic. In terms of its recent movements, the average of the index in the first five months of 2022 is considerably greater than its historical average. During this period, the search words most used on the Internet were: "intense heat", "extreme climate" and "drought", which appear to be related to the drought that was seen recently in the north of Mexico.

Graph 132
Stress Index on matters related to extreme hydrometereological events and natural disasters
Contents
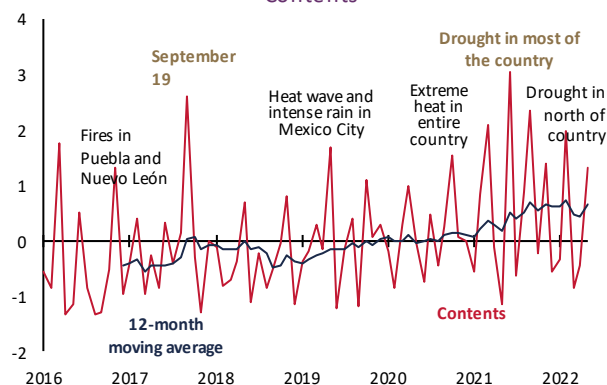
Data as of May 2022
Source: Banco de México and Google Trends

The index of searches related to transition risks also shows an upward trend, which began to deepen in 2021 following the proposal for a transition agenda towards a cleaner global economy put forward by the incoming US administration (Graph 133). The highest values of this index occurred, in most cases, when there was an announcement of or a discussion about actions that implied a more accelerated transition towards a cleaner economy. In the first five months of 2020, the index value was considerably greater than its historical value, but it showed a slight decrease compared to the fourth quarter of 2021, when the COP26 climate summit was held.
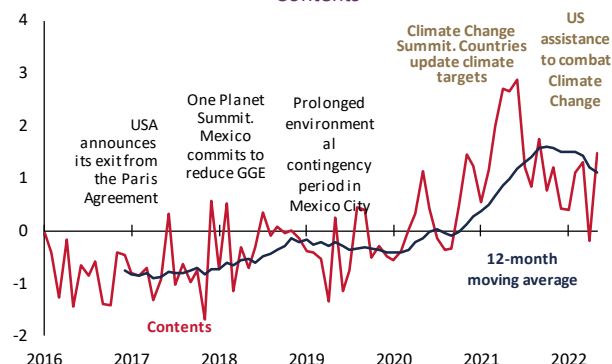
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[76] To select the search terms, the work completed by Zhang, L. (2021), which conducted an analysis of similar for the Hong Kong case, is used as a base.

Graph 133
Index of interest in matters related to transition risks
Contents

Data as of May 2022
Source: Banco de México and Google Trends

Transition risks

The commitments acquired by the different countries at international forums, such as the Climate Change Conference of the Parties (COP26) within the United Nations Framework Convention on Climate Change, suggests that there is currently a greater global awareness of the need to reduce greenhouse effect gas emissions in order to preserve the equilibrium of the eco-systems.

Nevertheless, a faster transition than expected towards a cleaner economy may lead to viability challenges for the most polluting industries. To the extent that these risks are not completely included in credit granting decisions and in risk premiums, the transition towards a greener economy may generate non-linear effects and challenges to financial stability.

If these transition risks materialize, there may be abrupt movements in the prices of financial assets and affect the companies' perception of not having emissions reduction strategies. The most affected by transition risks companies may face a reduction in their financial capacity and their availability to pay the debt, all of which may have an impact on the stability of the financial system.

Therefore, this *Report* provides an analysis of the credit portfolio in the sectors most exposed to transition risks.[77] To do so, the same three groups of sectors that

were considered in previous editions of this *Report* are considered: (i) sectors exposed directly due to their high emissions levels (Group 1), (ii) sectors exposed indirectly because they use supplies that generate high emissions in their production processes (Group 2), and (iii) sectors exposed indirectly because their demand depends, to a great extent, on polluting industries (Group 3).[78]

This classification is complemented with granular information to establish whether, within each group, the companies have characteristics that make them more vulnerable. The companies which tend to have more weight in the sectors exposed indirectly (Groups 2 and 3) are usually the youngest, which have less consolidated businesses, *pymes,* and those that sell products for which Mexico has no export advantages (Graph 134). Therefore, in the sectors exposed indirectly, companies are more vulnerable and may face greater refinancing problems if the transition risks were to materialize.

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[77] The portfolio analyzed is the sum of the financing to companies in the private non-financial sector and Semi-state production companies. Financing to the former represents 92% of the total, whereas financing to the latter represents 8%. By type of group, financing to the companies in the private non-financial sector represents 43%, 68% and 78% of the groups of sectors 1, 2 and 3, respectively; therefore, the Semi-state productive companies represent 57%, 32% and 22% of these groups.

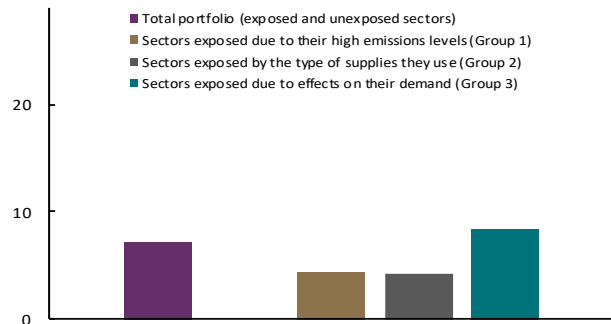[78] The definition of Group 2 bears a relationship with Scopes 2 and 3 on the GHG protocol because in these scopes it is considered that companies can generate emissions albeit physically in the plants that produce the supplies and not in the company that consumes them. In other words, contamination may be emitted indirectly through the use of supplies. The definition of Group 1 is directly related to the definition of Scope 1.

Graph 134

Characteristics of the portfolio in sectors exposed to transition risks, by type of exposure

Percent

a) Percentage of new companies portfolio (companies incorporated within the last five years)

- Total portfolio (exposed and unexposed sectors)
- Sectors exposed due to their high emissions levels (Group 1)
- Sectors exposed by the type of supplies they use (Group 2)
- Sectors exposed due to effects on their demand (Group 3)

b) Percentage of portfolio of companies of different sizes and comparative export advantage
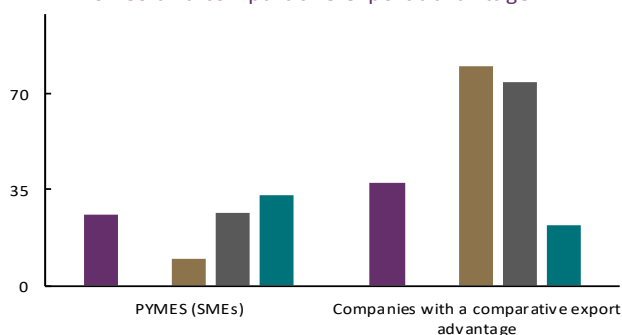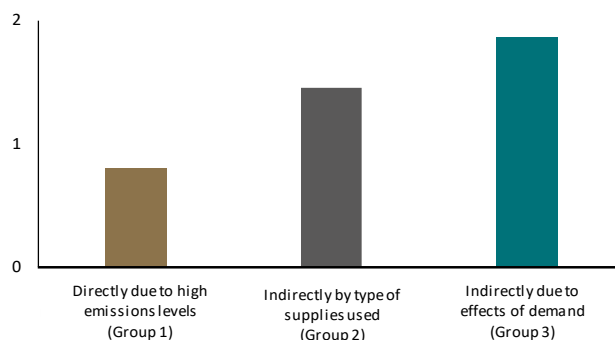
Data as of December 2021
Source: Banco de México

Moderate growth is observed in the three groups with regard to changes in the credit balance. The greatest growth was seen in the directly exposed sectors (Groups 2 and 3). Given that there are younger companies in this sector, more *pymes* and those with fewer export advantages, it was foreseeable that, in a context of less uncertainty due to COVID-19, the credit balance grew specifically in these sectors over the last year (Graph 135).

Graph 135

Changes in the balance of portfolios exposed to transition risks

Percent

Data as of December 2021
Source: Banco de México
1/ Portfolios of companies in the non-financial sector
2/ Changes in comparison with December 2020

The industry classification was also combined with banking information to establish whether or not their characteristics, and those of their portfolios, make them more vulnerable (Graph 136). In this vein, the indirectly exposed sectors (Groups 2 and 3) also represent a greater source of risk. Banks with greater portfolios in industries exposed indirectly due to the use of supplies (Group 2) are those that are less diversified. In particular, these brokers have more portfolios in the sectors exposed directly and due to demand shocks (Groups 1 and 3).

Graph 136

Diversification of the portfolio among sectors with different exposures to transition risks [1\]

Sectors exposed	Directly due to high emissions levels (Group 1)	Indirectly by type of supplies used (Group 2)	Indirectly due to effects of demand (Group 3)
Directly due to high emissions levels (Group 1)			
Indirectly by type of supplies used (Group 2)			
Indirectly due to effects of demand (Group 3)			

High diversification

Low diversification
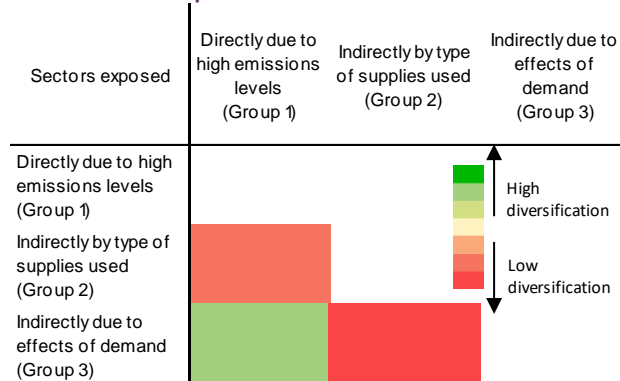
Data as of December 2021

Source: Banco de México, CNBV and INEGI

1/ The colors indicate the degree of diversification of the portfolio. The color red denotes a lower degree of diversification, whereas, green indicates a higher degree of diversification. Diversification is obtained from the correlation coefficient between the proportions of each bank's portfolio in sectors vulnerable to different transition risks.

Banks with greater portfolios in other directly exposed sectors, i.e., due to demand (Group 3) are those that

have more characteristics that may act as risk amplifiers (Graph 137). These banks are less profitable, have greater default indexes and a higher proportion of their portfolio is allocated to corporate credit. This section emphasizes the improvements in returns on assets of banks with larger portfolios in directly exposed sectors (Group 1).

Graph 137
Risk amplifying and mitigating factors, according to bank exposure to transition risks [1]

Variables	Directly due to high emissions levels (Group 1)	Indirectly by type of supplies used (Group 2)	Indirectly due to effects of demand (Group 3)
Capitalization Index (CAR).			
Past-Due Portfolio Hedging Index with Preventive Reserves (Loan-loss coverage index)			
Liquidity			
Return on Assets (ROA)			
Default Index (delinquency rate)			
Portfolio to companies (%)			

Data as of December 2021

Source: Banco de México, CENAPRED and CNBV

1/ The green tones represent mitigating effects whereas the red tones represent amplifying effects.

Physical risks: Corporate credit portfolio

The same four types of hydrometeorological events are considered as in the previous editions of this *Report*, i.e., cyclones, droughts, heat waves, and flooding. The sixth Evaluation Report published by the Intergovernmental Panel on Climate Change (IPCC 2021) confirmed that these are the four extreme climatic phenomena that are expected to increase in frequency or intensity in the future.

The increase in intensity or frequency of these events may generate risks for financial stability since their materialization may reduce the liquidity and repayment capacity of the borrowers affected, as well as reduce the value of the financial assets used as guarantees.

Therefore, the exposure to physical risks of the portfolios of companies granted credit by the commercial bank was studied, considering the aforementioned four hydrometeorological phenomena. In particular, the study identifies the credit in the sectors and regions exposed to this type of phenomenon.

To do this, first, the study accounted for the banking credit granted to companies located in municipalities exposed to each type of hydro-meteorological event. Then, only the credit granted to the sectors vulnerable to this same phenomenon is considered for each one of these municipalities. The analysis is conducted for different federal states of Mexico (at the state level) and for the banks that reside in the country (at the bank level).

At the state level, the percentage of the portfolio in sectors and municipalities exposed to the same type of event continues to be greater in the case of flooding (Graph 138). Nevertheless, its percentage is lower than in 2021, emphasizing the case of the state of Guerrero, where construction credit was reallocated from municipalities exposed to this phenomenon to municipalities vulnerable to heat waves.

Also, the cases of Baja California Sur, Quintana Roo, and Sinaloa are worthy of mention because a high proportion of their portfolios is concentrated in municipalities exposed to tropical cyclones in the primary, tourism, and retail trade sectors, which are also vulnerable to this hydrometeorological phenomenon.

Graph 138
Portfolio in sectors and municipalities vulnerable to each hydrometeorological phenomenon
a) Cyclones and flooding
Percentage
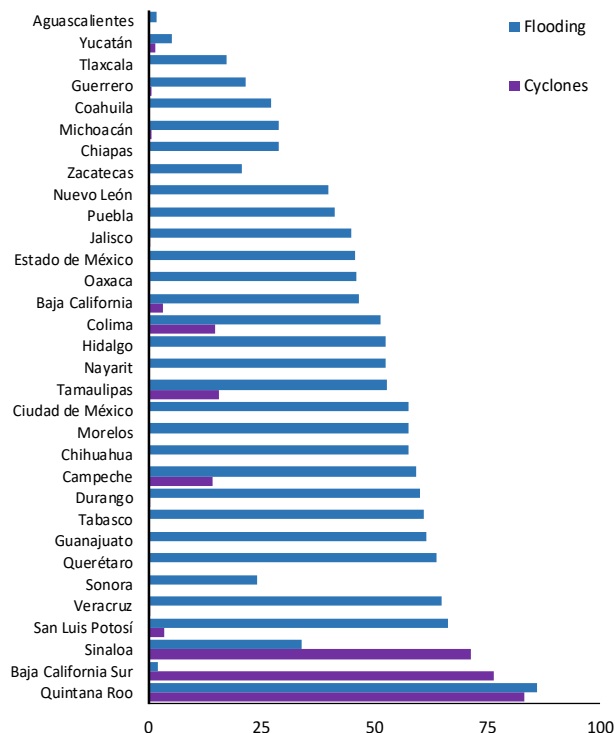
Data as of December 2021
Source: Banco de México

Portfolio in sectors and municipalities vulnerable to each hydrometeorological phenomenon
b) Heat waves and droughts
Percentage
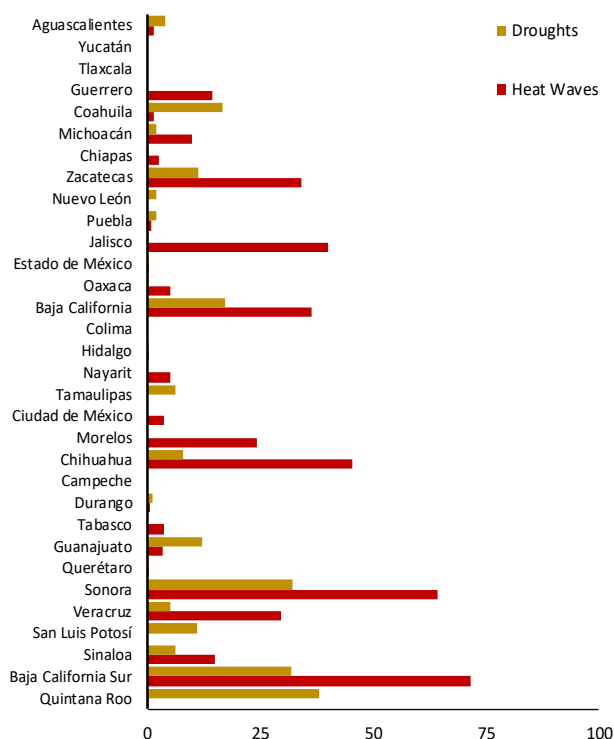
Data as of December 2021
Source: Banco de México, CENAPRED, CNBV, INEGI, SENER and SIAP

As for droughts, the states with the largest portfolios in sectors and regions exposed to this phenomenon continue to be those that have the most credit in municipalities vulnerable to tropical cyclones and heat waves. Therefore, they are poorly diversified, and if there are droughts or any of the other of these events in the short-term, these are the states that may be the most affected (Graph 139).

Graph 139

Diversification of portfolio among sectors and municipalities vulnerable to the different hydrometereological events (for different states) [1]
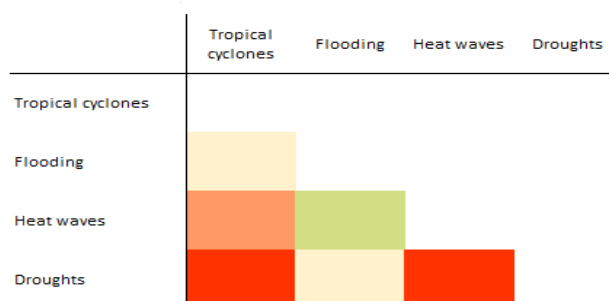
Data as of December 2021
Source: Banco de México

1/ The colors indicate the degree of diversification of the portfolio. The color red denotes a lower degree of diversification, whereas, green indicates a higher degree of diversification. Diversification is obtained from the correlation coefficient between the proportions of each state's portfolio that are vulnerable to the different hydrometereological events

Floods also continue to be the phenomenon with the largest portfolio in states that due to their characteristics, may increase credit risk (Graph 140). This is because these states are those that have mortgage with resistant roofs and no access to piped water, i.e., the type of water that is less prone to be contaminated by flooding.

Graph 140
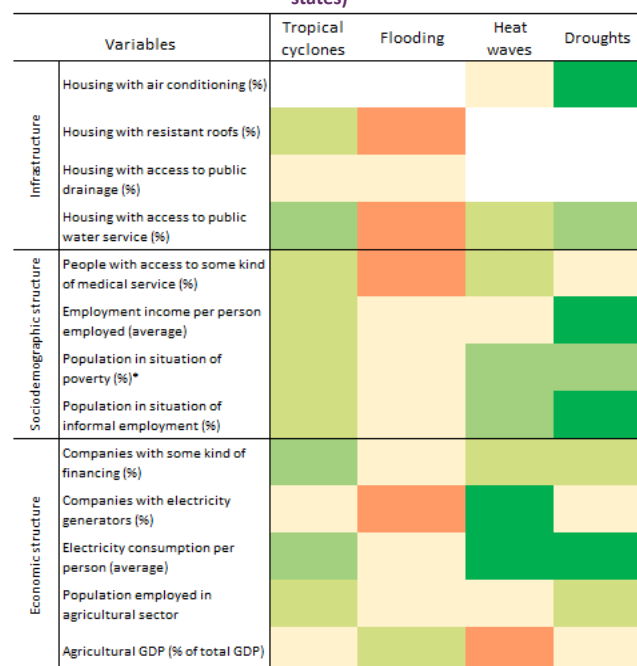
Amplifying and mitigating factors of the physical risks (for different states) [1]
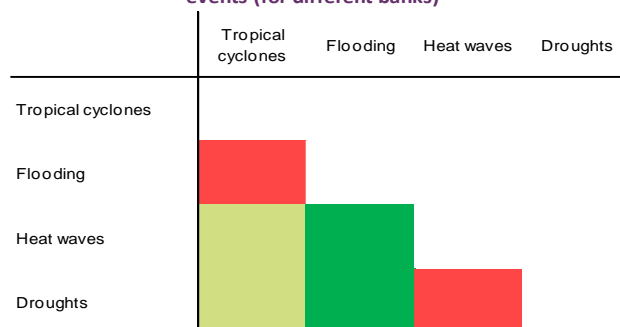

Data as of December 2021
Source: Banco de México, CENAPRED, CNBV, INEGI, SENER and SIAP

1/ The green tones represent mitigating effects whereas the red tones represent amplifying effects. The color determines the correlation coefficient between each factor considered and the proportions of the credit portfolio in each sector and in each state and municipality that are vulnerable to the different hydrometereological events.

Heat waves stand out when the analysis is conducted at the bank level. The banks with the most portfolios exposed to this phenomenon are the least diversified in the event of the potential occurrence of more than one type of extreme (Graph 141). Also, brokers with more portfolios exposed to heat waves and cyclones are those most related to the risk amplifiers, in particular, those that have lower levels of capitalization, profitability, liquidity and a higher proportion of their portfolio allocated to corporate credit (Graph 142).

Graph 141

Diversification of payroll credit portfolio among sectors and municipalities vulnerable to the different hydrometereological events (for different banks) [1]

Data as of February 2022
Source: Banco de México, CENAPRED and INEGI

1/ The colors indicate the degree of diversification of the payroll credit portfolio. The color red denotes a lower degree of diversification, whereas, green indicates a higher degree of diversification. Diversification is obtained from the payroll credit portfolio each bank that are vulnerable to the different

Diversification of payroll credit portfolio among sectors and municipalities vulnerable to the different hydrometereological events (for different banks) [1]
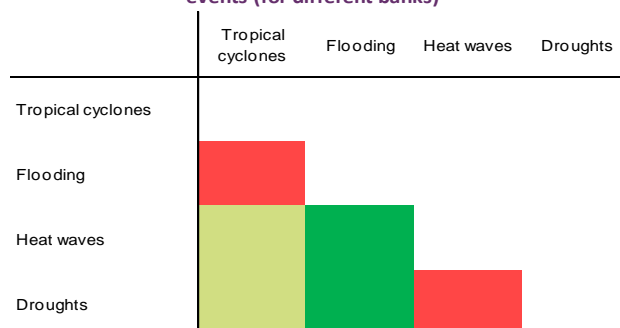

Data as of February 2022
Source: Banco de México, CENAPRED and INEGI

1/ The colors indicate the degree of diversification of the payroll credit portfolio. The color red denotes a lower degree of diversification, whereas, green indicates a higher degree of diversification. Diversification is obtained from the payroll credit portfolio each bank that are vulnerable to the different

Graph 142
Amplifying and Mitigating Factors of the Pysical Risks (for different banks) [1]

Variables	Tropical cyclones	Flooding	Heat waves	Droughts
Capitalization Adequacy Ratio (CAR)				
Past-Due Portfolio Hedging Index with Preventive Reserves (Loan-loss coverage ratio)				
Liquidity				
Return on Assets (ROA)				
Non-performing loan ratio (delinquency rate)				
Portfolio to companies (%)				

Data as of December 2021

Source: Banco de México, CENAPRED and CNBV

1/ The green tones represent mitigating effects whereas the red tones represent amplifying effects. The color determines the correlation coefficient between each factor considered and the proportions of the credit portfolio in each sector and in each municipality that are vulnerable to the different hydrometereological events.

## Physical risks: Mortgage and consumer credit portfolio

The analysis covers exposure to physical risks by mortgage loan portfolios and part of the consumer loan portfolio (payroll, auto, personal, and revolving). The same hydrometeorological phenomena mentioned in the previous sector are considered and a similar process is used to identify credit in the sectors and regions exposed to the same types of extreme climatic events.[79] This section analyzes the credit portfolio of banks that reside in Mexico.

Although flooding is also the phenomenon that involves the most credit in sectors and regions exposed to the same type of events for consumer and mortgage loans, it does not necessarily represent the greatest risk.

Droughts are also important for mortgage loans. The banks that lend the most to borrowers who live in municipalities prone to droughts and, at the same time work in the sectors exposed to this phenomenon, are those that are the least diversified (Graph 143). These are also the least liquid banks and a major part of their portfolios is allocated to mortgage loans (Graph 144).

Graph 143
Diversification of mortgage portfolio among sectors and municipalities vulnerable to the different hydrometereological events (for different banks) [1]
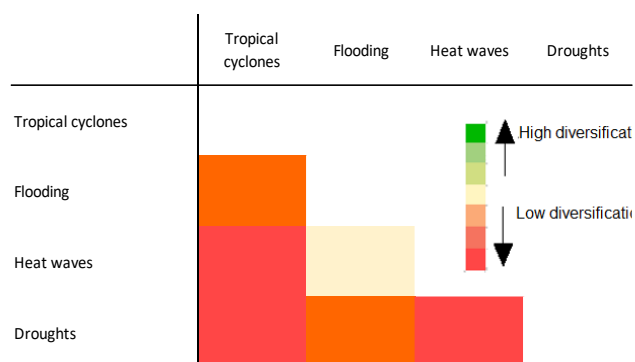
Data as of December 2021

Source: Banco de México, CENAPRED and INEGI.

1/ The colors indicate the degree of diversification of the mortgage portfolio. The color red denotes a lower degree of diversification, whereas, green indicates a higher degree of diversification. Diversification is obtained from the mortgage payroll credit portfolio each bank that are vulnerable to the different hydrometereological events

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[79] As with the corporate portfolio, the credit in regions and sectors exposed to the same type of hydro-meteorological phenomena is also identified. On this occasion, however, the proportion of the portfolio in the sectors at risk is approached by the following two steps. The first step involves identifying the proportion of the portfolio in high and low

salary bands for each municipality. In the second step, this information is combined with employment data taken from the most-recent census. In particular, for each salary level, the portfolio of the sectors at risk is treated as the proportion of formal employment in these sectors.

Graph 144

Amplifying and mitigating factors of the physical risks in the mortgage portfolio (for different banks) [1]

Variables	Tropical cyclones	Flooding	Heat waves	Droughts
Capital Adequacy Ratio (CAR)				
Past-Due Portfolio Hedging Index with Preventive Reserves (Mortgage loan-loss coverage ratio)				
Liquidity				
Return on Assets (ROA)				
Non-performing loan ratio (Mortgage delinquency rate)				
Mortgage portfolio (%)				

Data as of February 2022

Source: Banco de México, CENAPRED and CNBV

1\ The green tones represent mitigating effects whereas the red tones represent amplifying effects. The color determines the correlation coefficient between each factor considered and the proportions of the mortgage portfolio in each sector and in each municipality that are vulnerable to the different hydrometereological events.

A similar situation can be observed in payroll loans. The banks with the most portfolio exposed to droughts are the least diversified and are also those that are more closely related to risk amplification factors (Graph 145 and Graph 146). In this case, however, the amplification factors are different because the most-exposed banks have lower levels of capitalization and lower reserves hedging indexes. Heat waves can be added to droughts as hydrometeorological risk events that affect auto credit.

Graph 145

Diversification of portfolio among sectors and municipalities vulnerable to the different hydrometereological events (for different banks) [1]

	Tropical cyclones	Flooding	Heat waves	Droughts
Tropical cyclones				
Flooding				
Heat waves				
Droughts				

Data as of December 2021

Source: Banco de México

1/ The colors indicate the degree of diversification of the portfolio. The color red denotes a lower degree of diversification, whereas, green indicates a higher degree of diversification. Diversification is obtained from the correlation coefficient between the proportions of each bank's portfolio that are vulnerable to the different hydrometereological events.

Graph 146

Amplifying and mitigating factors of the physical risks in the payroll credit portfolio (for different banks) [1]

Variables	Tropical cyclones	Flooding	Heat waves	Droughts
Capital Adequacy Ratio (CAR)				
Past-Due Portfolio Hedging Index with Preventive Reserves (Payroll loan-loss coverage ratio)				
Liquidity				
Return on Assets (ROA)				
Non-performing loan ratio (Payroll delinquency rate)				
Payroll credit portfolio (%)				

Data as of February 2022

Source: Banco de México, CENAPRED, and CNBV

1\ The green tones represent mitigating effects whereas the red tones represent amplifying effects. The color determines the correlation coefficient between each factor considered and the proportions of the payroll credit portfolio in each sector and in each municipality that are vulnerable to the different hydrometereological events.

In terms of personal loans, it must be emphasized that there are a few characteristics of banks that act as potential risk amplifiers. Moreover, in the case of revolving credit, default and concentration of portfolio are the most notable possible amplification factors for the four types of hydro-meteorological events, as well as the banks' low levels of diversification poor in the light of the potential occurrence of one or more of these types of events.

Sustainable Finances Committee

The Sustainable Finances Committee (*CFS,* its acronym in Spanish), at the heart of the Financial System Stability Council (*CESF*, its acronym in Spanish), continued to meet during the first half of 2022. Also, the working groups established by the Committee continued to prepare evaluations proposals, recommendations, and training sessions on issues such as sustainable taxonomies, the inclusion of environmental and social risks in authorities' and institutions' decision-making processes through scenarios analysis, the mobilization of sustainable financing, and the disclosure of environmental, social and corporate governance factors by corporate issuers and financial institutions. A new temporary working group was created during the first semester of 2022 to coordinate the Committee's position on proposals for disclosure standards related to sustainability published by the International Sustainability Standards Board (ISSB), formed by the IFRS Foundation, which is in the consultation period until July 31, 2022.[80] The members of the Sustainable Finances Committee or their representatives, the permanent guest or its representatives, observers and their representatives (Mexican Banks' Association (*ABM*), Mexican Insurance Institutes' Association (*AMIS*), Mexican Pension Funds Managers' Association (amafore), Mexican Stockbrokers' Association (*AMIB*), Mexican Market Research Agencies' Association (*AMAI*) and the Green Finances Consultation Board (*CCFV*) and experts invited by the work group coordinators for their knowledge and experience participate in the working groups.

Sustainable Financial Assets

The ESG bonds market has continued to develop, thus allowing companies and other issuers to increase the diversification of their long-term financing sources considering sustainability criteria. Thus, between September 2021 and March 2022, placements by both private and public domestic issuers in the domestic and

international ESG bonds markets continued. In this context, issues denominated in Mexican pesos recorded high credit ratings (Graph 147a) while most of the issues denominated in foreign currencies recorded credit ratings within the investment-grade (Graph 147b). In this manner, issues with sustainable criteria represent financial assets with good credit ratings, which allow investors to diversify their portfolios. The issue of sustainability-linked bonds stands out in 2021 and the first months of 2022. In this type of bond, the cost for the issuer (interest rate) varies based on the level of compliance with specific sustainability targets (e.g. CO^2 emissions, the percentage of operating waste, and the percentage of renewable energy consumed), all of which are assessed annually.

Graph 147
Interest rates of placements (2018-2022) of Green, Sustainable, Social and Gender Bonds [1][2]
Vertical axis: Yield rate
Horizontal axis: Term in years
a) Pesos

b) Foreign Currency [3]
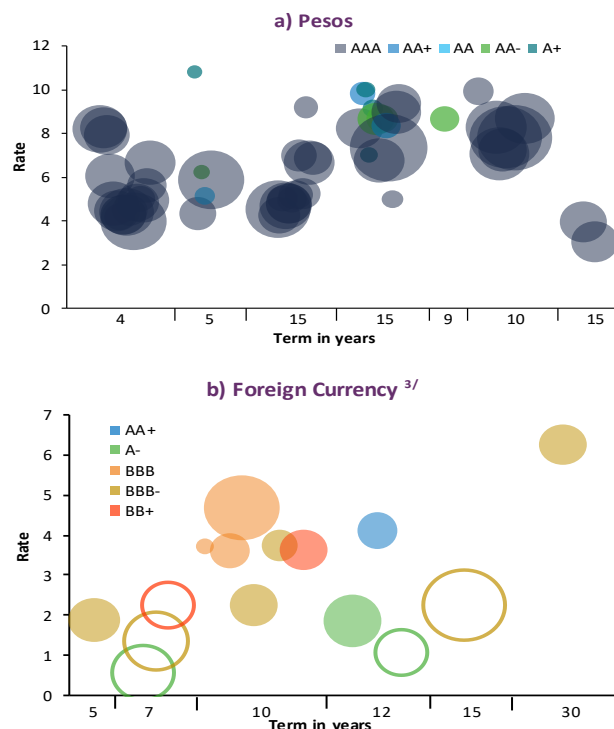
Data as of March 2022
Source: Green Finance Advisory Board
1/ Nominal value.
2/ The size of the bubble is the amount placed by term in millions of Mexican Pesos.
3/ The solid color are the issues in US Dollars and the color on the edge of issue in Euros.

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[80] https://www.ifrs.org/news-and-events/news/2022/03/issb-delivers-proposals-that-create-comprehensive-global-baseline-of-sustainability-disclosures/

On May 2, 2022, the Federal Government held the Federal Development Bonds (BONDES-G) auction at a variable interest rate aligned to environmental, social, and corporate governance criteria in the amount of 20 billion pesos. It must be pointed out that on settling these instruments, on May 4, the main purchasers of this issue were banking institutions with approximately 47% of the amount placed, and investment funds with almost 36% of the issue amount.

VI. Stress tests and recovery plans

VI.1. Credit stress tests

Stress tests are exercises conducted by Banco de México as part of its functions to promote the sound development of the financial system. The purpose of the exercise is to evaluate the commercial banking institutions' resilience to adverse, severe, but plausible macroeconomic and financial scenarios that may affect their financial intermediation performance.

This edition of the *Report* evaluated the impact that the materialization of four sets of macro-economic scenarios would have,[81] consistent with the macro-financial risks explained in this document. The exercise also considers three sets of historical scenarios that measure the resilience of the banking system when faced with scenarios similar to the crisis episodes that the Mexican economy has faced in the past.

The results of this exercise indicate that the financial system is resilient to shocks consistent with the scenarios considered. In terms of solvency, the system's CAR remains above the minimum regulatory level. The system's leverage ratio is also above the minimum regulatory levels. Regarding the impact of loan concentration, the system continues to be resilient, although the results are slightly less favorable.

It is important to highlight that these scenarios do not represent a forecast of the expected performance of the economy, and neither should they be associated with a probability of occurrence. Therefore, the exercise must be judged bearing in mind that it is a counterfactual and partial equilibrium simulation to identify, analyze and evaluate potential weaknesses of the banking system as a whole.

Scenario A: Tightening of global financial conditions

The first set of trajectories analyzed is consistent with a significant tightening of the global financial conditions as a result of the accelerated adjustments in the monetary policy stance of various economies faced with global inflationary pressures. In this environment, international financial markets would register episodes of high volatility that could lead to changes in risk premiums, thereby generating adjustments in portfolios and affecting capital flows to the domestic economy. Additionally, in this scenario, corporate and household financing costs would also increase, which may affect the banking system's capitalization level and lead to a decrease in the credit growth rate, which would in turn pressure the bank's income generation capacity.

Scenario B: Lower global growth

The second set of trajectories corresponds to a lower than expected economic growth as a result of supply chain disruptions associated with a significant new outbreak of COVID-19 cases in China and the intensification of the military conflict between Russia and Ukraine. In this set of trajectories, these factors may affect the domestic economy's recovery, thereby increasing unemployment levels and leading to a possible exchange rate depreciation. World economic deceleration would also increase the financial markets' volatility. In this set of trajectories, lower economic growth, together with greater financial market volatility, may affect credit growth and increase the bank's default indexes, thus affecting its income and capital.

Scenario C: Weakening of domestic consumption and investment

The third set of trajectories reflects the prolonged and accentuated weakening of domestic consumption and investment. This situation would have repercussions on employment levels and households' income, as well as on companies' economic outlooks. Moreover, interest rates and the exchange rate remain stable in the short

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[81] The variables modeled in the scenarios are derived from a set of simultaneous shocks in all the variables. In Scenario set A, the shocks fluctuate between -1.7 and 3.46 standard deviations from their historical values. The shock of 3.46 standard deviations relates to the exchange rate and the shock of -1.7 relates to the annual growth of the Global Economic Activity Index (GEAI). Scenario set B covers shocks between -1.54 and 3.44 standard deviations for all variables. A shock of 1.93 standard deviations stands out in performance, a shock of 3.44 standard deviations in the exchange rate, and a shock of -1.54 can be noted in the annual growth of

the GEAI. In Scenario set C, the shocks vary between -1.49 and 1.82 deviations. Shocks of 1.2 standard deviations in performance, 1.82 standard deviations in the exchange rate and -1.49 in the annual growth of the GEAI are relevant. Finally, in Scenario set D, the shocks for all variables fluctuate between -1.64 and 3.46 standard deviations, with a shock of 1.36 standard deviations in performance, 3.46 standard deviations in the exchange rate and -1.64 in the average growth of the GEAI standing out. The shocks described for the annual growth of the GEAI are between 1 and 2.5 standard deviations below the historical deviation.

and medium terms and inflation is converging to its target in the medium-term. Low-interest rates, together with economic deceleration, are factors that may affect banks' balance sheets.

Scenario D: Adjustment in credit ratings

Finally, the fourth set of trajectories is consistent with possible adjustments in the sovereign and Pemex credit ratings as a result of the negative outlook that certain rating agencies have on the debt of these issuers. This would cause increased volatility in the domestic financial markets, which would cause a depreciation in the exchange rate, greater risk premiums, and therefore, upward pressure on interest rates. Furthermore, there would be a contraction in aggregate demand that would lead to a lower output level and greater unemployment. In the environment previously described, credit growth and portfolio risk would be affected, which would in turn affect banks' income generation mechanisms.

Historical Scenarios

The resilience of the banking system was also evaluated against three historical scenarios that replicate the magnitude of the shocks and the evolution of the main macro-financial variables during the 1995 crisis (Scenario H1), the global financial crisis of 2008 (Scenario H2), and the global financial volatility episode of May 2013 (Scenario H3) around the normalization of the US Federal Reserve's monetary policy, known in the media as *taper tantrum*.

Methodological considerations

The different sets of scenarios used in the exercise were generated based on the same methodology described in previous editions of the *Report*.[82] The scenarios are generated using a vector autoregression (VAR) econometric model based on the central trajectory that reflects the evolution of the main macroeconomic and financial variables on a 36-month horizon (from April 2022 to March 2025). This model generates random and simultaneous shocks that affect the central trajectory of the macro-financial variables, maintaining the internal consistency of the covariances and the dynamics of the variables. It is important to mention that the occurrence of extreme events arising from the effects of feedback from the financial sector to the real sector, from the simultaneous interaction of the shocks of the different

scenarios, and/or from non-linear effects may be underestimated.

Based on the scenarios generated, the possible market risks that may be incurred by the banking institutions in the stress scenarios were estimated by contemplating the effects of financial contagion that would potentially increase the magnitude of the shock throughout the interbank network.

An econometric model is also used to estimate the effect that a macroeconomic shock would have on the probabilities of default of the credit portfolio, the constitution of reserves, and the dynamic of each bank's credit portfolio.

In the exercise, differentiated effects are considered for the level of risk of each economic sector for the credit portfolios of private non-financial companies. The risk differentiation is based on the sectoral economic growth and its delinquency rates. This partition of the portfolio allows the evaluation of the impact that exposure would have on the sectors of greater risk in the banks' capital.

The exercise also measures the concentration risk in the credit portfolio by applying a simulation process of low-probability and high-severity events, which enables the estimation of the impact that default by large creditors who have credit ratings would have on the capital levels of the system.

Once the impact on the bank's portfolio has been evaluated, the effect on operating income and solvency is calculated. To do this, the financial margin is estimated by applying elasticities to the interest rates of the assets and liabilities of each bank with regard to the treasury certificate (*Cetes*, its acronym in Spanish) rate. Moreover, non-financial income and administration costs are modeled assuming that both are proportional to the credit portfolio of each bank. Finally, taking operating income, market losses, contagion, and credit losses into account, the absorption capacity of shocks and the evolution of the net capital of the banking system is evaluated for each scenario.

The simulation does not consider reactions or changes in the behavior of the banking institutions and the regulators in the occurrence of stress events. In other words, banks do not adjust their derivatives and/or repurchase positions or make capital contributions or

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[82] Please refer to Figure 3 Stress Tests Methodology, published in the *December 2019 Financial Stability Report.*

changes in their business strategies. For their part, regulators do not take any corrective measures nor offer any facilities that may mitigate the shock. This is why the stress exercise is a counterfactual and partial equilibrium exercise.

Main Results

The results of the stress test show that in all the scenarios simulated, at the end of the time horizon evaluated, the system as a whole maintains capital levels above the minimum regulatory level, plus capital buffers (Graph 149). Moreover, the risk-weighted assets (Graph 150) increased from the second year of the simulation in the seven scenarios of the exercise.

Graph 148
System's Capital Adequacy Ratio (CAR)
a) Scenarios A
Percent
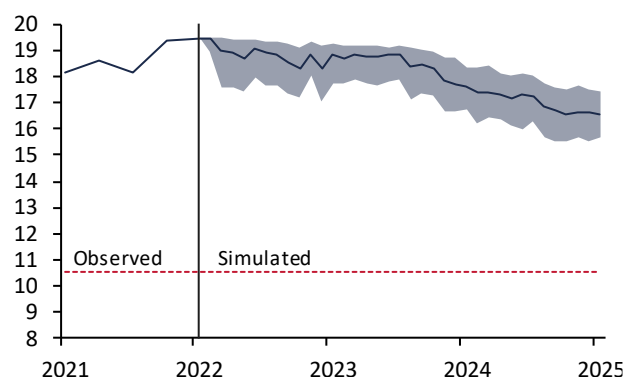
Data as of March 2022 and 3-year simulations thereafter

Source: Banco de México

1/ The horizontal line corresponds to the minimum CAR plus capital supplements.

(b) Scenarios B
Percent

Data as of March 2022 and 3-year simulations thereafter

Source: Banco de México

1/ The horizontal line corresponds to the minimum CAR plus capital supplements.

(c) Scenarios C
Percent

Data as of March 2022 and 3-year simulations thereafter

Source: Banco de México

1/ The horizontal line corresponds to the minimum CAR plus capital supplements.

(d) Scenarios D
Percent

Data as of March 2022 and 3-year simulations thereafter

Source: Banco de México

1/ The horizontal line corresponds to the minimum CAR plus capital supplements.

e) H1
Percent

Source: Banco de México

1/ The horizontal line corresponds to the minimum CAR plus capital supplements.
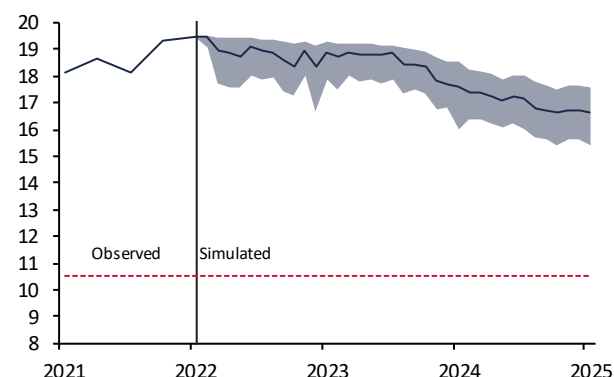
f) H2
Percent

Data as of March 2022 and 3-year simulations thereafter

Source: Banco de México

1/ The horizontal line corresponds to the minimum CAR plus capital supplements.

g) H3
Percent
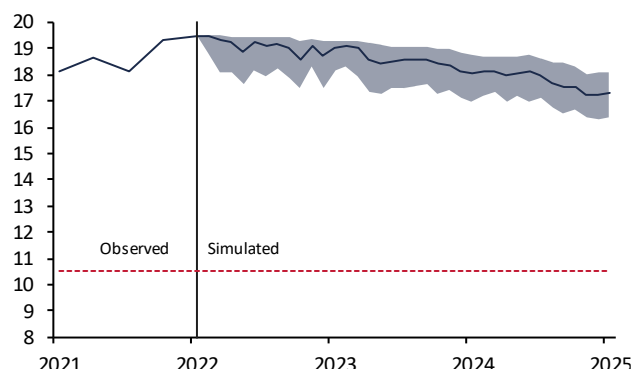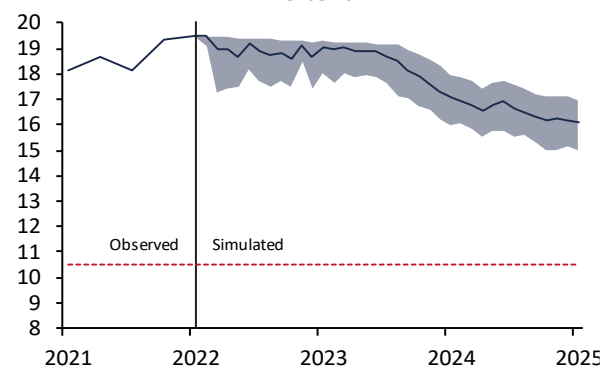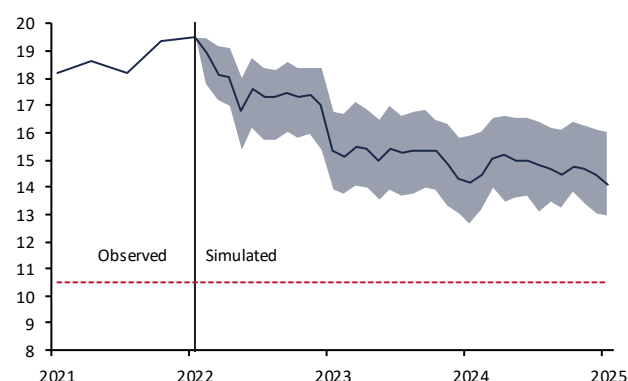

Data as of March 2022 and 3-year simulations thereafter

Source: Banco de México

1/ The horizontal line corresponds to the minimum CAR plus capital supplements.

Graph 149
Evolution of the average net capital of the system
(a) Scenarios A, B, C and D
Million pesos

b) Historical Scenarios
Million pesos

Data as of March 2022 and 3-year simulations thereafter

Source: Banco de México

Graph 150
Evolution of the system's average risk-weighted assets
(a) Scenarios A, B, C and D
Million pesos

(b) Historical scenarios
Million pesos

Data as of March 2022 and 3-year simulations thereafter

Source: Banco de México
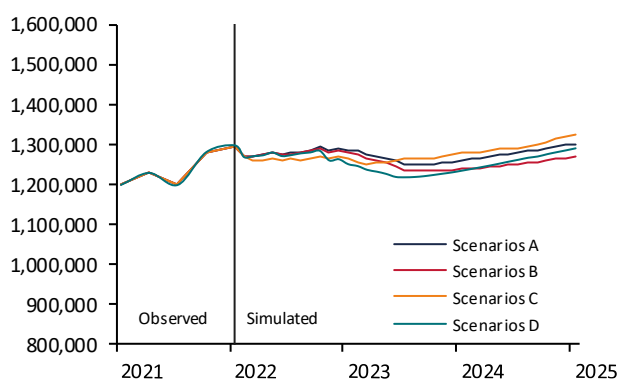
It is relevant to highlight that in the extreme scenarios simulated, there are some banking institutions that had capitalization levels below the minimum regulatory levels (Graph 151) at the end of the exercise; however, these banks represent a low percentage of the system's

assets. In scenarios A, C, and D, the institutions that would complete the exercise with a capital ratio below 8% represent 5.32% of the system's assets, whereas in the scenario, this percentage is 4.1%.

The shocks simulated affect the banking system's levels through an increase in the default probabilities (Graph 152). The increase in delinquency rates also has an adverse effect on banks' capital.

The materialization of default of the largest borrowers in the system may have an adverse effect on the banks. In this vein, the results show that in the seven scenarios simulated, the system's average CAR is lower than that of the exercise that does not consider this element. On average, when considering the effect of concentration, the CAR in the balance scenarios is 3.93 points lower and the CAR in the historical scenarios is 5.62 points lower than in the simulations that do not consider this effect (Graph 153). Only in the scenario that simulates the 1995 crisis shock, the CAR would be below the minimum level (plus capital buffers) of 10.5% in the lower tail, although on average they would remain above that level.

Graph 151
Distribution of the average CAR at bank level at the end of the test[1]
Percent
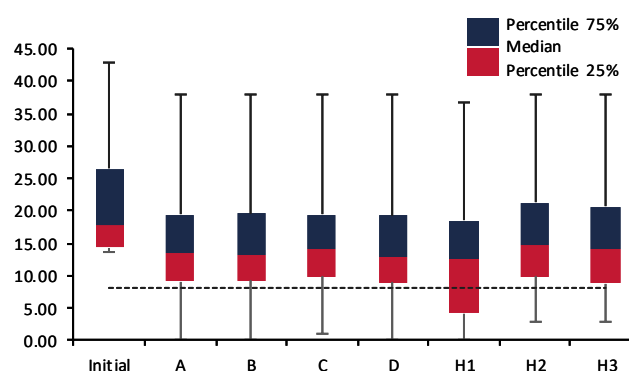
Data as of March 2022 and 3-year simulations thereafter

Source: Banco de México

1/ The dotted horizontal line corresponds to the minimum ICAP without considering capital supplements. In the box and arms diagram, the arms represent 10 and 90% of the distribution.

Graph 152
Average probabilities of default of the system's credit portfolio
Weighted by the current portfolio of each bank, percent
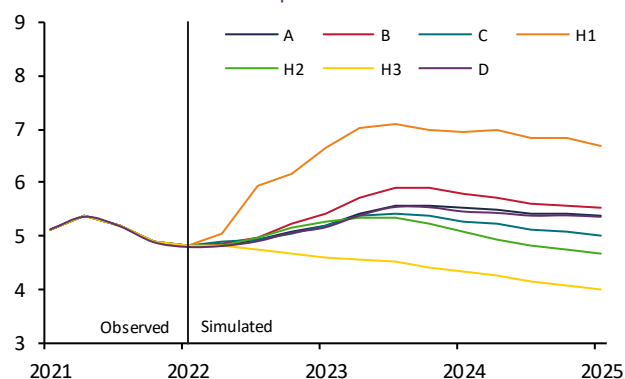
Data as of March 2022 and 3-year simulations thereafter

Source: Banco de México

Graph 153
Average CAR of the system considering an impact per concentration corresponding to 99% of the losses[1]
(a) Scenarios A, B, C and D
Percent

(b) Historical scenarios
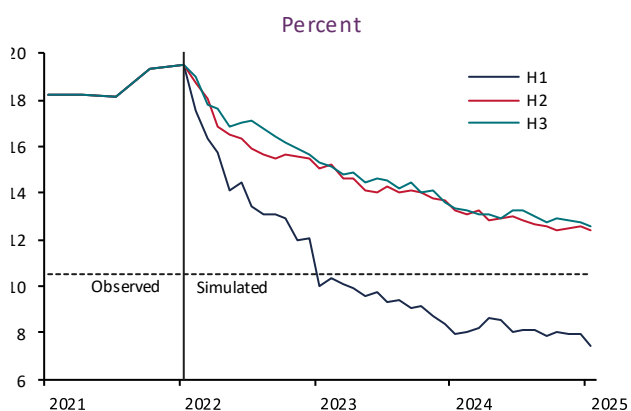
Percent

Data as of March 2022 and 3- year simulations thereafter

Source: Banco de México

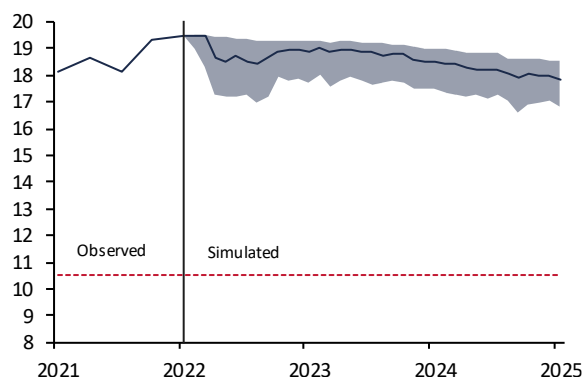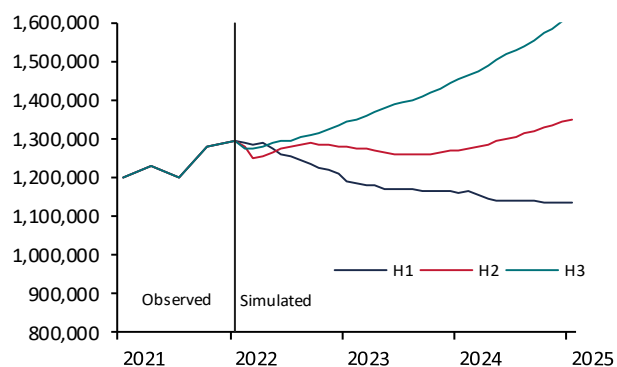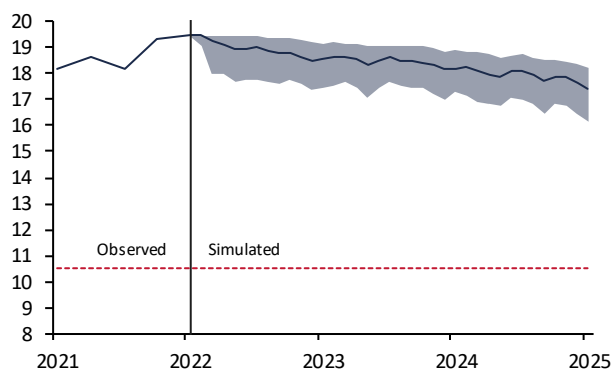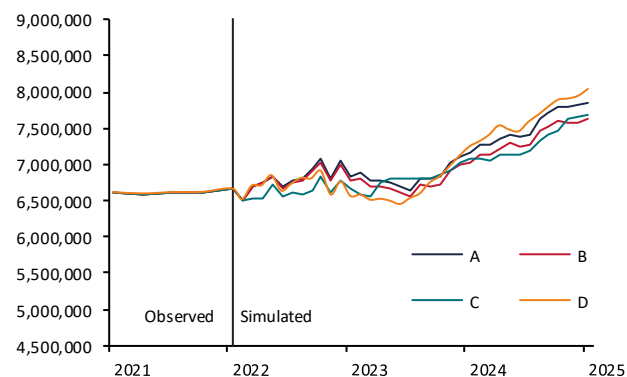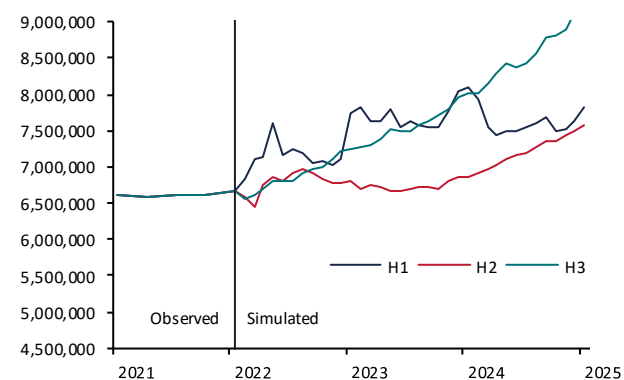1/ The horizontal line corresponds to the minimum CAR plus capital supplements.

Graph 154
Average leverage ratio of the system
(a) Scenarios A, B, C and D

Percent
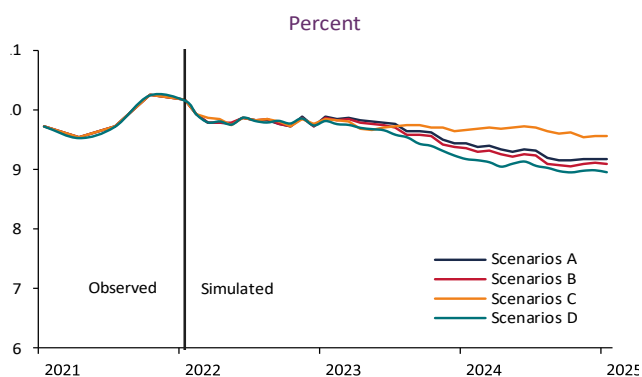
Data as of March 2022 and 3-year simulations thereafter

Source: Banco de México
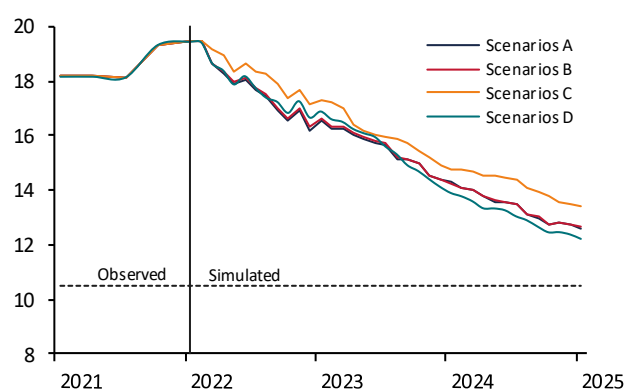
(b) Historical scenarios
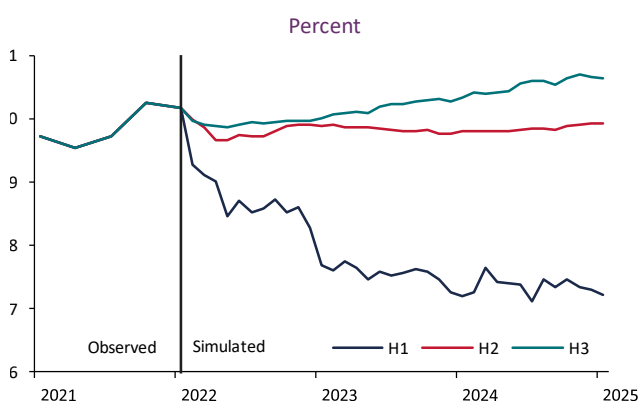
Percent

Data as of March 2022 and 3-year simulations thereafter

Source: Banco de México

Graph 155
Average CAR and leverage ratio in stress scenarios
Percentage of system assets
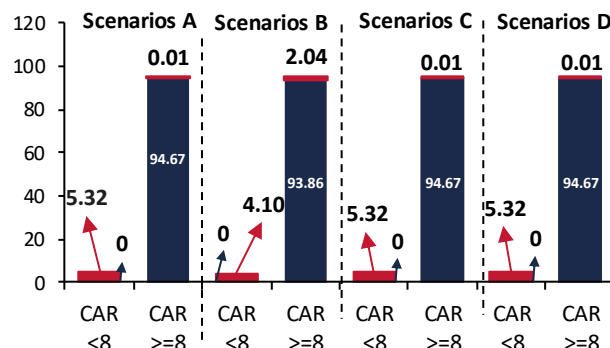
Data as of March 2022 and 3- year simulations thereafter
Source: Banco de México

The exercise also estimates the effect that the scenarios would have on the banking institutions' leverage ratios. In all the scenarios simulated, the system's average was above the regulatory minimum of 3% (Graph 153); however, some banks would finish the exercise at levels below the regulatory minimum. Also, most of the institutions with CARs above the regulatory minimum tend to have leverage ratios greater than 3% (Graph 155).

In summary, the stress exercises suggest that the Mexican banking system has sufficient levels of capital to face the adverse scenarios simulated. Nonetheless, certain banking institutions would end up with levels of capital below the regulatory minimum, although the aforementioned institutions represent a low percentage of the system's assets. The results also show that the concentration risks in corporate portfolios may generate additional pressures on the system's capital. The system's leverage levels also remain above the regulatory minimum. Finally, it is worth mentioning that the results do not contemplate the possible mitigation actions that may be adopted by the banks considered in the test. Therefore, the exercises must be considered at the aggregate level and not necessarily for the particular banking institutions.

VI.2. Liquidity stress tests

According to the liabilities coverage horizon, as of April 2022, most of the banks are able to cover their liabilities within a period of 30 days considering only their stock of liquid assets (Graph 156). The liabilities coverage horizon serves as an indication of the institutions' capacity to face stricter stress scenarios than those considered in the Liquidity Coverage Ratio (LCR) since it

does not consider the cash inflows that the institution is expected to receive.

Graph 156
Percentage of banks that could meet their obligations in an extreme stress scenario for different time horizons [1]
Percent
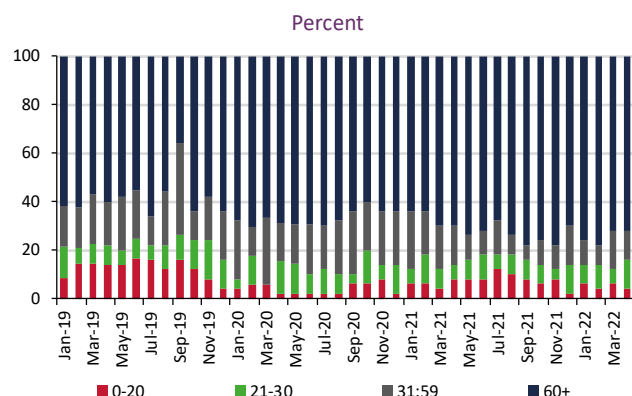
Data as of April 2022

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.

VI.3. Stress tests of physical risks associated with climate change

Although the framework for analyzing climate risks is still in the development phase, one of the expected consequences from of climate change is the more frequent materialization and greater severity of extreme climate events. Therefore, it is important to evaluate the resilience of the financial system against these types of shocks and be able to quantify their impact.

Consequently, Banco de México, assisted by the United Nations Environment Program in Mexico (UNEP-Mexico) developed a stress exercise triggered by extreme climate events.

Mexico is exposed to the occurrence of this type of events at a relatively high frequency, due to its characteristics and geographical location. The occurrence of phenomena that triggers a disaster declaration is frequent and it is important for the authorities to have an estimate of the magnitude of the damage of these events could have ion the financial system.

In this regard, firstly, it is important to note that although there is a high correlation between climate change and the occurrence of extreme meteorological events, strictly speaking, this analysis is not a climate stress exercise. Secondly, due to their characteristics, the impact of these types of shocks is usually less severe

than the scenarios considered in macrofinancial stress exercises.

Despite these limitations, this exercise is an initial approach to assess the impact of climate-related risk in the financial system, in order to identify risks, quantify their potential impact, and contribute to the compliance of Banco de Mexico's mandate to promote the financial system's sound development.

It is also worth mentioning that this exercise follows the same logic as all stress exercises: evaluating the resilience of the system against adverse and severe, but plausible shocks. In this case, the shock that triggers the possible stress event is an extreme climate event and its severity consists of the simultaneous occurrence of several extreme meteorological events

The exercise consisted of three parts: determining the characteristics of the climate shock that may put the financial system at risk, estimating direct losses, and through an estimate of the effect that the shock may have on the main macrofinancial variables, estimating the potential losses by applying the stress test methodology. In other words, this test is similar to the conventional stress exercises apart from three important differences: first, in the narrative of the scenario, the shocks are extreme climate events and not shocks to macrofinancial variables. Second, for the solvency analysis, banks start from a position of further weakness due to the losses assumed by the direct impact of the shock. And finally, given that these shocks may be considered as independent events from macrofinancial shocks, the results are reported as relevant changes to a base scenario.

The narrative of the initial shock only considered hydrometeorological events. Within these types of phenomena, National Disaster Prevention Center´s (*Cenapred*, its acronym in Spanish) information was used to locate which events had caused the greatest economic damage recently; so, the scenario would be the simultaneous occurrence of similarly destructive events.

The next step was to estimate the initial impact of these shocks. For that, the following assumptions were made: Direct losses would only occur in the sectors vulnerable to risks of hydro-meteorological events and in those states in which the event occurred. Losses in the vulnerable sectors of the credit portfolio would be proportional to the losses recorded by the *Cenapred*. The impact on the capital and the assets of each bank was calculated considering these losses.

Finally, it was estimated that the impact on the GDP would correspond to a fall of one percentage point

(Scenario C1)[83]. Also, to evaluate a greater impact, the results are reported assuming a 2% fall in the GDP (Scenario C2). The results are reported as follows.

VI.3.1. Main results

Since these shocks are independent to those modeled in the macro-financial scenarios, and that the severity of the losses is lower in comparison to those observed in these scenarios, the results of this exercise are reported in comparison with the levels that would be observed in a base scenario in which the trajectories would not suffer adverse shocks. That is, instead of the results showing the level of the banking indicators, they reflect the difference in the variables in terms of this base scenario. This allows us to interpret the losses as being additional to other scenarios in case they occur simultaneously.

The results of the first scenario show a drop of 0.55 percentage points in CAR with respect to the baseline scenario, whereas, in the second scenario, the decrease is 0.78 percentage points (Graph 157). However, it is important to emphasize that certain banking institutions would incur reductions in their capitalization levels greater than those in the base scenario (Graph 158).
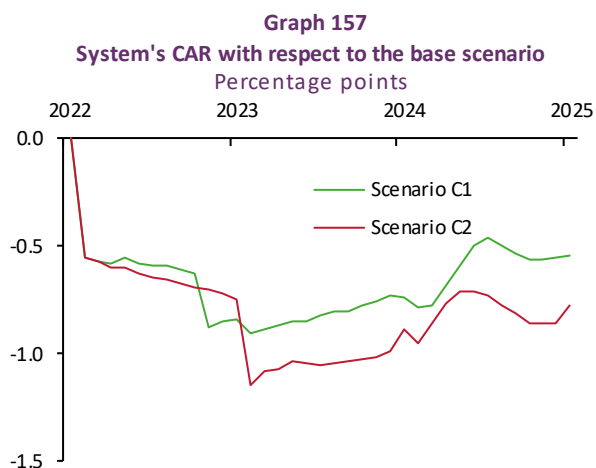
Graph 157
System's CAR with respect to the base scenario
Percentage points

Data as of March 2022 and data at the end of the stress horizon
Source: Banco de México

Graph 158
Distribution of banks' capitalization index in relation to the baseline scenario
Percentage points
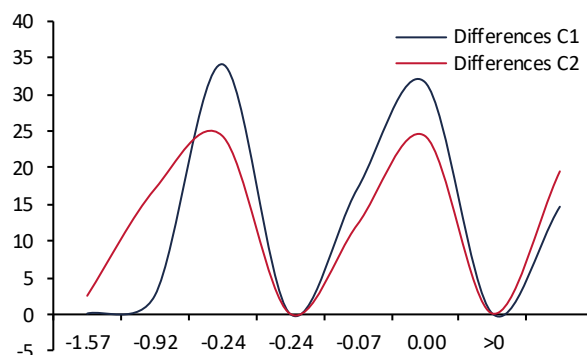
Data as of March 2022 and data at the end of the stress horizon
Source: Banco de México

Moreover, in the first scenario, there is a decrease in risk-weighted assets of 2.64%, and in the case of the second scenario, the percentage is 5.46% (Graph 159). These decreases are heterogeneous in the different institutions and in both scenarios (Graph 160).

Graph 159
Risk-weighted assets of the system with respect to the base scenario
Percent
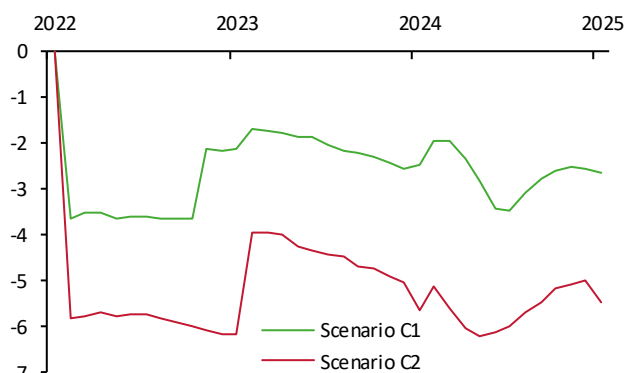
Data as of March 2022 and data at the end of the stress horizon
Source: Banco de México

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[83] For example, the Regional Economies Report of April-June 2018 estimates that the regional impacts of these type events on economic activity are significant, although a relatively quick recovery has also

been observed. An additional stress element considered in this exercise is that the subsequent recovery from shocks is slower than estimated in the aforementioned Report.

Graph 160
Distribution of banks' risk-weighted assets relative to the baseline scenario
Percentage points

Figures as of March 2022 and data at the end of the stress horizon
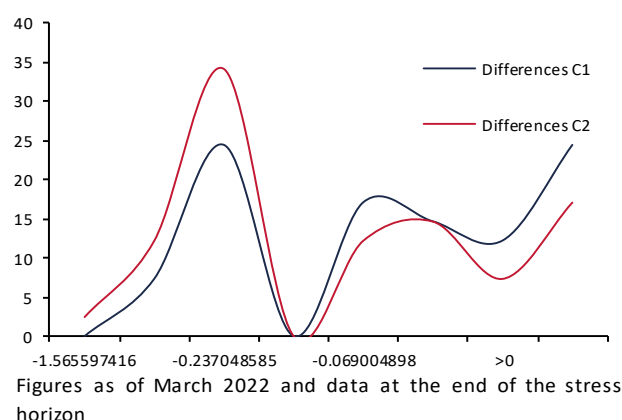
Source: Banco de México

In summary, extreme climate events may lead to additional risks to the Mexican banking system by affecting its institutions' capitalization levels and risk-weighted assets, although, up to now, with a moderate impact. However, despite the lower severity of the scenarios, there are institutions whose credit concentration in high-risk regions or sectors could have greater losses. In conclusion, the climate scenarios presented in this *Report* allow us to measure, although to a limited extent, the financial system's exposure to hydrometeorological risks and sets the benchmark to evaluate other types of physical risks.

VI.4. Recovery plans

Among the crisis preparedness and risk management tools, the regulatory framework requires commercial banking institutions to have recovery plans in place. These plans must identify the actions that banks could implement to reestablish their financial situation against adverse scenarios that may affect their liquidity or solvency.

During the review cycle of the plans submitted during 2020 and 2021, the most relevant requirements established in Annex 69 of the Single Banking Circular (*CUB*, its acronym in Spanish) showed improved compliance. Compared to the previous review cycle, the corrective action plans improved the substance of the recovery actions triggered if the indicators exceed the thresholds set by the institutions, including execution times and costs, as well as, their congruence with other plans and manuals (Graph 161).

Graph 161
Compliance with section IV of Annex 69 of the CUB: Description, evaluation and activation of recovery actions
Percent
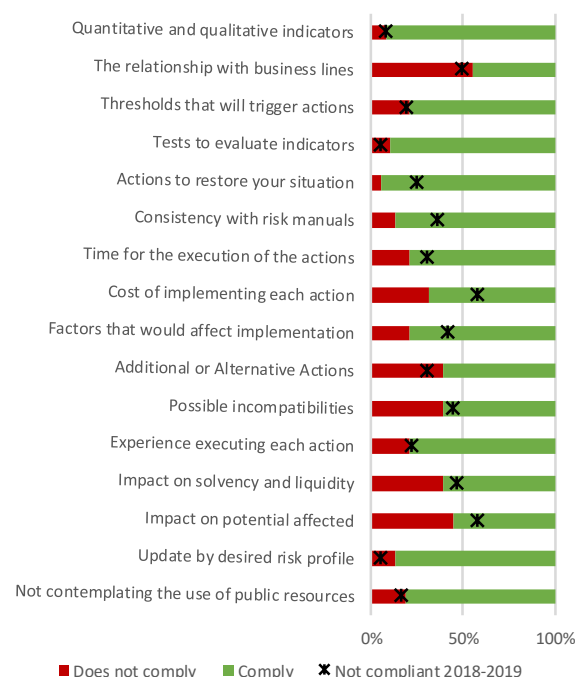
Data of plans delivered as of December 2021

Source: Banco de México

Also, during the first quarter of 2022, most institutions maintained observed levels of their CAR and LCR above its activation threshold set in their recovery plans, for the different banking groups (Graph 162).

As per the number and type of recovery actions considered by each institution, it is worth mentioning that these are related to, among other factors, the size of the institution, its monitoring capacity, and the business lines it operates. The recovery actions considered in the recovery plans are crucial for the success of the plan, as such, they must be tailor-made for each institution and situation for them to be feasible and effective in restoring the institution's financial situation during stress events.

Graph 162
Activation thresholds and observed data
of CAR and LCR [1]
Percent

CAR

─ Early Warning   ─ Activation Trigger   □ Average 1Q-2022

LCR

─ Early Warning   ─ Activation Trigger   □ Average 1Q-2022
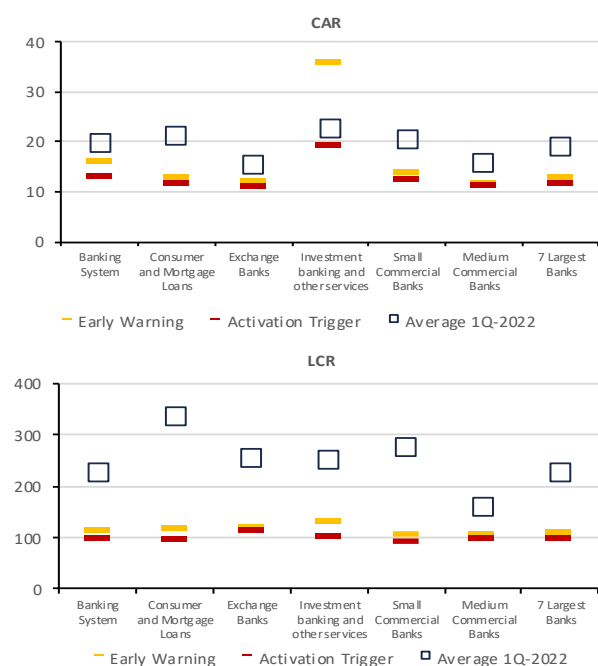
Data of CAR and LCR from January to March 2022.

Source: Banco de México and CNBV

1/ The averages of thresholds and data observed by type of institution are presented. The most recent threshold available is considered. For the observed data, capped averages are presented due to scale issues, the LCR is capped to 350 and the CAR is capped to 25.

The institutions must continue working to increase the credibility and feasibility of their corrective actions, as well as update their recovery plans regularly and integrate them into their comprehensive risk management processes. Therefore, the institutions must ensure that these documents are known by the areas involved in their execution and even consider holding drills.

VII. Final considerations

Since December 2021, the Mexican financial system has maintained a solid and resilient position. In particular, commercial banks have capital and liquidity levels that amply comply with the regulatory minima. However, the Mexican financial system faces relevant challenges in the light of the current situation, which combines the remaining effects of the COVID-19 pandemic with the new challenges arising from the conflict between Russia and Ukraine and the tightening of financial conditions given the withdrawal of the monetary stimulus in several economies as a result of the global inflationary pressures.

During the first half of 2022, economic activity has recorded a sharper-than-expected slowdown and the IMF's growth estimates for the world economy were significantly downgraded for 2022 and to a lesser extent for 2023. This is a result of the persistence of bottlenecks in the global supply chains, the ongoing negative effects of COVID-19 and the increased geopolitical tensions caused by the war between Russia and Ukraine. Against this backdrop, global inflation continued to increase, particularly due to energy and food prices. This is the result of the recovery in the demand side, the persistence of bottlenecks in the supply side, as well as additional pressures on commodities' prices as a result of the conflict.

In this context, it is advisable to continue following up on the weaknesses and the imbalances that may originate in the financial system because certain external and internal risks persist, and going forward, they may intensify and thus affect the correct operation of the financial system. Thus, this *Report* considers the following macro-financial risks to financial stability: i) a faster tightening of global financial conditions, given the monetary policy adjustments implemented in several economies, in response to more persistent global inflationary pressures, ii) lower-than-expected global economic growth, with implications for the post-pandemic recovery, iii) a prolonged and more accentuated weakness in domestic consumption and investment, and iv) possible adjustments in sovereign and Pemex's credit ratings.

Stress tests were conducted for the Mexican banking sector based on these risks. From the results of this exercise, it can be concluded that the banking sector as a whole has the capital levels that would allow it to face the different simulated adverse macroeconomic and financial scenarios. However, at the individual level, some banking institutions that represent a small percentage of the total assets of the system may face difficulties to maintain the minimum capitalization levels required by the regulations.

Further, the banking system's current capital and liquidity levels, as well as the main risks faced, could enable the prudent expansion of banking credit as credit granting continues without recording any robust general reactivation. Therefore, an important challenge going forward continues to be to maintain financial stability in an internal environment of credit reactivation that promotes greater economic growth.

Certain weaknesses and risks that increased from the pandemic have been reduced, including the liquidity, credit, and contagion risks for the banking system, whereas the market risk has increased in the margin. The risks for other financial intermediaries have remained, for the most part, within contained levels. It must be mentioned that this sector has a small participation in the system as a whole; therefore, it does not represent a potential systemic risk. However, financial intermediaries continue to face challenges in the current economic environment in which the financing granted by this segment is contracting, in part as a result of the effects of the pandemic and the slow recovery of the economy.

It must be emphasized that during the period covered by this *Report*, the liquidity and financing measures implemented by the authorities in response to the COVID-19 pandemic concluded. These measures contributed to ensuring a more orderly market behavior during the most critical period of the pandemic. Since their announcement, these measures granted resources and regulatory exemptions that provided additional support to financial intermediaries, thus fostering their orderly operation, even for those who did not make direct use of the facilities.

Banco de México will continue to monitor the evolution of financial markets in Mexico, and take the necessary actions, in strict compliance with the 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

Heat map of the Mexican financial system

Holding of government securities	
Holding of Cetes	
Holding of M-bonds	
Bond flows	
Stock streams	
Risky Bond Surcharge Relative to Investment Grade Bonds	
Difference between 10-year node and 3-month node	
Difference between the commercial credit rate and the TIIE	
EMBIG Composite	
Price-to-value ratio for Mexbol	
Federal Mortgage Company Index Monthly Change	
Monthly oil price change	
Tail dependency measure of 5-year interest rates	
Tail dependency measure of 10-year interest rates	
Global volatility index	
Local volatility index	
Rate volatility index	
Implied volatility of at-the-money exchange rate options	

Market exposure risk

Leverage of the banking sector
Monthly change in total assets
Banking System Capitalization Index
Monthly change of the HH index of the current portfolio
Monthly change of the HH index of the overdue portfolio
Monthly change of the HH index of consumer credit
Monthly change of the HH index of the commercial portfolio
Monthly change of the HH index of the portfolio of companies
Monthly change of the HH index of the total portfolio
Monthly change of the HH index of housing credit
Probability of default of a loan in the overdue portfolio
Probability of default of a loan in the current portfolio
Average exposure of the interbank network
Average proximity between the nodes of the interbank network
Average percentage of assets under stress given a bank default

Ap. Financial sector

Monthly change in the financial position of households
Debt to voluntary savings ratio
Indebtedness vs. compulsory savings ratio
Debt to Total Savings Ratio
Monthly change in the financial position of companies
External financing to companies/Total financing
Debt issued in Mexico at 12m/Debt issued in Mexico (companies)
Debt issued abroad at 12m/Debt issued abroad (companies)
Interest paid 12m / EBITDA 12m
EBITDA 12m to Revenues 12m

Ap. Non-financial sector

5-year Mexican CDS
Primary Fiscal Balance as a percentage of GDP
Cyclical component of the public sector debt to GDP ratio
Monthly growth in public spending
CDS Pemex 5 years
Inflation
Inflation expectations at the end of the year
Uncertainty index
Current account as percentage of GDP
Monthly change in the real exchange rate
Monthly change in international reserves
Monthly variation Export Price Index
Monthly variation Import Price Index
US output gap
Mexico output gap
Probit index

Macroeconomic risk

Preliminary data as of March 2022.
Source: Banco de México

List of initials and acronyms

Bancomext	*Banco Nacional de Comercio Exterior* (National Foreign Trade Bank)
Banobras	*Banco Nacional de Obras y Servicios Públicos* (National Public Works and Services Bank)
ECB	European Central Bank
BIVA	*Bolsa Institucional de Valores* (Institutional Securities Exchange)
BMV	*Bolsa Mexicana de Valores* (Mexican Stock Exchange)
BONDES	*Bonos de Desarrollo del Gobierno Federal (Federal Development Bonds)*
BPAS	*Bonos de Protección al Ahorro* (Savings Protection Bonds)
CAR	*Capital Adequacy Ratio*
CBFI	*Certificados Bursátiles Fiduciarios Inmobiliarios* (Real Estate Investment Trust Stock Certificate)
CCE	*Criterios Contables Especiales* (Special Accounting Criteria)
CCL	*Coeficiente de Cobertura de Liquidez* (Liquidity Hedging Coefficient)
CCV	*La Contraparte Central de Valores, S.A. de C.V.*
CDS	Credit Default Swaps
CENAPRED	*Centro Nacional de Prevención de Desastres* (National Disaster Prevention Center)
Cerpis	*Certificados bursátiles fiduciarios de proyectos de inversión* (Senior Trust Bonds for Investment Project)
Cetes	*Certificados de la Tesorería de la Federación* (Federal Treasury Bills)
CF	*Costo de captación a plazo en veces tiie 28 días* [28-Day Equilibrium Interbank Interest Rate (*TIIE*) Deposit Cost]
CFE	*Comisión Federal de Electricidad* (Federal Electricity Commission)
CME	Chicago Mercantile Exchange
CNBV	*Comisión Nacional Bancaria y de Valores* (National Banking and Securities Commission)
CNSF	*Comisión Nacional de Seguros y Fianzas* (National Insurance and Bonding Commission)
Conavi	*Comisión Nacional de Vivienda* (National Housing Commission)
Condusef	*Comisión Nacional para la Protección y Defensa de los Usuarios de Servicios Financieros* (National Financial Services Users' Protection and Defense Commission)
Consar	*Comisión Nacional del Sistema de Ahorro para el Retiro* (National Retirement Savings System Commission)
CRLB	*Comité de Regulación de Liquidez Bancaria* (Banking Liquidity Regulation Committee)
BCBS	Basel Banking Supervision Committee
CUB	*Circular Única de Bancos* (Single Banking Circular)
CVAR	Conditional Value at Risk
DRM	*Depósitos de Regulación Monetaria* (Monetary Regulation Deposits)

D-SIBS	Domestic Systemically Important Banks
ESG	Environmental, Social and Corporate Governance
FCA	Financial Conduct Authority
FEIEF	*Fondo de Estabilización de Ingresos para las Entidades Federativas* (State Revenue Stabilization Fund)
FIBRA	*Fideicomisos de infraestructura y bienes raíces* (Real Estate Infrastructure Trust)
FIFOMI	*Fideicomiso de Fomento Minero* (Mining Development Trusts)
FIRA	*Fideicomisos Instituidos en Relación con la Agricultura* (Agricultural Trusts)
FLAO	Additional Ordinary Liquidity Facility
FND	*Financiera Nacional de Desarrollo Agropecuario, Rural, Forestal y Pesquero* (National Farming, Rural, Forestry and Fisheries Development Bank)
FOVI	*Fondo de Operación y Financiamiento Bancario a la Vivienda* (Banking Housing Financing Operation Fund)
Fovissste	*Fondo de Vivienda del ISSSTE* (State Workers' Social Security and Services Institute Housing Fund)
FRTC	*Facilidad de Reporto de Títulos Corporativos* (Corporate Repurchase Agreements Facility)
FSB	Financial Stability Board
IBA	ICE Benchmark Administration
IBOR	Interbank Offered Rate
ICF	*Índice de Condiciones Financieras* (Financial Conditions Index)
ICRCS	Capital Solvency Requirement Hedging Index
ICRT	Technical Reserves Hedging Index
IEMF	Financial Markets Stress Index
IFNB	Non-Banking Financial Institutions
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
Imora	*Índice de morosidad ajustado* (Adjusted Loss Index)
INEGI	*Instituto Nacional de Estadística y Geografía (*National Geographical Statistics and Information Institute)
Infonavit	*Instituto del Fondo Nacional de la Vivienda para los Trabajadores* (Federal Housing Fund)
IOSCO	International Organization of Securities Commissions
ISDA	International Swaps and Derivatives Association
IPYC	*Índice de Precios y Cotizaciones* (Stock exchange index)
IPCC	Intergovernmental Panel on Climate Change
LGOAAC	*Ley General de Organizaciones y Actividades Auxiliares del Crédito* (General Credit Organizations and Auxiliary Activities Law)
LIBOR	London Interbank Offered Rate
LIF	*Ley de Ingresos de la Federación* (Federal Income Law)

LRITF	*Ley para Regular las Instituciones de Tecnología Financiera* (Financial Technology Institutions Regulation Law)
LTV	Loan to Value
MexDer	*Mercado Mexicano de Derivados* (Mexican Derivatives Market)
mipymes	*Micro, pequeñas y medianas empresas* (Micro-, small and medium-sized companies)
Nafin	*Nacional Financiera* (Mexican development bank)
NGFS	Network for Greening the Financial System
NICAP	*Nivel de Capitalización* (Capitalization Level)
OIFNB	*Otros Intermediarios Financieros No Bancarios* (Other Non-Banking Financial Brokers)
PEF	*Presupuesto de Egresos de la Federación* (Federal Expenditure Budget)
Pemex	*Petróleos Mexicanos (Mexican state oil company)*
PRLV	*Pagaré con Rendimiento Liquidable al Vencimiento* (Promissory Notes with Interest Payable on Maturity)
pymes	*Pequeñas y medianas empresas* (Small and medium-sized companies)
RCS	*Requerimiento de Capital de Solvencia* (Capital Solvency Requirement)
RFSP	*Requerimientos Financieros del Sector Público* (Public Sector Financial Requirements)
ROE	Return On Equity
SAR	*Sistema de Ahorro para el Retiro* (Retirement Savings Fund)
SCV	*Seguros de Crédito a la Vivienda* (Mortgage Credit Insurance)
SHCP	*Secretaría de Hacienda y Crédito Público* (Ministry of Finance and Public Credit)
SHF	*Sociedad Hipotecaria Federal* (Federal Mortgage Society)
SHRFSP	*Saldo Histórico de los Requerimientos Financieros del Sector Público* (Historical Public Sector Financial Requirement Balance)
siefores	*Sociedades de inversión especializada en fondos para el retiro* (Pension Funds)
Socaps	*Sociedades cooperativas de ahorro y préstamo* (Savings and Loan Cooperatives)
Sofipos	*Sociedades financieras populares* (Popular Finance Corporations)
sofomes **enr**	*Sociedad financiera de objeto múltiple entidades financieras no reguladas* (Non-Regulated Multi-Purpose Financial Companies)
TIIE	*Tasa de interés interbancaria de equilibrio* (Interbank Equilibrium Interest Rate)
VSM	*Veces Salario Mínimo* (Minimum Salary Multiple)